BASIC STRUCTURE FOR **MECHANICAL ENGINEERING**

Semester I (First year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	BSC	20AC11T	Algebra and Calculus	3	0	0	3
2	BSC	20AC14T	Engineering Chemistry	3	0	0	3
3	HSMC	20AC15T	Communicative English	3	0	0	3
4	ESC	20A311T	Engineering Graphics –I	1	0	4	3
5	ESC	20A511T	Problem solving through C Programming	3	0	0	3
6	BSC	20AC14L	Engineering Chemistry Lab	0	0	3	1.5
7	HSMC	20AC15L	Communicative English Lab	0	0	3	1.5
8	ESC	20A511L	C Programming Lab	0	0	3	1.5
9	MC	20AC16T	Environmental Science	3	0	0	0
						Total credits	19.5

Category	Credits
Basic Science courses	7.5
Engineering science courses	7.5
Humanities and social science	4.5
Total Credits	19.5

Semester II (First year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	BSC	20AC21T	Differential Equations and Vector Calculus	3	0	0	3
2	BSC	20AC24T	Engineering Physics	3	0	0	3
3	ESC	20A321T	Engineering Materials	3	0	0	3
4	ESC	20A322T	Engineering Graphics –II	1	0	4	3
5	ESC	20A323T	Engineering Mechanics	3	0	0	3
6	BSC	20AC24L	Engineering Physics Lab	0	0	3	1.5
7	ESC	20A321L	Engineering Materials Lab	0	0	0	1.5
8	ESC	20A324L	Engineering & IT Workshop	0	0	3	1.5
						Total credits	19.5

Category	Credits
Basic Science courses	7.5
Engineering science courses	12
Total Credits	19.5

Semester III (Second year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	BSC	20AC31T	Partial Differential Equations and Numerical Methods	3	0	0	3
2	ESC		Basic Electrical and Electronics Engineering	3	0	0	3
3	PCC	20A331T	Mechanics of Solids	3	0	0	3
4	PCC	20A332T	Theory of Machinery	3	0	0	3
5	PCC	20A333T	Basic Thermodynamics	3	0	0	3
6	ESC		Basic Electrical and Electronics Engineering lab	0	0	3	1.5
7	PCC	20A331L	Mechanics of Solids Lab	0	0	3	1.5
8	PCC	20A332L	Theory of Machinery Lab	0	0	3	1.5
9	SC	20A335L	Auto CAD	1	0	2	2
						Total credits	21.5

Category	Credits
Basic Science courses	3
Engineering science courses	4.5
Professional core Courses	12
Skill oriented course	2
Total Credits	21.5

Semester IV (Second year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	BSC	20AC41T	Probability and Statistics	3	0	0	3
2	PCC	20A341T	Manufacturing Processes	3	0	0	3
3	PCC	20A342T	Fluid Mechanics and Hydraulic Machinery	3	0	0	3
4	PCC	20A343T	Design of Machine Elements-I	3	0	0	3
5	HSMC	20AC45T	Managerial Economics & Financial Analysis	3	0	0	3
6	PCC	20A341L	Manufacturing Processes Lab	0	0	3	1.5
7	PCC	20A342L	Fluid Mechanics and Hydraulic Machines Lab	0	0	3	1.5
8	PCC	20A343L	CAD Machine Drawing lab	0	0	3	1.5
9	MC	20AC44T	Life Sciences for Engineers	3	0	0	0
10	SC		**Programming I**	2	0	2	2
						Total credits	21.5
Internship 2 Months (Mandatory) during summer vacation							

Category	Credits
Basic Science Courses	3
Professional core Courses	13.5
Humanities and social science including Management courses	3
Skill oriented course	2
Total Credits	21.5

Semester V (Third year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	PCC	20A351T	Applied Thermodynamics	3	0	0	3
2	PCC	20A352T	Machine tools	3	0	0	3
3	PCC	20A353T	Design of Machine Elements-II	3	0	0	3
4	OEC		**Python Programming & Lab**	2	0	2	3
5	PEC	20A35AT	IC Engines	3	0	0	3
		20A35BT	Design and Transmission system				
		20A35CT	Industrial Management				
		20A35DT	Optimization Techniques through MATLAB				
6	PCC	20A351L	Thermal Engineering Lab	0	0	3	1.5
7	PCC	20A352L	Machine tools Lab	0	0	3	1.5
8	SC	20AC51L	Professional Communication	1	0	2	2
9	MC	20AC52T	Constitution of India	3	0	0	0
Summer Internship 2 Months (Mandatory) after second year (to be evaluated during V semester				0	0	0	1.5
						Total credits	21.5
Internship 2 Months (Mandatory) during summer vacation							

Category	Credits
Professional core Courses	12
Professional Elective courses	3
Open Elective Course/Job oriented elective	3
Skill advanced course/ soft skill course	2
Summer Internship	1.5
Total Credits	21.5

Semester VI (Third year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	PCC	20A361T	Heat Transfer	3	0	0	3
2	PCC	20A362T	Metrology & Measurements	3	0	0	3
3	PCC	20A363T	CAD/CAM	3	0	0	3
4	PEC	20A36AT	Automobile Engineering	3	0	0	3
		20A36BT	Design for Manufacturing				
		20A36CT	Non-Destructive Testing				
		20A36DT	Automation & Robotics				
5	OEC	20A36ET	Rapid Prototyping	3	0	0	3
		20A36FT	Industrial Robotics				
		20A36GT	Entrepreneurship development				
		20A36HT	Total Quality Management				
6	PCC	20A361L	Heat Transfer Lab	0	0	3	1.5
7	PCC	20A362L	Metrology& Measurements Lab	0	0	3	1.5
8	PCC	20A363L	CAD/CAM Lab	0	0	3	1.5
9	SC		**Programming II**	1	0	2	2
10	MC	20AC63T	Essence of Indian Traditional Knowledge	3	0	0	0
						Total credits	21.5
Industrial/Research Internship (Mandatory) 2 Months during summer vacation							

Category	Credits
Professional core courses	13.5
Professional Elective courses	3

Open Elective Course/Job oriented elective	3
Skill advanced course/ soft skill course	2
Mandatory course	0
Industrial/Research Internship (Mandatory) 2 Months	-
Total Credits	21.5

Semester VII (Fourth year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	PEC	20A37AT	Operations Research	3	0	0	3
		20A37BT	Turbo machinery				
		20A37CT	Tribology				
		20A37DT	Additive Manufacturing				
2	PEC	20A37ET	Non-conventional sources of energy	3	0	0	3
		20A37FT	Finite Element Methods				
		20A37GT	Unconventional machining process				
		20A37HT	Mechatronics				
3	PEC	20A37IT	Power plant engineering	3	0	0	3
		20A37JT	Mechanical Vibrations				
		20A37KT	Production and Operation Management				
		20A37LT	CNC and Adaptive Control				
4	OEC			3	0	0	3
5	OEC			3	0	0	3
6	HSMC	20AC71T	Universal Human Values II	3	0	0	3
7	SC	20A371L	R & AC	1	0	2	2
Industrial/Research Internship 2 Months (Mandatory) after third year (to be evaluated during VII semester				0	0	0	3
						Total credits	23
Industrial/Research Internship (Mandatory) 2 Months during summer vacation							

Category	Credits
Professional Elective courses	9
Open Elective Course/Job oriented elective	6
Humanities and Social Sciences	3
Skill advanced course/ soft skill course	2
Industrial/Research Internship	3
Total Credits	23

Semester VIII (Fourth year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	PROJ		Project work, seminar and internship in industry	0	0	0	12
Internship (6 months)							
						Total credits	12

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Humanities and Sciences

Title of the Course	Algebra and Calculus
Category	BSC
Course Code	20AC11T

Year	I B. Tech.
Semester	I Semester
Branch	Common to all branches of Engineering

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- This course will illuminate the students in the concepts of calculus and linear algebra
- To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications

Unit 1 Matrices 10

Rank of a matrix by echelon form, Normal form, Solving system of homogeneous and non-homogeneous linear equations, Eigen values and Eigen vectors and their properties.

Learning Outcomes:At the end of the unit, the student will be able to:

- Find the rank, Eigenvalues and Eigenvectors of a matrix (L1)
- Solve systems of linear equations(L3)

Unit 2 Quadratic forms of matrices 8

Cayley-Hamilton theorem (without proof), Finding inverse and power of a matrix by Cayley-Hamilton theorem, Diagonalization of a matrix, Quadratic forms and nature of the quadratic forms, Reduction of quadratic form to canonical form by orthogonal transformation.

Learning Outcomes:At the end of the unit, the student will be able to:

- Apply Cayley-Hamilton theorem to find inverse and power of a matrix (L3)
- Identify special properties of a matrix, such as positive definite, etc., and use this information to facilitate the calculation of matrix characteristics(L3)

Unit 3 Mean Value Theorems & Multivariable calculus 10

Taylor's theorem and Maclaurin's theorem (without proofs) – Simple problems.

Partial derivatives, total derivatives, chain rule, change of variables, Jacobian, maxima and minima of functions of two variables, method of Lagrange multipliers for three variables.

Learning Outcomes:At the end of the unit, the student will be able to:

- Translate the given function as series of Taylor's and Maclaurin's(L2)
- Find partial derivatives numerically and symbolically and use them to analyze and interpret the way a function varies, and utilize Jacobian of a coordinate transformation to deal with the problems in change of variables (L3)
- Acquire the Knowledge of maxima and minima of functions of several variables (L1)

Unit 4 Multiple Integrals 8

Double integrals, change of order of integration, change of variables (Cartesian to polar), areas enclosed by plane curves, evaluation of triple integrals.

