ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET (AUTONOMOUS)

Department of Civil Engineering

VISION and MISSION of THE DEPARTMENT

Vision

The department of civil engineering strives to help its graduates to become technically sound and ethically strong engineers and to be recognized as one of the best civil engineering programs in the country through its pursuit of excellence in teaching, research and service activities, besides imparting basic knowledge.

Mission

- To impart training to the students in order to make themselves suitable for the changing technologies in civil engineering field.
- To provide an environment which inspires the students to enhance their analytical thinking and creativity to solve the problems of rural public and problems of the world related to civil engineering.
- To nurture leadership and team work in the students so as to make them good leaders, entrepreneurs and responsible citizens. Department of civil engineering.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO 1. To apply a broad, fundamental-based knowledge and up-to- date skills required in performing professional work in Civil Engineering and related disciplines.

PEO 2. To design the works pertaining to Civil Engineering, incorporating the use of design standards, realistic constraints and consideration of the economic, environmental, and social impact of the design. PEO 3. To use modern computer software tools to solve Civil Engineering problems and explain and defend their solutions and communicate effectively using graphic, verbal and written techniques to all audiences and

PEO 4. To demonstrate their ability to deal effectively with ethical and professional issues, taking into account the broader societal implications of civil engineering.

PROGRAM OUTCOMES (POs)

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. Department of civil engineering
4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of,and need for sustainable development.
8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions
11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

1. Gradates will able to apply technical skills and modern engineering tools for civil engineering day to day practice
2. Graduates will be able to participate in critical thinking and problem solving of civil engineering field that requires analytical and design requirements
3. Enhancing the employability skills by making the students capable of qualifying competitive examinations

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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I B. Tech - Zero Semester

Phase	Course Code	Name of the course	Lecture	Practical
Regular Phase	19A501	Proficiency classes: Familiarity with a computer	2	2
Regular Phase	19AC01	Proficiency classes: English Communication Skills	2	2
Regular Phase	19A502	Basics of Programming and Lab	3	2
Regular Phase	19AC02	Foundation classes in Mathematics	3	0
Regular Phase	19AC03	Foundation classes in Physics	3	2
Regular Phase	19AC04	Foundation classes in Chemistry	3	2
Regular Phase	19AC05	Universal Human Values	2	0
Regular Phase	19A301	Fundamentals of Engineering Drawing	1	0
Regular Phase	-	Physical education activities – Sports and Games	0	1
Non daily	-	Creative Arts		
Non daily	-	Lectures by eminent personalities		
Non daily	-	Visits to local area		
Non daily	-	Extra-curricular activities		

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(AUTONOMOUS)
Department of Civil Engineering
Course Structure for R19 Regulations
I Year I Semester

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	HS	19AC15T	Functional English and Life Skills	3	-	-	3
2	BS	19AC11T	Algebra and Calculus	3	1	-	4
3	BS	19AC13T	Chemistry of Materials	3	-	-	3
4	ES	19A311T	Engineering Graphics –I	1	-	2	2
5	ES	19A511T	Problem solving and C Programming	3	-	-	3
6	MC	19AC16T	Environmental Science	3	-	-	0
Lab Courses							
7	HS	19AC15L	Communicative English Lab	-	-	3	1.5
8	BS	19AC13L	Chemistry of Materials Lab	-	-	3	1.5
9	ES	19A511L	C-Programming Lab	-	-	3	1.5
				16	1	11	19.5

I Year II Semester

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	BS	19AC21T	Differential Equations and Vector Calculus	3	1	-	4
2	BS	19AC23T	Engineering Physics	3	-	-	3
3.	ES	19A521T	Python Programming	3	-	-	3
4	ES	19A321T	Engineering Graphics-II	2	-	2	3
5	ES	19A322T	Engineering Mechanics	3	-	-	3
Lab Courses							
6	ES	19A521L	Python Programming Lab	-	-	3	1.5
7	BS	19AC23L	Engineering Physics Lab	-	-	3	1.5
8	ES	19A323L	Engineering & IT Work Shop	-	-	3	1.5
				14	1	11	20.5

II Year I Semester

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	BS	19AC34T	Life Sciences for Engineers	2	-	-	2
2	BS	19AC31T	Partial Differential Equations & Complex Variables	3	-	-	3
3	PC	19A131T	Building Materials and Construction	3	-	-	3
4	PC	19A132T	Surveying	3	-	-	3
5	PC	19A133T	Mechanics of Materials	3	-	-	3
6	PC	19A134T	Fluid Mechanics	3	-	-	3
7	ES	19A235T	Basic Electronics, Electrical and Mechanical Technology	2	-	-	2
8	MC	19AC37T	Constitution of India	3	-	-	-
Lab Courses							
9	PC	19A132L	Surveying Lab	-	-	2	1
10	PC	19A133L	Mechanics of Materials Lab	-	-	2	1
11	PC	19A134L	Fluid Mechanics Lab	-	-	2	1
				22	-	6	22