Learning Outcomes:At the end of the unit, the student will be able to:

- Extend the definite integral to double and triple integrals in cartesian and polar coordinates(L2)
- Apply double integration techniques in evaluating areas bounded by region(L3)

Unit 5 Special Functions 8

Beta and Gamma functions and their properties, relation between beta and gamma functions, evaluation of definite integrals using beta and gamma functions.

Learning Outcomes:At the end of the unit, the student will be able to:

- Understand the properties of beta and gamma functions and its relations(L2)
- Utilize the special functions in evaluating definite integrals(L3)

Prescribed Textbooks:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons,2011.

Reference Books:

1. B. V. Ramana, Higher Engineering Mathematics, Mc Graw Hill Education.
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers,2013.
3. R.L. Garg Nishu Gupta, Engineering Mathematics Volumes-I &II, Pearson Education
4. H. K. Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Apply the knowledge to solve System of linear equations.	L3
2. Develop the use of matrix algebra techniques that is needed by engineers for practical applications	L3
3. Classify the functions of several variables which is useful in optimization	L4
4. Solve important tools of calculus in higher dimensions and be familiar with 2-dimensional, 3- dimensional coordinate systems	L3
5. Understand the properties of beta and gamma functions and its relations	L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20AC11T.1	3	3	-	-	-	-	-	-	-	-	-	3
20AC11T.2	3	2	-	-	-	-	-	-	-	-	-	3
20AC11T.3	3	3	-	-	-	-	-	-	-	-	-	2
20AC11T.4	3	3	-	-	-	-	-	-	-	-	-	2
20AC11T.5	3	3	-	-	-	-	-	-	-	-	-	2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Department of Humanities and Sciences

Title of the Course	Engineering Chemistry
Category	BSC
Course Code	20AC14T

Year	I Year
Semester	I Semester
Branch	CE & ME

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To acquaint the students with soft and hard water types and softening methods.
- To introduce the basic concepts of electrochemical cells
- To impart knowledge on corrosion and its significance.
- To familiarize the students with engineering materials, their properties and applications

Unit 1 Water Technology 9

Introduction –Hard and Soft water, Estimation of hardness by EDTA Method -Boiler troubles -scale and sludge, priming and foaming, specifications for drinking water, Bureau of Indian Standards(BIS) and World health organization(WHO) standards, Industrial water treatment – zeolite and ion-exchange processes, desalination of brackish water, reverse osmosis (RO) and electro dialysis.

Learning Outcomes: At the end of the unit, the student will be able to:

- list the differences between temporary and permanent hardness of water (L1)
- compare quality of drinking water with BIS and WHO standards. (L4)
- explain the working principles of different Industrial water treatment processes (L4)

Unit 2 Electrochemistry & Corrosion 11

Electrode potential, determination of single electrode potential –Nernst's equation, Reference electrodes - hydrogen and calomel electrodes – electrochemical series and its applications – primary cell, dry or Leclanche cell – secondary cell, lead acid storage cell, nickel-cadmium cell – lithium batteries (Lithium-MnO_2). Fuel cells, Hydrogen-Oxygen fuel cell.
Corrosion: Definition – theories of corrosion, dry corrosion and electro chemical corrosion – factors affecting corrosion.
Corrosion controlling methods: Sacrificial and Impressed current cathodic protection, anodic and cathodic inhibitors

Learning Outcomes:At the end of the unit, the student will be able to:

- apply Nernst equation for calculating electrode and cell potentials (L3)
- demonstrate the corrosion prevention methods and factors affecting corrosion (L3)
- compare different batteries and their applications (L4)

Unit 3 Polymers and Fuel Technology 10

Polymers: Introduction to polymers, functionality of monomers, Mechanism of chain growth and step growth polymerization. differences between thermoplastic and thermo setting resins, Preparation, properties and uses of PVC and Bakelite

Fuels – Types of fuels, calorific value, determination of calorific value of a fuel using bomb calorimeter, numerical problems based on calorific value. Liquid Fuels - refining of petroleum, fuels for IC engines, knocking and anti-knock agents, Octane and Cetane values. Alternative fuels- propane, power alcohol

Learning Outcomes:At the end of the unit, the student will be able to:

- list major chemical reactions that are used in the synthesis of polymers (L1)
- explain different types of polymers and their applications (L2)
- solve the numerical problems based on Calorific value(L3)
- explain different types of fuels and their applications (L4)

Unit 4 Advanced Engineering Materials 10

Composites- Definition, Constituents, Classification- Particle, Fibre and Structural reinforced composites, properties and Engineering applications

Refractories- Classification, Properties, Factors affecting the refractory materials and Applications.

Lubricants- Classification, Functions of lubricants, Mechanism, Properties of lubricating oils and Applications

Building materials- Portland Cement - constituents and manufacture. Setting and Hardening of cement.

Learning Outcomes:At the end of the unit, the student will be able to:

- explain the constituents of Composites (L4)
- illustrate the functions and properties of lubricants (L4)
- enumerate the reactions at setting and hardening of the cement (L1)

Unit 5 Nanomaterials and Smart Materials 10

Nano Materials: Introduction to Nano materials, chemical synthesis of nanomaterials by Sol-gel method, Characterization of nanomaterials by XRD & SEM, Applications of nanomaterials in wastewater treatment, lubricants, and engines.

Smart Materials: Introduction – Types of smart materials-self healing materials. Shape memory alloys and Uses of smart materials

Learning Outcomes:At the end of the unit, the student will be able to:

- summarize the applications of SEM, in surface characterization (L4)
- outline the preparation of nanomaterials (L1)
- distinguish the principles of XRD and SEM (L4)

Prescribed Textbooks:

1. P.C. Jain and M. Jain, Engineering Chemistry, 17/e, Dhanapat Rai & Sons, 2018.
2. Shashi Chawla, A textbook of Engineering chemistry, 3/e, Dhanapat Rai & Co, 2015.

Reference Books:

1. O.G Palanna, Engineering Chemistry, 2/e, Tata McGraw Hill Education Private Limited, 2017
2. B.S Murthy, P. Shankar, A textbook of NanoScience and NanoTechnology, University Press 2013
3. R. Bouhfid, A.K Qaiss, and M. Jawaid, Polymer Nanocomposite based Smart Materials, Elsevier Woodhead Publishing, 2020.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. compare different water analysis and water treatment methods	L4
2. apply the principles of corrosion control and differentiate various cells	L3
3. explain different types of polymers and fuels	L4
4. explain the classification, properties and applications of engineering materials	L2
5. analyze the properties and applications of nano materials and smart materials and distinguish the principles of XRD and SEM.	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20AC14T.1	3	2	-	-	-	-	-	-	-	-	-	2
20AC14T.2	3	2	2	-	-	-	-	-	-	-	-	2
20AC14T.3	3	2	-	-	-	-	-	-	-	-	-	-
20AC14T.4	3	2	2	-	-	-	-	-	-	-	-	-
20AC14T.5	3	2	2	-	-	-	-	-	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Department of Humanities and Sciences

Title of the Course	Communicative English
Category	HSMC
Course Code	20AC15T

Year	I Year
Semester	I Semester
Branch	CE, ME, CSE, AIDAS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
- To focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
- To Help improve speaking skills through participation in activities such as role plays,discussions and structured talks/oral presentations
- To impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays
- To provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

Unit 1 9

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 oneself and others.
Reading: On the Conduct of Life by William Hazlitt; 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: Parts of Speech, Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countable and uncountable; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentences.
Learning Outcomes: At the end of this unit, the student will be able to

- understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information
- ask and answer general questions on familiar topics and introduce oneself/others
- employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information
- recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
- form sentences using proper grammatical structures and correct word forms

Unit 2 9

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: The Brook by Alfred Tennyson; 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, signposts and transition signals; use of articles and zero article; prepositions.
Learning Outcomes: At the end of this unit, the student will be able to

- comprehend short talks on general topics
- participate in informal discussions and speak clearly on a specific topic using suitable discourse markers
- understand the use of cohesive devices for better reading comprehension
- write well-structured paragraphs on specific topics
- identify basic errors of grammar/ usage and make necessary corrections in short texts

Unit 3 9

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: The Death Trap by Saki; Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.
Writing: Summarizing, Paragraph Writing, 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.
Learning Outcomes: At the end of the unit, the student will be able to

- comprehend short talks and summarize the content with clarity and precision
- participate in informal discussions and report what is discussed
- infer meanings of unfamiliar words using contextual clues
- write summaries based on global comprehension of reading/listening texts
- use correct tense forms, appropriate structures and a range of reporting verbs in speech and writing

Unit 4 9

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:Muhammad Yunus; Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.
Writing: Writing structured essays on specific topics using suitable claims and evidence.
Grammar and Vocabulary: Quantifying expressions - adjectives and adverbs; comparing and contrasting; Voice - Active & Passive Voice
Learning Outcomes: At the end of the unit, the student will be able to

- infer and predict about content of spoken discourse
- understand verbal and non-verbal features of communication and hold formal/informal conversations
- interpret graphic elements used in academic texts
- produce a coherent paragraph interpreting a figure/graph/chart/table
- use language appropriate for description and interpretation of graphical elements

Unit 5 9

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: The Dancer with a White Parasol by Ranjana Deve; Reading for comprehension.
Writing: Letter Writing: Official Letters/Report Writing
Grammar and Vocabulary: Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)
Learning Outcomes: At the end of the unit, the student will be able to

- take notes while listening to a talk/lecture and make use of them to answer questions
- make formal oral presentations using effective strategies
- comprehend, discuss and respond to academic texts orally and in writing
- produce a well-organized essay with adequate support and detail
- edit short texts by correcting common errors

Prescribed Textbook:

1. Language and Life published by Orient Black Swan (with CD).

Reference Books

1. English Grammar in Use: A Self Study Reference and Practice Book, Raymond Murphy, Fourth Edition, Cambridge Publications
2. English Grammar and Composition, David Grene, Mc Millan India Ltd
3. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
4. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
5. Raymond Murphy's English Grammar in Use Fourth Edition (2012) E-book
6. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.
7. Oxford Learners Dictionary, 12th Edition, 2011
8. Norman Lewis Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary (2014)
9. Speed Reading with the Right Brain: Learn to Read Ideas Instead of Just Words by David Butler

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English	L3
2. read, scan and skim texts such as literary forms, journalistic articles and scientific readings for comprehension and retention	L2
3. exhibit self-confidence and speak in formal and informal contexts	L3
4. apply grammatical knowledge in speech and writing and formulate sentences with accuracy	L2
5. produce coherent and unified paragraphs with adequate support and detail	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20AC15T.1	-	-	-	-	-	-	-	-	-	3	-	2
20AC15T.2	-	-	-	-	-	-	-	-	-	3	-	2
20AC15T.3	-	-	-	-	-	-	-	-	-	3	-	2
20AC15T.4	-	-	-	-	-	-	-	-	-	3	-	2
20AC15T.5	-	-	-	-	-	-	-	-	-	3	-	2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Mechanical Engineering

Title of the Course ENGINEERING GRAPHICS – I
Category ESC
Couse Code 20A311T

Year I B.Tech
Semester I Semester
Branch ME

Lecture Hours	Tutorial Hours	Practice Hours	Credits
1	0	4	3

Course Objectives:

- To enable the students with various concepts like Dimensioning, Conventions and standards related to working drawing in order to become professionally efficient.
- To introduce fundamental concepts of curves used in engineering, projection of points, lines and planes.
- To impart and inculcate proper understanding of the theory of projections.

Unit 1 Theory: 03
Practice Sessions: 03

Lettering – Geometrical constructions - Curves used in Engineering Practice: Conic Sections– General method only. Special methods: Ellipse – Oblong method, Arcs of circle method, Concentric circles methods - Rectangle method and Tangent method for Parabola - Rectangular Hyperbola.

Learning Outcomes: At the end of the unit, a student will be able to

- Mention the description of a diagram clearly and will be in a position to apply the knowledge of basics learned in Geometrical Constructions wherever applicable
- Understands the concepts of Conic Sections

Unit 2 Cycloidal Curves& Involutes Theory: 02
Practice Sessions: 02

Cycloid, Epicycloid and Hypocycloid (treatment of simple problems)

Involutes – Square, Pentagon, Hexagon and Circle.

Learning Outcomes: At the end of the unit, a student will be able to

- Understands the concept of Cycloidal Curves and the application of industry standards
- Understands the concept of Involutes and the application in industry standards

Unit 3 Orthographic Projections Of Points And Lines Theory: 03
Practice Sessions: 03

Orthographic Projections of Points, Lines-Inclined to one reference plane and Inclined to both reference planes, Finding the True lengths - Traces.

Learning Outcomes: At the end of the unit, a student will be able to

- Understand the Orthographic Projections of Points
- Understand the Orthographic Projections of Lines and are able to improve their visualization skills so that they can apply these skills in developing the new products.

Unit 4 Projections Of Planes Theory: 02
Practice Sessions: 02

Projections of regular Plane surfaces inclined to one reference plane and both reference planes.

Learning Outcomes: At the end of the unit, a student will be able to

- Understand Orthographic Projections of Planes
- Understand and is capable of analysing how a plane object's shape and size in real working environment is changed while the plane is positioned in seeing in different directions orin different angles

Unit 5 Auxiliary Planes Theory: 02
Practice Sessions: 02

Projection of lines and planes using auxiliary planes.

Learning Outcomes: At the end of the unit, a student will be able to

- Understands the Auxiliary Projections of Lines and Planes
- Apply the concepts learned through this topic in the situations where actual shape and size is to be identified for sectioned parts

Prescribed Text Books:

1. Engineering Drawing, N.D. Bhatt, Charotar Publishers
2. Engineering Drawing, K.L. Narayana, P. Kanniah, Scitech Pub

Reference Books:

1. Engineering Drawing and Graphics, Venugopal/ New age.
2. Engineering Drawing, Johle, Tata McGraw-Hill
3. Engineering Drawing, Shah and Rana, 2/e, Pearson Education

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Mention the description of a diagram clearly and will be in a position to apply the knowledge of basics learned in Geometrical Constructions wherever applicable	L1, L2
2. Understands the concepts of Conic Sections	L1, L2
3. Understands the concept of Cycloidal Curves and the application of industry standards	L1, L2
4. Understands the concept of Involutes and the application of industry standards	L1, L2
5. Understand the Orthographic Projections of Points	L1, L2
6. Understand the Orthographic Projections of Lines and are able to improve their visualization skills so that they can apply these skills in developing the new products	L1, L2, L3
7. Understand Orthographic Projections of Planes	L1, L2
8. Understand and is capable of analysing how a plane object's shape and size in real working environment is changed while the plane is positioned in seeing in different directions or in different angles	L1, L2, L3
9. Understands the Auxiliary Projections of Lines and Planes	L1, L2
10. Apply the concepts learned through this topic in the situations where actual shape and size is to be identified for sectioned parts	L1, L2, L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A311T. 1	3	-	-	-	-	3	2	-	1	2	-	-	-	-	-
20A311T. 2	3	-	-	-	-	3	2	-	1	2	-	-	-	-	-
20A311T. 3	3	-	-	-	-	3	2	-	1	2	-	-	-	-	-
20A311T. 4	3	-	-	-	-	3	2	-	1	2	-	-	-	-	-
20A311T. 5	3	2	-	-	-	3	2	-	1	2	-	-	-	-	-
20A311T. 6	3	2	-	-	-	3	2	-	1	2	-	-	-	-	-
20A311T. 7	3	2	-	-	-	3	2	-	1	2	-	-	-	-	-
20A311T. 8	3	2	-	-	-	3	2	-	1	2	-	-	-	-	-
20A311T. 9	3	2	-	-	-	3	2	-	1	2	-	-	-	-	-
20A311T. 10	3	2	-	-	-	3	2	-	1	2	-	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Computer Science and Engineering

Title of the Course	Problem Solving and C programming
Category	ES
Course Code	20A511T

Year	I B. Tech
Semester	I Semester
Branch	Common to CE, EEE, ME, ECE & CSE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- Understanding the steps in problem solving and formulation of algorithms to problems.
- Develop programming skills as a means of implementing an algorithmic solution with appropriate control and data structures.
- Develop intuition to enable students to come up with creative approaches to problems.
- Develop programs using pointers, structures and unions
- Manipulation of text data using files

Unit 1 Problem Solving and Introduction to C 9

Steps to solve problems, algorithm, Pseudo code, Flowchart with examples, Program Development Environments.
Introduction to programming: Programming languages and generations.
Introduction to C: Introduction, structure of C program, keywords, identifiers, Variables, data types, constants, I/O statements, operators, precedence and associatively.
Learning Outcomes: At the end of the unit, the student will be able to:

- Identify situations where computational methods and computers would be useful.
- Approach the programming tasks using techniques learned and writepseudo-code.
- Choose the right data representation formats based on the requirements of the problem.
- Write the program on a computer, edit, compile, debug, correct, recompile and run it.

Unit 2 Introduction to decision control statements and Arrays 9

Selective, looping and nested statements, jumping statements.
Arrays: Introduction, declaration of arrays, accessing and storage of array elements, searching (linear and binary search algorithms) and sorting (selection and bubble) algorithms, multidimensional arrays, matrix operations.
Learning Outcomes: At the end of the unit, the student will be able to

- Use the comparisons and limitations of the various programming constructs and choosethe right one for the task in hand.
- Identify tasks in arrays with different techniques that are applicable and apply them to write programs.
- Design and implement operations on both single and Multidimensional arrays.

Unit 3 Strings and Functions 9

Strings: Declaration and Initialization, String Input / Output functions, String manipulation functions.
Functions: Types of functions, recursion, scope of variables and storage classes.
Preprocessor Directives: Types of preprocessor directives, examples.
Learning Outcomes: At the end of the unit, the student will be able to

- Implement and test the programs on strings using string manipulation functions.
- Analyze programming problems to choose when regular loops should be used and when recursion will produce a better program.

Unit 4 Pointers 9

Pointers: Understanding computer's memory, introduction to pointers, declaration pointer variables, pointer arithmetic, pointers and strings, array of pointers, function pointers, dynamic memory allocation, advantages and drawbacks of pointers.

Learning Outcomes: At the end of the unit, the student will be able to:

- Identify tasks in which the dynamic memory allocation techniques learned are applicable and apply them to write programs, and hence use computers effectively to solve the task.
- Design and develop Computer programs, analyzes, and interprets the concept of pointers and their usage.

Unit 5 Structures and Files 9

Structures: Structure definition, initialization and accessing the members of a structure, nested structures, array of structures, structures and functions, structures and pointers, self-referential structures, unions and enumerated data types.

Files: Introduction to files, file operations, reading and writing data on files, error handling during file operations.

Learning Outcomes: At the end of the unit, the student will be able to:

- Define derived data types and use them in simple data processing applications.
- Develop and test C programs for simple applications using files.