II Year II Semester

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	BS	19AC41T	Numerical Methods & Probability and Statistics	3	-	-	3
2	ES	19A141T	Building planning & Environment	2	-	-	2
3	HS	19AE41T	Managerial Economics and Financial Accounting	3	-	-	3
4	PC	19A142T	Concrete Technology	3	-	-	3
5	PC	19A143T	Strength of Materials	3	-	-	3
6	PC	19A144T	Hydraulic Engineering	3	-	-	3
7	MC	19AC45T	Essence of Indian Traditional Knowledge	3	-	-	0
Lab Courses							
8	PC	19A141L	Computer Aided Building planning Drawing	-	-	2	1.0
9	PC	19A142L	Concrete Technology Lab	-	-	3	1.5
10	PC	19A144L	Hydraulics Engineering Lab	-	-	2	1.0
11	ES	19A145L	Civil Engineering Work Shop	-	-	3	1.5
				20	-	10	22

III Year I Semester

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	PC	19A151T	Basic Reinforced Concrete Design	3	-	-	3
2	PC	19A152T	Soil Mechanics	3	-	-	3
3	PC	19A153T	Water Resource Engineering	3	-	-	3
4	PC	19A154T	Structural Analysis	3	-	-	3
5	PE	19A155A	Advanced Structural Engineering	3	-	-	3
		19A155B	Prestressed Concrete				
		19A155C	Construction Project Planning & Systems				
6	OE	19A155D	Finite Element Methods	3	-	-	3
		19A155E	Instrumentation & Sensor Technologies for Civil Engineering Applications				
		19A155F	Watershed Management				
		19A155G	Disaster Management				
Lab Courses							
7	PC	19A154L	Structural Analysis & Design Lab (STAAD software)	-	-	2	1
8	PC	19A152L	Soil Mechanics Lab	-	-	2	1
9	HS	19AC51L	General Aptitude	-	-	2	1
				18		6	21

III Year II Semester

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	PC	19A161T	Design of Steel Structures	3	-	-	3
2	PC	19A162T	Engineering Geology	2	-	-	2
3	PC	19A163T	Environmental Engineering	3	-	-	3
4	PE	19A164A	Engineering Hydrology	3	-	-	3
		19A164B	Design & Drawing of Irrigation Structures				
		19A164C	Bridge Engineering				
5	PE	19A165A	Ground Improvement Techniques	3	-	-	3
		19A165B	Foundation Engineering				
		19A165C	Environmental Geo-Technology				
6	OE	19A26GT	Energy Management and Conservation	3	-	-	3
		19A26JT	Fuzzy Logic and Neural Networks				
		19A36ET	Introduction to Mechatronics				
		19A36FT	Fundamentals of Robotics				
		19A46GT	Electronic Circuits and its Applications				
		19A46HT	Basics of Communication Systems				
		19A56IT	Artificial Intelligence				
Lab Courses							
7	PC	19A162L	Engineering Geology Lab	-	-	2	1
8	PC	19A163L	Environmental Engineering Lab	-	-	3	1.5
9	HS	19AC62L	Professional Communication Skills Lab	-	-	3	1.5
10	INTERN	19A164I	Innovative project / Socially relevant project / Entrepreneurship / Internship	-	-	-	2
				17	-	8	23

IV Year I Semester

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	PC	19A171T	Transportation Engineering	3	-	-	3
2	PC	19A172T	Estimation, Costing and Valuation	3	-	-	3
3	PE	19A173A	Sustainable Construction Methods	3	-	-	3
		19A173B	Repairs & Rehabilitation of Structures				
		19A173C	Advanced RCC Design				
4	PE	19A174A	Sustainable Engineering & Technology	3	-	-	3
		19A174B	Advanced Environmental Engineering				
		19A174C	Environmental Impact Assessment & Life Cycle Assessment				
5	OE	19A17IT	Open Elective-III (MOOC)	3	-	-	3
Lab Courses							
6	PC	19A171L	Transportation Engineering Lab	-	-	2	1
7	PW	19A17P	Project Phase-I	-	-	-	2
				15	-	2	18

IV Year II Semester

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	PE	19A181A	Advanced Transportation Engineering	3	-	-	3
		19A181B	Advanced Surveying				
		19A181C	Remote Sensing and GIS				
2	OE	19A28DT	Battery Energy Storage Systems	3	-	-	3
		19A28ET	System Modelling and Simulation				
		19A38FT	Optimization in Engineering				
		19A38GT	Total Quality Management				
		19A48DT	Introduction to Digital Design				
		19A48ET	Industrial Electronics				
		19A58ET	Internet of Things				
		19A58FT	Web Programming				
Lab Courses							
3	PW	19A18P	Project Phase-II	-	-	-	8
				6	-	-	14