Prescribed Text Books:

3. C Programming and Data Structures. B.A. Forouzan, R. F.Gilberg,Cengage learning, Indian edition.
4. C and Data Structures, E.Balaguruswamy, Tata McGraw Hill.
5. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education.

Reference Books:

1. LET US C, YeswanthKanitkar, Ninth Edition, BPB Publication
2. Byron Gottfried, Schaum's" Outline of Programming with C", McGraw-Hill.
3. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
4. A K Sharma "Computer Fundamentals and Programming", 2nd Edition, University Press, 2018.
5. PradeepDey and Manas Ghosh, "Programming in C", Oxford Press, 2nd Edition, 2017
6. ReemaTharaja "Introduction to C Programming", Second Edition, OXFORD Press, 2015

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Formulate solutions to problems and represent those using algorithms/Flowcharts.	L3
2. Choose proper control statements and use arrays for solving problems.	L3
3. Decompose a problem into modules and use functions to implement the modules.	L4
4. Apply and use allocation of memory for pointers and solve the problems related to manipulation of text data using files and structures.	L3
5. Develop the solutions for problems using C programming Language.	L6

CO-PO Mapping:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A511T.1	1	2	2	3	-	1	-	-	-	-	-	-	3	-	-
20A511T.2	3	3	3	3	3	-	-	-	1	-	-	-	3	-	-
20A511T.3	3	2	1	2	1	-	-	-	1	-	-	2	3	-	-
20A511T.4	2	3	2	2	3	-	-	-	1	-	1	2	3	-	-
20A511T.5	3	2	2	2	2	-	-	-	1	-	-	2	3	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Humanities and Sciences

Title of the Course Engineering Chemistry lab
Category BSC
Course Code 20AC14L

Year I Year
Semester I Semester
Branch CE&ME

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

- To familiarize the students with the basic concepts of chemistry
- To impart training for handling of different instruments.
- To familiarize the students with digital and instrumental methods of analysis
- To expose the students in practical aspects of the theoretical concepts.

List of experiments:

1. Determination of Hardness of a ground water sample by Complexometry.
2. Estimation of active chlorine content in Bleaching powder.
3. Determination of strength of an acid by pH metric method.
4. Determination of Fe (II) in Mohr's salt by potentiometric method.
5. Conductometric titration of Acid mixture against Strong base
6. Estimation of Iron in Cement by Colorimetry
7. Preparation of Phenol-formaldehyde resin
8. Determination of strength of solutions by Conductometry
9. Determination of viscosity of lubricating oil by Red Viscometer 1 & 2
10. Estimation of Ferrous iron by Dichrometry.
11. Determination of copper in by Iodometry.
12. Determination of calorific value of a fuel by bomb calorimeter

Prescribed Text Books:

1. J. Mendham, R.C Denney, J.D Barnes, M. Thomas, B. Sivasankar Vogel's Quantitative Chemical Analysis 6/e, Pearson publishers, 2009.
2. N.K Bhasin and Sudha Rani Laboratory Manual on Engineering Chemistry 3/e, Dhanpat Rai Publishing Company 2009.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Explain the functioning of instruments such as pH meter, conductivity meter and potentiometers.	L4
2. estimate Cr, Fe & Cu and other metals in various compounds	L2
3. analyze the quality of ground water sample and determine physical properties of liquids	L4
4. determine calorific value of different fuel samples and synthesize polymers	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20AC14L 1	3	2	-	-	-	-	-	-	-	-	-	2
20AC14L 2	3	2	-	-	-	-	-	-	-	-	-	2
20AC14L 3	3	2	-	-	-	-	-	-	-	-	-	2
20AC14L 4	3	2	-	-	-	-	-	-	-	-	-	2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Humanities and Sciences

Title of the Course	Communicative English Lab
Category	HSMC
Couse Code	20AC15L

Year	I B. Tech.
Semester	I Semester
Branch	CE, ME, CSE & AIDAS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

1. To learn better English pronunciation
2. To use language effectively in everyday conversations
3. To make formal oral presentations using effective strategies in professional life
4. To be exposed to a variety of self-instructional, learner friendly modes of language learning

Detailed Syllabus:

Pronunciation: 6
Introduction to English speech sounds
Learning Outcome:
At the end of the module, the learners will be able to

- understand different accents spoken by native speakers of English and speak in intelligible way

Listening Comprehension: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.Answering a series of questions about main idea and supporting ideas after listening to audio texts.Listening for global comprehension and summarizing what is listened to.
Learning Outcome:
At the end of the module, the learners will be able to

- Adopt better strategies to listen attentively and comprehend attentively

Speaking 24
Situational Dialogues (Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions - Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.)

Oral Presentations: Formal oral presentations on topics from academic contexts - Formal presentations using PPT slides with graphic elements,deliver an enthusiastic and well-practiced presentation

Describing people and situations (learn new adjectives, practice describing themselves and others, describe objects using proper adjectives, use details in pictures to make predictions orally, describing situations, Integrate and evaluate information presented in diverse media visually and orally
Learning Outcomes:
At the end of the module, the learners will be able to

- speak confidently in formal and informal contexts
- comprehend and produce short talks on general topics
- use specific vocabulary to describe different persons, places and objects

Reading 6
Information Transfer (Studying the use of graphic elements in texts to convey information, reveal trends/ patterns/ relationships, communicate processes or display complicated data.

Learning Outcome:
At the end of the unit, the student will be able to

- Analyze data given in an infographic and write/speak about it

Minimum Requirements:

1. Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.
2. Communication Skills Lab with movable chairs and audio-visual aids with a P.A System, a T. V. an LCD projector, a digital stereo –audio & video system and camcorder etc.

Prescribed Textbook: Lab Manual developed by Faculty Members of AITS Rajampet
Suggested Software:

1. Loose Your Accent in 28 days, CD Rom, Judy Ravin
2. Sky Pronunciation Suite
3. Clarity Pronunciation Power – Part I
4. Learning to Speak English - 4 CDs

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Neutralize their pronunciation of English sounds, and their accent	L3
2. Adopt effective listening skills for better comprehension of English, spoken by native speakers	L2
3. Illustrate themselves in social and professional context effectively	L3
4. Improve their public speaking skills and make technical presentations confidently	L4
5. Describe people and situations using adjectives effectively	L3
6. Assess and Deduct data from graphs/pie charts/tables	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20AC15L/25L-1	-	-	-	-	-	-	-	-	-	2	-	1
20AC15L/25L-2	-	-	-	-	-	-	-	-	-	1	-	2
20AC15L/25L-3	-	-	-	-	-	-	-	-	3	3	-	3
20AC15L/25L-4	-	-	-	-	-	-	-	-	3	2	-	1
20AC15L/25L-5	-	-	-	-	-	-	-	-	1	3	-	3
20AC15L/25L-6	-	-	-	-	-	-	-	-	-	2	-	1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Computer Science and Engineering

Title of the Course	C Programming Lab
Category	ESC
Course Code	20A511L

Year	I B. Tech
Semester	I Semester
Branch	CE, EEE, ME, ECE & CSE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

- Setting up programming environment.
- Develop Programming skills to solve problems.
- Use of appropriate C programming constructs to implement algorithms.
- Identification and rectification of coding errors in program
- Develop applications using a modular programming and Manage data using files.

Minimum number of FOUR programs from each exercise is to be done students

Data Types, constants, Input and Output and expressions

Exercise :(week-1): Data types, Variables, Constants and Input and Output.
Exercise2 :(week-2): Operators, Expressions and Type Conversions.
Learning Outcomes: At the end of the unit, the student will be able to:

- Identify situations where computational methods and computers would be useful.
- Approach the programming tasks using techniques learned and writepseudo-code.
- Write the program on a computer, edit, compile, debug, correct, recompile and run it.

Decision control statements and Arrays

Exercise3 :(week-3): Conditional Statements [two way and multipath].
Exercise4:(week-4):Loop Control Statements.[for, while and do-While]
Exercise5 :(week-5): Unconditioned JUMP Statements-break, continue, go to.
Exercise6 :(week-6): Declaring Arrays, Referencing Arrays, Array Subscripts. Using for loop for sequential Access.
Exercise7:(week-7):Multidimensional Arrays
Learning Outcomes: At the end of the unit, the student will be able to:

- Choose the right data representation formats based on the requirements of the problem.
- Use the comparisons and limitations of the various programming constructs and choosethe right one for the task in hand.
- Identify tasks in arrays with different techniques that are applicable and apply them to write programs.
- Design and implement operations on both single and Multidimensional arrays.

Strings and Functions

Exercise8 :(week-8): String Basics, String Library Functions and Array of Strings.
Exercise9 :(week-9): Simple user defined functions, Parameter passing methods – pass by value, pass by reference.
Exercise10:(week-10):Storageclasses-Auto,Register,StaticandExtern
Exercise11 :(week-11): Recursive Functions, Preprocess or commands.
Exercise12 :(week-12): Array Elements as Function Arguments.
Learning Outcomes: At the end of the unit, the student will be able to:

- Implement and test the programs on strings using string manipulation functions.

- Analyze programming problems to choose when regular loops should be used and when recursion will produce a better program

Pointers

Exercise13:(week-13): Pointers, Dynamic memory allocation and error handling

Learning Outcomes: At the end of the unit, the student will be able to:

- Design and develop Computer programs, analyzes, and interprets the concept of pointers and their usage.
- Identify tasks in which the dynamic memory allocation techniques learned are applicable and apply them to write programs, and hence use computers effectively to solve the task.

Structures and Files

Exercise14:(week-14):Structures

Exercise15:(week-15): File handling

Learning Outcomes: At the end of the unit, the student will be able to:

- Define structure data types and use them in simple data processing applications.
- Develop and test C programs for simple applications using files.

Prescribed Text Books:

1. C Programming and Data Structures. B.A. Forouzan, R. F.Gilberg,Cengage learning, Indian edition.
2. C and Data Structures, E.Balaguruswamy, Tata McGraw Hill.
3. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education.

Reference Books:

1. Let Us C, Yeswanth Kanitkar, Ninth Edition, BPB Publication
2. A K Sharma "Computer Fundamentals and Programming", 2nd Edition, University Press, 2018.
3. Pradeep Dey and Manas Ghosh, "Programming in C", Oxford Press, 2nd Edition, 2017
4. Reema Tharaja "Introduction to C Programming", Second Edition, OXFORD Press, 2015
5. https://www.cprogramming.com/
6. https://www.mycplus.com/tutorials/c-programming-tutorials

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Identify and setup program development environment	L2
2. Implement the algorithms using C programming language constructs	L3
3. Identify and rectify the syntax errors and debug program for semantic errors	L3
4. Solve problems in a modular approach using functions	L4
5. Implement file operations with simple text data	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A511L.1	3	2	-	2	2	-	-	-	2	2	1	-	3		
20A511L.2	2	2	-	-	-	-	-	-	1	-	-	-	3		
20A511L.3	3	3	3	3	-	-	-	-	1	-	-	3	3		
20A511L.4	3	3	3	3	-	-	-	-	-	-	-	3	3		
20A511L.5	3	3	3	3	-	-	-	-	-	-	-	3	3		

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Humanities and Sciences

Title of the Course Environmental Science
Category MC
Couse Code 20AC16T

Year I B. Tech
Semester I Semester
Branch CE, ME, CSE & AIDAS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	0

Course Objectives:

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

Unit 1 Multidisciplinary Nature of Environmental Studies 10

Definition, Scope and Importance – Need for Public Awareness. NATURAL RESOURCES: Renewable and non-renewable resources – Forest resources: Uses, deforestation– Water resources: Uses, floods, drought – Mineral resources: Uses, environmental effects of extracting mineral resources – Food resources: Impacts of overgrazing, problems with traditional agriculture, effects of modern agriculture – Land Resources: Land degradation, soil erosion - Energy resources: Renewable and non-renewable energy resources.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the importance of public awareness.
- Know about the various natural resources.

Unit 2 Ecosystems, Biodiversity and its Conservation 10

Ecosystems: Producers, consumers and decomposers – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem, lake ecosystem.

Biodiversity and Its Conservation: Definition – Value of biodiversity - Hot-spots of biodiversity – Threats to biodiversity – Conservation of biodiversity.

Learning Outcomes: At the end of the unit, the student will be able to:

- Know about the concept of ecosystem.
- Know about the importance of biodiversity.

Unit 3 Environmental Pollution 8

Definition, Causes, effects and control measures of: Air Pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards.

Learning Outcomes: At the end of the unit, the student will be able to:

- Know about the different types of pollution.
- Know about various sources, effects and control measures of pollution.

Unit 4 Social Issues and the Environment 10

Rain water harvesting, Environmental ethics: Issues and possible solutions – global warming, acid rain, ozone

layer depletion – Environment Protection Act – Air (Prevention and Control of Pollution) Act – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act.

Learning Outcomes: At the end of the unit, the student will be able to:

- Know about social issues related to environment.
- Know about importance of environmental acts.

Unit 5 Human Population and the Environment 7

Population explosion – Family Welfare Programmes – Environment and human health – Value Education – HIV/AIDS – Role of information Technology in Environment and human health, Field work – Visit to a local area to document environmental assets.

Learning Outcomes: At the end of the unit, the student will be able to:

- Know about the effects of population explosion.
- Identify the natural assets and their relationship.

Prescribed Textbooks:

1. Perspectives in environmental Studies, Anubha Kaushik and C P Kaushik, New Age International Publishers, New Delhi, 2018.
2. A Textbook of Environmental Studies, Shashi Chawla, McGraw Hill Education, New Delhi, 2017.

Reference Books:

1. Environmental Studies by Benny Joseph, McGraw Hill Education, New Delhi, 2017.
2. A textbook of environmental studies, A Dhinakaran and B Sankaran, Himalaya Publishing House, Mumbai, 2017.
3. Fundamentals of environmental studies, Mahua Basu and S Xavier, Cambridge University Press, New Delhi, 2017.
4. Textbook of Environmental Studies for undergraduate courses, ErachBharucha for University Grant Commission, University press, New Delhi, 2013.
5. A textbook of environmental studies, Vijay kumarTiwari, Himalaya Publishing House, Mumbai, 2017.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Explain how natural resources should be used.	L2
2. Identify the needto protectecosystems and biodiversity for future generations.	L3
3. List out the causes, effects, and control measures of environmental pollution.	L1
4. Demonstrate knowledge to the society in the proper utilization of goods and services.	L2
5. Outline the interconnectedness of human dependence on the earth's ecosystems.	L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20AC16T.1	1	1	-	-	-	3	3	1	-	-	-	3
20AC16T.2	1	2	-	-	-	3	3	1	-	-	-	3
20AC16T.3	-	1	-	-	-	3	3	1	-	-	-	3
20AC16T.4	2	-	-	-	-	3	3	1	-	-	-	3
20AC16T.5	1	-	-	-	-	3	3	1	-	-	-	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Humanities and Sciences

Title of the Course	Differential Equations and Vector Calculus
Category	BSC
Course Code	20AC21T

Year	I B. Tech
Semester	II Semester
Branch	CE, EEE, ME, ECE, CSE & AIDS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To enlighten the learners in the concept of differential equations and multivariable calculus.
- To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

Unit 1 Linear differential equations of higher order with constant coefficients 10

Definitions-complete solution-operator D-rules for finding complimentary function-inverse operator-rules for finding particular integral for RHS term of the type e^{ax}, $\sin ax / \cos ax$, polynomials in x, $e^{ax}\sin ax / e^{ax}\cos ax / e^{ax}x^n$, $x\sin ax / x\cos ax$ -method of variation of parameters.

Learning Outcomes: At the end of the unit, the student will be able to

- Identify the essential characteristics of linear differential equations with constant coefficients(L3)
- Solve the linear differential equations with constant coefficients by appropriate method (L3)

Unit 2 Equations reducible to Linear Differential Equations 8

Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficients, Applications: Electrical Circuits – L-C and L-C-R Circuit problems.\

Learning Outcomes: At the end of the unit, the student will be able to

- Classify and interpret the solutions of linear differential equations(L4)
- Generalize and solve the higher order differential equation by analyzing physical situations(L3)

Unit 3 Partial Differential Equations 8

Formation of PDEs by eliminating arbitrary constants and arbitrary functions, solutions of first order linear and non-linear PDEs using Charpit's method, solutions of boundary value problems by using method of separation of variables.

Learning Outcomes: At the end of the unit, the student will be able to

- Apply the techniques to find solutions of standard PDEs (L3)
- Solve the boundary value problems (L3)

Unit 4 Vector Differentiation 8

Scalar and vector point functions, vector operator Del, Del applied to scalar point functions- Gradient, del applied to vector point functions-Divergence and Curl- del applied twice to scalar point function, vector identities.

Learning Outcomes: At the end of the unit, the student will be able to

- Apply del to Scalar and vector point functions(L3)
- Illustrate the physical interpretation of Gradient, Divergence and Curl(L2)

Unit 5 Vector integration 10

Line integral-circulation-work done, surface integral, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and applications of these theorems.

Learning Outcomes: At the end of the unit, the student will be able to

- Find the work done in moving a particle along the path over a force field(L1)
- Apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals(L3)

Prescribed Textbooks:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons,2011.

Reference Books:

1. B. V. Ramana, Higher Engineering Mathematics, Mc Graw Hill Education.
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers,2013.
3. R.L. Garg NishuGupta, Engineering Mathematics Volumes-I &II, PearsonEducation
4. H. K. Das, Er. Rajnish Verma, Higher Engineering Mathematics, S.Chand.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Solve the differential equations related to various engineering fields	L3
2. Generalize and solve the higher order differential equation by analyzing physical situations	L3
3. Identify solution methods for partial differential equations that model physical processes	L3
4. Understand the physical meaning of different operators such as gradient, curl and divergence	L2
5. Find the work done against a field, circulation and flux using vector calculus	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20AC21T.1	3	3	-	-	-	-	-	-	-	-	-	2
20AC21T.2	3	3	-	-	-	-	-	-	-	-	-	2
20AC21T. 3	3	3	-	-	-	-	-	-	-	-	-	3
20AC21T.4	3	3	-	-	-	-	-	-	-	-	-	2
20AC21T.5	3	3	-	-	-	-	-	-	-	-	-	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Humanities and Sciences

Title of the Course Engineering Physics
Category BSC
Course Code 20AC24T

Year I B. Tech.
Semester II Semester
Branch CE & ME

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To impart knowledge in basic concepts of mechanics, acoustics, and ultrasonics with their engineering applications
- To explain the significant concepts of dielectrics and magnetic materials in the field of engineering and their potential applications.
- To impart knowledge in basic concepts of LASERs and optical fibers along with its engineering applications.

Unit 1 Mechanics 9

Gradient of scalar, Divergence and Curl of vector field and their physical significance-rotational frames-conservative forces- F = - grad V, torque and angular momentum - Newton's laws in inertial and non-inertial frames of reference-rotating frame of reference with constant angular velocity-qualitative explanation of Foucault's pendulum-rigid body-angular velocity vector-centre of mass- gravitation law and Kepler's laws(qualitative).