LIST of OPEN ELECTIVE COURSES

S. No.	Category	Course Title	Offered by
1	OE	Basic Civil Engineering	CE
2	OE	Water Resources and Conservation	CE
3	OE	Disaster Management	CE
4	OE	Building Planning and Construction	CE

LIST OF VALUE-ADDED COURSES:

S. No.	Course Title
1	Importance of Soft wares in Civil Engineering
2	ARCHI CAD
3	Building Information Modelling
4	Building Planning and Construction
5	Revit Architecture
6.	AUTO CAD 3D Basics

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

Title of the Course	Functional English and Life Skills
Category	HS
Course Code	19AC15T
Year	I B.Tech
Semester	I Semester (Common to CE, ME, CSE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	3

Course Objectives:

- To focus on appropriate reading strategies for comprehension of various academic texts and authentic materials.
- 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.
- To build self-confidence, encourage critical thinking, foster independence and help people to communicate more effectively.

Unit 1 9

Reading: *On the Conduct of Life* by William Hazlitt
Life Skills: 'Values and Ethics' with reference to Rudyard Kipling's poem '*If*'
Grammar and Vocabulary: Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countables and uncountables; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentences.
Writing: Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph.

Unit 2 9

Reading: *The Brook* by Alfred Tennyson
Life Skills: 'Self-Improvement' with reference to George Bernard Shaw's speech '*How I Became a Public Speaker'*
Grammar and Vocabulary: Cohesive devices - linkers, sign posts and transition signals; use of articles and zero article; prepositions.
Writing: Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters.

Unit 3 9

Reading: *The Death Trap* by Saki
Life Skills: 'Time Management' with reference to an extract from Seneca's letter to his friend '*On Saving Time'*
Grammar and Vocabulary: Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.
Writing: Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions.

Unit 4 9

Reading: *ChinduYellamma*
Life Skills: 'Innovation' with reference to the life of 'Muhammad Yunus'
Grammar and Vocabulary: Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of antonyms
Writing: Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables.

Unit 5 9

Reading: *Politics and the English Language b*y George Orwell

Life Skills: 'Motivation with reference to Ranjana Deve's article 'The Dancer with a White Parasol'

Grammar and Vocabulary: Editing short texts – identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

Writing: Writing structured essays on specific topics using suitable claims and evidences.

Prescribed Text Books:

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.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Read, scan and skim texts such as literary forms, journalistic articles and scientific readings for comprehension and retention.	L2
2. Exhibit self-confidence and innovative thinking and communicate more effectively.	L3
3. understand the factors that influence use of grammar and vocabulary in speech and writing and formulate sentences with grammatical accuracy	L2
4. 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
19AC15T.1	-	-	-	-	-	-	-	-	-	3	-	2
19AC15T.2	-	-	-	-	-	-	-	-	-	3	-	2
19AC15T.3	-	-	-	-	-	-	-	-	-	3	-	2
19AC15T.4	-	-	-	-	-	-	-	-	-	3	-	2
19AC15T.5	-	-	-	-	-	-	-	-	-	3	-	2

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

Title of the Course	Algebra and Calculus
Category	BS
Course Code	19AC11T
Year	I B.Tech
Semester	I Semester (Common to all branches of Engineering)

Lecture Hours	Tutorial Hours	Practical	Credits
3	1	-	4

Course Objectives:

- This course will illuminate the students in the concepts of calculus and linear algebra.
- This course will 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 Matrix Operations and Solving Systems of Linear Equations 8

Rank of a matrix by echelon form - solving system of homogeneous and non-homogeneous linear equations by rank method - Eigen values and Eigen vectors - their properties.

Unit 2 Cayley-Hamilton theorem 8

Cayley-Hamilton theorem (without proof) - finding inverse and power of a matrix by Cayley-Hamilton theorem - diagonalisation of a matrix, quadratic forms and nature of the quadratic forms - reduction of quadratic form to canonical forms by orthogonal transformation.

Unit 3 Functions of several variables 8

Partial derivatives - total derivatives - chain rule - change of variables – Jacobian - maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers for three variables.

Unit 4 Mean value theorems and curve tracing 6

Taylor's and Maclaurin's theorems (without proofs) – simple problems. Curve tracing – Cartesian and polar curves.

Unit 5 Multiple Integrals and Special Functions 10

Double integrals: Evaluation - change of order of integration - change of variables (Cartesian to polar) - areas enclosed by plane curves and Evaluation of triple integral. Beta and Gamma functions and their properties - relation between beta and gamma functions.