Learning Outcomes: At the end of the unit, the student will be able to:

- Identify forces and moments in mechanical systems using scalar and vector techniques. (L3)
- Interpret the equation of motion of a rigid rotating body (torque on a rigid body). (L3)
- Extend Newton's second law for inertial and non-inertial frame of reference. (L2)

Unit 2 Acoustics and Ultrasonic's 9

Acoustics: Introduction- reverberation-reverberation time-Sabine's formula- derivation using growth and decay method – Absorption coefficient and its determination –factors affecting acoustics of buildings and their remedies.

Ultrasonics: Introduction- Properties- Production of ultrasonics by magnetostriction and piezoelectric methods - acoustic grating -Non Destructive Testing – pulse echo system through transmission and reflection modes - A,B and C – scan displays, Medical applications – Sonogram.

Learning Outcomes: At the end of the unit, the student will be able to:

- Explain how sound is propagated in buildings. (L2)
- Analyze acoustic properties of typically used materials in buildings. (L4)
- Identify the use of ultrasonic's in different fields. (L3)

Unit 3 Dielectric and Magnetic materials 10

Introduction-Dielectric Polarization-Dielectric polarizability- Susceptibility and Dielectric constant- Types of polarizations: Electronic and Ionic (quantitative), 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-Weiss domain theory of ferromagnetism (qualitative)-Hysteresis-soft and hard magnetic materials-Magnetic device applications.

Learning Outcomes: At the end of the unit, the student will be able to: <Please describe two/three learning outcomes of the unit>

- Explain the concept of dielectric constant and polarization in dielectric materials. (L2)
- Classify the magnetic materials based on susceptibility and their temperature dependence. (L2)
- Apply the concept of magnetism and magnetic devices. (L3)

Unit 4 LASERs and Fiber Optics 10

Introduction-characteristics of lasers-spontaneous and stimulated emission of radiation-Einstein's coefficients-population inversion-pumping mechanism-Ruby laser- He-Ne laser-semiconductor laser-applications of lasers. Introduction to Optical Fibers-Total Internal Reflection-Critical angle of propagation- Acceptance angle -Numerical Aperture-Classification of fibers based on Refractive index profile& modes (step index and Graded index optical fibers)-attenuation and optical fiber losses-Block diagram of fiber optic communication- Medical Applications.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the basic concepts of laser light sources. (L2)
- Identify the Engineering applications of lasers. (L2)
- Classify optical fibers based on refractive index profile and mode of propagation and identify the applications of optical fibers in medical, communication and other fields. (L2)

Unit 5 Sensors 8

Sensors:(qualitative description only): Different types of sensors and applications; Strain and Pressure sensors- Piezoelectric, magneto strictive sensors, Fibre optic methods of pressure sensing; Temperature sensors - bimetallic strip, pyroelectric detectors, Hall-effect sensor, smoke, and fire detectors.

Learning Outcomes: At the end of the unit, the student will be able to: <Please describe two/three learning outcomes of the unit>

- Identify different types of sensors and applications. (L3)
- Explain physics behind the working principles of sensors. (L2)
- Select sensors for different type of applications. (L3)

Prescribed Textbooks:

1. D.Kleppner and Robert Kolenkow , "An introduction to Mechanics"-II -Cambridge University Press,2015
2. M.N.Avadhanulu & P.G.Kshirsagar, "A textbook of Engineering Physics"- S. Chand Publications, 2017
3. Ian R Sinclair, Sensors and Transducers, 3rd ed,Elsevier (Newnes), 2001

Reference Books:

1. K.Thyagarajan. "Engineering Physics"-Mc Graw Hill Publishing company Ltd,2015.
2. M K Varma "Introduction to Mechanics"-Universities Press-2015.
3. D.K. Bhattacharya and A. Bhaskaran, "Engineering Physics"- Oxford Publications-2015

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Explain physics applied to solve engineering problems in mechanics.	L2
2. Apply the principles of acoustics for noise cancellation and explain the applications of ultrasonics in various engineering fields.	L3 & L2
3. Summarize the various types of polarization of dielectrics, classification of magnetic materials and the applications of dielectric and magnetic materials.	L2
4. Apply the lasers and optical fibre concepts in various applications.	L3
5. Identify the sensors for various engineering applications	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20AC24T. 1	3	2	-	-	-	-	-	-	-	-	-	-
20AC24T. 2	3	2	2	-	-	-	-	-	-	-	-	-
20AC24T.3	3	2	2	-	-	-	-	-	-	-	-	2
20AC24T. 4	3	2	2	-	-	-	-	-	-	-	-	2
20AC24T. 5	3	2	2	-	-	-	-	-	-	-	-	2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Mechanical Engineering

Title of the Course	Engineering Materials
Category	ESC
Couse Code	20A321T

Year	I B. Tech
Semester	II Semester
Branch	ME

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To understand the basic structure, properties of metals, mechanism of crystallization and imperfections in crystals.
- To study the importance of binary phase diagrams.
- To acquire knowledge on properties and structure of ferrous and nonferrous alloys and to select suitable materials for various engineering applications.
- To learn various methods of heat treatment and surface coating processes.
- To gain knowledge on materials like Ceramics and Composites

Unit 1 Structure of Metals & Constitution of Alloys 08

Structure Of Metals: Bonds in Solids – Metallic bond with examples, Crystal structures, crystallization of metals, imperfections, grain and grain boundaries, effect of grain boundaries on the properties of metal / alloys – determination of grain size.

Constitution Of Alloys: Necessity of alloying, types of solid solutions, Hume Rotherys rules, intermediate alloy phases, and electron compounds with examples.

Learning Outcomes:At the end of the unit, the student will be able to:

- Recall the definitions ad terminology of crystallography
- Understand the effect of grain size and grain boundaries on the properties of metals and alloys
- Differentiate between metals and alloys

Unit 2 Equilibrium Diagrams 08

Experimental methods of construction of equilibrium diagrams, Isomorphous alloy systems, equilibrium cooling and heating of alloys, Phase rule, Lever rule, eutectic systems with examples, peritectic reaction, eutectoid, peritectoid reactions, phase rule, relationship between equilibrium diagrams and properties of alloys. Study of binary phase diagram of Fe-Fe3C.

Learning Outcomes:At the end of the unit, the student will be able to:

- Make use of the principles of construction of binary phase diagrams
- Know the concepts of Lever and phase rule.
- Identify various Invariant reactions in binary phase diagrams

Unit 3 Ferrous & Non-Ferrous Alloys 08

Ferrous - Cast Irons: Structure, composition and properties of White Cast iron, Malleable Cast iron, grey cast iron, Spheroidal graphite cast iron, Alloy cast irons with applications.

Steels - Classification of steels, structure and properties of plain carbon steels, Low alloy steels, Stainless steels, Hadfield manganese steels, tool steels with applications.

Non-Ferrous Metals And Alloys: Structure and properties of copper and its alloys, Aluminium and its alloys, Titanium and its alloys, with applications.

Learning Outcomes: At the end of the unit, the student will be able to:

- Classify various types of cast irons and steels , their properties and applications
- Understand the importance of non ferrous metals and their alloys in engineering applications
- Compare cast Irons, steels and non ferrous alloys , their limitations in applications

Unit 4 Heat Treatment of Alloys & Surface Engineering 07

Heat Treatment of Alloys: Effect of alloying elements on Iron – Iron carbon system, Annealing, normalizing, Hardening, TTT diagrams, tempering, Hardenability, surface - hardening methods, Age hardening.

Surface Engineering: Surface treatment processes and their characteristics and applications, mechanical coatings, Diffusion coating.

Learning Outcomes: At the end of the unit, the student will be able to:

- Know the influence of heat treatment in modification of properties of steels.
- Develop a heat treatment cycle based on properties required.
- Learn the importance of surface treatment processes.

Unit 5 Ceramic Materials & Composite Materials 07

Ceramic Materials: Crystalline ceramics, glasses, cermets.

Composite Materials: Classification of composites, various methods of component manufacture of composites, particle – reinforced materials, fiber reinforced materials, metal ceramic mixtures, metal – matrix composites and Carbon – Carbon composites.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the properties of ceramics and their applications.
- Summarize the properties of composites and their use
- Choose composites for various applications

Prescribed Text Books:

1. Kodgire, Material Science and Metallurgy, 42nd edition Everest Publishing House 2017.
2. Donald R. Askeland, Essential of Materials Science and Engineering. Thomson Publications 2014

Reference Books:

1.Sidney H. Avener, Introduction to Physical Metallurgy, TMH
2. William and collister, Materials Science and Engineering, wiley pub. 2014
3. V. Raghavan, Material science and engineering, PH Pub. 2015
4. R.K.Rajput, Engineering materials and metallurgy. S.Chand & Co. 2006
5. O.P. Khanna, Material Science and Metallurgy. Dhanpatrai Pub. 2014
6.L.H. Van Vlack, Elements of Material Science and Engineering, 6/e, Pearson Education, 2008

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand the mechanism of crystallization, methods of determining grain size and factors affecting the solid solubility.	L2
2. Use the phase diagrams of binary systems and iron-carbide diagram to select the material composition	L2
3. Understand the structure and properties of various cast irons, steels and non-ferrous alloys.	L2
4. Apply the various heat treatment processes, TTT diagram, surface hardening methods & coatings depending on material requirements.	L3
5. Understand the importance of ceramics , composites and their use.	L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A321T.1	3	3	3	3	3	3	3	-	-	-	-	3	-	-	-
20A321T.2	3	3	3	3	3	3	3	-	-	-	-	3	-	-	-
20A321T.3	3	3	3	3	3	3	3	-	-	-	-	3	-	-	-
20A321T.4	3	3	3	3	3	3	3	-	-	-	-	3	-	2	2
20A321T.5	3	3	3	3	3	3	3	-	-	-	-	3	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Mechanical Engineering

Title of the Course Engineering Graphics – II
Category ESC
Course Code 20A322T

Year I B. Tech
Semester II Semester
Branch ME

Lecture Hours	Tutorial Hours	Practice Hours	Credits
1	0	4	3

Course Objectives:

- To impart and inculcate proper understanding of the theory of projections of solids and simple machine components.
- To visualize projections of solids with sectioning, isometric views and conversion of views.
- To prepare the student for future engineering positions.

Unit 1 Projections of Solids Theory: 03
Practice Sessions: 03

Projections of Regular Solids – Cylinder, Cone, Prism and Pyramid - inclined to one reference plane & both reference planes – Auxiliary Views.

Learning Outcomes:At the end of the unit, the student will be able to:

- Understand the Orthographic Projections of Solids.
- Apply the concepts learned in industrial applications.

Unit 2 Sections Of Solids Theory: 02
Practice Sessions: 02

Section Planes and Sectional views of Right Regular Solids–Prism, Cylinder, Pyramid and Cone. True shapes of the sections.

Learning Outcomes:At the end of the unit, the student will be able to:

- Understand the concept of Sections of Solids.
- Apply sectional views for engineering components.

Unit 3 Development of Surfaces & Interpenetration of Right Regular Solids Theory: 03
Practice Sessions: 03

Development of Surfaces of Right Regular Solids – Prisms, Cylinder, Pyramid, Cone and their Sectioned parts. Projections of curves of Intersection of Cylinder Vs Cylinder – Cylinder Vs square prism – Cylinder Vs Cone and Square prism Vs Square prism (Axis bisecting problems only).

Learning Outcomes:At the end of the unit, the student will be able to:

- Understand the Development of surfaces and Intersections of Solids
- Develop a sheet which meets the specifications of an object and can analyze the image of an intersected solids

Unit 4 Isometric Projections / Views Theory: 02
Practice Sessions: 02

Principles of Isometric Projection – Isometric Scale – Isometric Views– Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids.

Learning Outcomes:At the end of the unit, the student will be able to

- Understand the Isometric Views and Isometric Projections
- Employ freehand 3D pictorial sketching to aid in the visualization process and can efficiently communicate ideas graphically.

Unit 5 Conversion of Views Theory: 02
Practice Sessions: 02

Conversion of Isometric views to Orthographic Views and Conversion of Orthographic views to Isometric views.

Learning Outcomes:At the end of the unit, the student will be able to: <Please describe two/three learning outcomes of the unit>

- Understands the conversion of views.
- Analyze a drawing and can efficiently communicate ideas graphically

Prescribed Text Books:

1. Engineering Drawing, N.D. Bhatt, Charotar Publishers
2. Engineering Drawing, K.L. Narayana, P. Kanniah, Scitech Pub

Reference Books:

1. Engineering Drawing and Graphics, Venugopal/ New age
2. Engineering Drawing, Johle, Tata McGraw-Hill
3. Engineering Drawing, Shah and Rana, 2/e, Pearson Education

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand the Orthographic Projections of Solids	L1, L2
2. Apply the concepts learned in industrial applications	L1, L2, L3
3. Understand the concept of Sections of Solids	L1, L2
4. Apply sectional views for engineering components	L1, L2, L3
5. Understand the Development of surfaces and Intersections of Solids	L1, L2
6. Develop a sheet which meets thespecifications of an object and can analyze the image of an intersected solids	L1, L2, L3
7. Understand the Isometric Views and Isometric Projections	L1, L2
8. Can employ freehand 3D pictorial sketching to aid in the visualization process and can efficiently communicate ideas graphically	L1, L2, L3
9. Understands the conversion of views	L1, L2
10. Analyze a drawing and can efficiently communicate ideas graphically	L1, L2, L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A322T. 1	3	-	-	-	-	2	2	-	3	3	-	-	-	-	-
20A322T. 2	3	-	-	-	-	2	2	-	3	3	-	-	-	-	-
20A322T. 3	3	-	-	-	-	-	2	-	3	3	-	-	-	-	-
20A322T. 4	3	-	-	-	-	-	2	-	3	3	-	-	-	-	-
20A322T. 5	3	2	-	-	-	-	2	-	3	3	-	-	-	-	-
20A322T. 6	3	2	-	-	-	-	2	-	3	3	-	-	-	-	-
20A322T. 7	3	2	-	-	-	-	2	-	3	3	-	-	-	-	-
20A322T. 8	3	2	-	-	-	-	2	-	3	3	-	-	-	-	-
20A322T. 9	3	2	-	-	-	-	2	-	3	3	-	-	-	-	-
20A322T. 10	3	2	-	-	-	-	2	-	3	3	-	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Mechanical Engineering

Title of the Course Engineering Mechanics
Category ESC
Couse Code 20A323T

Year I B. Tech
Semester II Semester
Branch Common to CE & ME

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To explain the effect of force and moment in the different engineering applications.
- To familiarize frictional forces in mechanical applications.
- To teach centre of gravity and moment of inertia of solids and surfaces.
- To understand the analysis of rigid bodies under dynamic conditions.

Unit 1 Introduction to Engineering Mechanics 8

Introduction to Engineering Mechanics: Composition and resolution of forces, parallelogram law, principle of transmissibility, types of force systems - concurrent and concurrent coplanar forces, resultant of coplanar force systems couple, moment of a force Varignon's theorem, concept of free body diagrams, concept of equilibrium of coplanar force and non-coplanar systems.

Learning Outcomes:At the end of the unit, the student will be able to

- Resolve the forces in mechanical systems (L2)
- Identify the moments and forces (L3)
- Draw free body diagram (L3)
- Demonstrate equilibrium of ideal system. (L2)

Unit 2 Analysis of Structures and Friction 9

Introduction to plane trusses, analysis of plane trusses by method of joints and method of sections.

Friction: Laws of friction, types of friction, equilibrium of force systems involving frictional forces, wedge friction. Free body diagrams involving frictional forces.

Learning Outcomes:At the end of the unit, the student will be able to:

- Identify different types of trusses. (L2)
- Analyze the plane trusses by method of joints and the method of sections. (L4)

Unit 3 Properties of Surfaces and Moment of Inertia 9

Properties of Surfaces and Volumes: Centroid and center of gravity, derivation of centroids from first moment of area, centroids of composite sections, center of gravity of common volumes - cylinder, cone, sphere, theorem of Pappus-guldinus.

Moment of Inertia: Area moment of inertia of plane and composite shapes, parallel axis theorem, perpendicular axis theorem, polar moment of inertia, mass moment of inertia of common volumes -thin plates, thin rod, cylinder, cone, sphere, rectangular prism, radius of gyration.

Learning Outcomes:At the end of the unit, the student will be able to:

- Identify the centre of gravity of composite sections. (L3)
- Determine the centre of gravity of common solids. (L3)
- Determine moment of inertia for composite volumes. (L3)

Unit 4 Kinematics 8

Equations of motion for rigid bodies, constant and variable acceleration, rectilinear and curvilinear motion, motion under gravity -projectile motion, use of rectangular coordinates, tangential and normal coordinates, radius of curvature, rotation of a rigid body about a fixed axis, introduction to plane motion.

Learning Outcomes:At the end of the unit, the student will be able to:

- Write equations of motion for rigid bodies. (L3)
- Find velocity and acceleration in rectilinear and curvilinear motions (L4)
- Trace the path of projectile. (L3)

Unit 5 Kinetics and Ideal Systems 8

Kinetics: Principles of dynamics - Newton's Laws of motion, D'Alembert's principle in rectilinear translation, principle of work and energy.

Ideal Systems: Principle of conservation of energy, concept of power, conservation of linear and angular momentum, principle of momentum and impulse, impact - types of impact.

Learning Outcomes:At the end of the unit, the student will be able to:

- Apply D'Alembert's principle in rectilinear translation. (L3)
- Estimate the work done by a force and work done by a couple. (L3)
- Relate principle of work and energy in dynamic systems. (L3)
- Make use of principle of momentum and impulse to dynamic bodies. (L4)

Prescribed Text Books:

1. A Nelson, Engineering Mechanics: Statics and Dynamics, McGraw Hill publications.
2. J.L.Meriam , L.G.Kraige , J.N.Bolton ,Engineering Mechanics-statics, Engineering Mechanics-Dynamics.
3. S SBhavikatti, Engineering Mechanics, New Age International.
4. RK Bansal , Engineering Mechanics, Laxmi Publications.

Reference Books:

1. Basudeb Bhattacharya., Engineering Mechanics, 2/e, Oxford University Press (India), 2015.
2. Irving Shames, G K M Rao, Engineering Mechanics: Statics and Dynam-ics, 4/e, Pearson, 2009
3. K L Kumar, Veenu Kumar, Engineering Mechanics, 4/e, Tata McGraw Hill, 2010.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Resolve forces and couples in mechanical systems	L3
2. Identify different types of trusses and analyze the plane trusses by method of joints and the method of sections	L2,L4
3. Identify the frictional forces and its influence on equilibrium	L3
4. Find the centre of gravity and moment of inertia for various geometric shapes	L3
5. Develop equations for different motions	L4
6. Determine the displacement, velocity and acceleration relations in dynamic systems	L4
7. Relate the impulse and momentum	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A323T.1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20A323T.2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20A323T.3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20A323T.4	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
20A323T.5	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20A323T.6	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20A323T.7	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Humanities and Sciences

Title of the Course	Engineering Physics Lab
Category	BSC
Course Code	20AC24L

Year	I B. Tech.
Semester	II Semester
Branch	CE & ME

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

- Understand the role of Optical fiber parameters in engineering applications.
- Recognize the significance of laser and ultrasonics by studying its characteristics and its applicationin finding the particle size.
- Illustrate the semiconductor, magnetic and dielectric materials applications.
- Identify the various sensor 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 usingHalleffect.
5. Determination of Dielectric constant of dielectric material using charging and dischargingofcapacitor.
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. Determination of hysteresis loss by tracing B-H Curve of ferromagnetic material.
9. Determination of the numerical aperture of a given optical fiber and hence to find itsacceptance 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

Course Outcomes:

At the end of the course, student will be able to	Blooms Level of Learning
1. Understand the characteristics and behavior of various materials.	L2
2. Estimate the basic characteristic quantities of LASER and ultrasonics	L4
3. Exhibit an ability to use techniques and skills associated with modern engineering tools such as fiber optics and sensors.	L4& L5
4. Measure properties of a semiconductors, magnetic and dielectric materials.	L5

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20AC24L.1	3	-	-	-	2	-	-	-	-	-	-	-
20AC24L.2	3	-	-	-	-	-	-	-	-	-	-	-
20AC24L.3	3	2	-	-	2	-	-	-	-	-	-	-
20AC24L.4	3	2	-	-	2	-	-	-	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Mechanical Engineering

Title of the Course Engineering Materials Lab
Category ESC
Couse Code 20A321L

Year I B. Tech
Semester II Semester
Branch ME

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

- To gain the knowledge of microstructures of different ferrous and non ferrous alloys
- To gain the knowledge of calculating hardness number of heat treated steels
- To gain the knowledge of conducting experiment on jominy & quench apparatus for hardenability

List of Experiments: 24

1. Study of Microstructures of Pure Metals – Copper & Aluminium.
2. Study of Microstructures of Non – Ferrous Alloy – Brass.
3. Study of Microstructures of Other Alloys – Stainless Steel, Case Carburized Steel & Bearing Metal.
4. Study of Microstructures of Cast Irons – Gray, Malleable & White Cast Irons.
5. Study of Microstructures of Low Carbon Steel & Medium Carbon Steel.
6. Study of Microstructures of Heat Treated Steels.
7. Finding out the Hardness of Treated and Untreated Steels.
8. Finding out the Hardability of Steels by using Jominy End Quench Test Apparatus.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Know and draw the microstructure of ferrous, nonferrous alloys, steels and cast irons	L1
2. visualize grains and grain boundaries	L1
3. Evaluate the hardness of treated and untreated steels	L2
4. summarize the importance of hardening of steels	L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A321L.1	3	-	-	3	-	-	-	-	-	-	-	-	1	2	2
20A321L.2	3	-	-	3	-	-	-	-	-	-	-	-	1	2	2
20A321L.3	3	-	-	3	-	-	-	-	-	-	-	-	1	2	2
20A321L.4	3	-	-	3	-	-	-	-	-	-	-	-	1	2	2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Mechanical Engineering

Title of the Course Engineering & IT Workshop
Category ESC
Couse Code 20A326L

Year I B. Tech
Semester II Semester
Branch Common to CE, ME & ECE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

- To read and interpret job drawing, plan various operations and make assembly.
- To identify and select the hand tools and instruments used in various trades.
- To gain practical skills by performing the experiments in different trades of workshop.
- Demonstrate the parts of a personal computer system
- Demonstrate the Installation the operating system and other software required in a personal computer system
- Introduce connecting the PC on to the internet from home and workplace and effectively usage of the internet, Usage of web browsers, email, news groups and discussion forums
- Introduce the usage of Productivity tools in crafting professional word documents, excel spreadsheets and power point presentations
- To utilize MS Office tools

Engineering Workshop:

Trade 1 Carpentry Shop 02
Two joints (exercises) from : Mortise and tenon T joint, Dove tail joint, Bridle T joint, middle lap T joint, Half Lap joint, cross lap joint, Corner Dovetail joint or Bridle Joint from soft wood stock.
Learning Outcomes: At the end of the unit, the student will be able to apply wood working skills in real world applications.

Trade 2 Sheet metal shop 02
Two jobs (exercises) from: Tapered Tray, cylinder, conical funnel from out of 22 or 20 guage G.I. sheet
Learning Outcomes:At the end of the unit, the student will be able to build different parts with metal sheets used in various appliances

Trade 3 Fitting shop 02
Two jobs (exercises) from: square Fit, V-Fit, Semi-circular fit, dove tail fit from M.S. stock
Learning Outcomes: At the end of the unit, the student will be able to apply fitting operations in various assemblies.

Trade 4 House-wiring 02
Two jobs (exercises) from: Parallel and Series, Two way switch, Tube –Light connection, Stair case connection.
Learning Outcomes: At the end of the unit, the student will be able to apply basic electrical engineering knowledge for house wiring practice.

Trade 5 Demonstration 01
Any one trade of Plumbing • Machine Shop • Metal Cutting • Soldering and Brazing
Learning Outcomes: At the end of the unit, the student will be able to get the basic awareness of any of trade demonstrated.

Prescribed Text Books:

6. Kannaiah P. and Narayana K.L., Workshop Manual, 3rd Edn, Scitech publishers.
7. John K.C., Mechanical Workshop Practice. 2nd Edn. PHI 2010.

Reference Books:

7. Jeyapoovan T.and Pranitha S., Engineering Practices Lab Manual, 3rd Edn. Vikas Pub.2008.

IT Workshop:

Task 1 02

Learn about Computer: Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report

Learning Outcomes: At the end of the unit, the student will be able to:

- Identify the parts of a computer
- Know the usage of internal parts of a computer

Task 2 02

Install Operating System: Student should install Linux on the computer. Students should record the entire installation process.

Learning Outcomes: At the end of the unit, the student will be able to:

- Install another operating systems
- Know how to install software's

Task 3 02

Browsing Internet: Student should access the Internet for Browsing. Students should search the Internet for required information. Students should be able to create e-mail account and send email. They should get acquaintance with applications like Face book, Skype etc. If Intranet mailing facility is available in the organization, then students should share the information using it. If the operating system supports sending messages to multiple users (LINUX supports it) in the same network, then it should be done by the student. Students are expected to submit the information about different browsers available, their features, and search process using different natural languages, and creating e-mail account.

Learning Outcomes: At the end of the unit, the student will be able to:

- Create e-mail account and send email
- Browse internet for required information

Task 4 02

Word Processor: Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the colour, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered. .

Learning Outcomes: At the end of the unit, the student will be able to:

- Prepare project documents, user manuals
- Get the knowledge on word processor tool

Task 5 02

Spreadsheet: Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet application considered.

Learning Outcomes: At the end of the unit, the student will be able to:

- Create , open and save spread sheets
- Apply formulas for different tasks

02

Task 6

Presentations: creating, opening, saving and running the presentations, selecting the style for slides, formatting the slides with different fonts, colours, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyper linking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.

Learning Outcomes: At the end of the unit, the student will be able to:

- Create , open and save slides
- Create their own presentations for seminars

Prescribed Text Books:

1. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
2. Upgrading and Repairing PC's, 22nd Edition, Scott Muller QUE, Pearson Education.
3. Comdex Information Technology Course Kit, Vikas Gupta, WILEY Dream tech.
4. MOS 2010 Study Guide for Microsoft Word, Excel, PowerPoint, and Outlook Exams, 1st Edition, Joan Lambert, Joyce Cox, Microsoft Press

Reference Books:

1. IT Essentials PC Hardware and Software Companion Guide, CICSO Networking Academy
2. Network Your Computer & Devices Step by Step 1st Edition, Ciprian Rusen, Microsoft Press
3. Troubleshooting, Maintaining & Repairing PCs, 5th Edition, Bigelow, TMH
4. Introduction to computers, Peter Norton, 6/e, Mc Graw Hill

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
6. Apply wood working skills in real world applications.	L3
7. Build different parts with metal sheets used in various appliances.	L3
8. Employ fitting operations in various assemblies.	L3
9. Execute basic electrical engineering knowledge for house wiring practice.	L3
10. Identify various operations and its applications from the demonstration.	L3
11. Recognize the peripherals of a computer, perform assembling and disassembling of various components of a computer.	L1, L3
12. Describe and perform installation and un-installation of Windows and Linux operating systems and also perform troubleshooting of various hardware and software components.	L2, L3
13. Use Web browsers to access Internet, Search Engines.	L3
14. Use word processor; spread sheet, presentation and data storage tools.	L3

CO-PO Mapping:

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20A326L.1	3	-	1	-	1	-	-	-	-	-	-	1	-	-	-
20A326L.2	3	-	1	-	1	-	-	-	-	-	-	1	-	-	-
20A326L.3	3	-	1	-	1	-	-	-	-	-	-	1	-	-	-
20A326L.4	2	-	1	-	1	-	-	-	-	-	-	1	-	-	-
20A326L.5	3	-	1	-	1	-	-	-	-	-	-	1	-	-	-
20A326L.6	3	3	1	-	3	-	-	-	-	-	-	3	2	-	-
20A326L.7	3	3	1	-	3	-	-	-	-	-	-	3	2	-	-
20A326L.8	3	3	1	-	3	-	-	-	-	-	-	3	2	-	-
20A326L.9	3	3	1	-	3	-	-	-	-	-	-	3	2	-	-