Prescribed Text Books:

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. Higher Engineering Mathematics, Ramana B.V., Tata McGraw
2. Higher Engineering Mathematics, John Bird 7th Edition, Routledge-Tylor and /francis Group London, 2014

Course Outcomes:

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. Understand mean value theorems to real life problems and will understand the applications of curve tracing. L2
5. Solve important tools of calculus in higher dimensions and be familiar with 2- dimensional, 3- dimensional coordinate systems and also learn the utilization of special functions. L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19AC11T.1	3	3	-	-	-	-	-	-	-	3	-	3
19AC11T.2	3	3	-	-	-	-	-	-	-	3	-	3
19AC11T.3	3	3	-	-	-	-	-	-	-	3	-	2
19AC11T.4	3	3	-	-	-	-	-	-	-	3	-	2
19AC11T.5	3	3	-	-	-	-	-	-	-	3	-	2

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

Title of the Course	Chemistry of Materials
Category	BS
Course Code	19AC13T
Year	I B. Tech
Semester	I Semester (Common to CE & ME)

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	3

Course Objectives:

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

Unit 1 Water Technology 8

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.

Unit 2 Energy Sources and Applications 10

Electrode potential, determination of single electrode potential –Nernst's equation, reference electrodes, Weston Cd Cell, 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 cell, hydrogen-oxygen fuel cell. Solar energy, photovoltaic cell and applications.

Unit 3 Corrosion Engineering 10

Partial derivatives - total derivatives - chain rule - change of variables – Jacobian - maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers for three variables.

Unit 4 Polymers and Fuel Technology 10

Polymers: Introduction, differences between thermoplastic and thermo setting resins, Preparation, properties and uses of PVC, Bakelite and polyphosphazenes.

Fuels – Types of fuels, calorific value, 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, ethanol, bio fuels

Cement: Portland cement, constituents, Manufacture of Portland Cement, chemistry of setting and hardening of cement

Unit 5 Nano and Smart Materials 10

Double integrals: Evaluation - change of order of integration - change of variables (Cartesian to polar) - areas enclosed by plane curves and Evaluation of triple integral.Beta and Gamma functions and their properties - relation between beta and gamma functions.

Prescribed Text Books:

1. P.C. Jain and M. Jain, Engineering Chemistry, 15/e, Dhanapat Rai & Sons, (2014).
2. B.K. Sharma, Engineering Chemistry, Krishna Prakasham, (2014).

Reference Books:

1. Sashi Chawla, A Textbook of Engineering Chemistry, Dhanapath Rai and sons, (2003).

2. B.S Murthy and P. Shankar, A Text Book of NanoScience and NanoTechnology, University Press (2013).
3. S.S. Dara, A Textbook of Engineering Chemistry, S.Chand& Co, (2010).
4. V. Raghavan, A Material Science and Engineering, Prentice-Hall India Ltd, (2004).
5. N. Krishna Murthy and Anuradha, A text book of Engineering Chemistry, Murthy Publications (2014).
6. K. Sesha Maheshwaramma and Mridula Chugh, Engineering Chemistry, PearsonIndia Edn services, (2016).

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. List different water analysis methods and water treatment processes.	L1
2. Understand different cells and illustrate the principles of solar energy	L2
3. Classify theories of corrosion and apply their principles for corrosion control	L3
4. Distinguish between various polymers, fuels and analyze the composition of cement	L4
5. Analyze the properties and application of nano materials and smart materials	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19AC13T.1	2	2	-	2	-	-	-	-	-	3	-	2
19AC13T.2	3	2	-	2	-	-	-	-	-	3	-	2
19AC13T.3	3	2	-		-	-	-	-	-	3	-	2
19AC13T.4	3	2	-		-	-	-	-	-	3	-	2
19AC13T.5	2	2	-	2	-	-	-	-	-	3	-	2

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

Title of the Course	Engineering Graphics - I
Category	ES
Course Code	19A311T
Year	I B.Tech
Semester	I Semester (Common to CE, ME)

Lecture Hours	Tutorial Hours	Practical	Credits
1	-	2	2

Course Objectives:
This course will

- Cover BIS standards and conventions while drawing Lines, printing Letters and showing Dimensions.
- Teach the fundamental in Geometrical Constructions, Polygons and Curves used in Engineering Practices.
- Prepare the student for future Engineering positions.

Unit 1 Introduction 12
Lettering – Geometrical constructions - Curves used in Engineering Practice: Conic Sections– General method only. Special methods: Ellipse – Oblong method, Arcs of circle method and Concentric circles method - Rectangle method and Tangent method for Parabola – Rectangular Hyperbola.

Unit 2 Cycloidal Curves and Involutes 6
Cycloidal Curves: Cycloid, Epicycloid and Hypocycloid (treatment of simple problems only)
Involutes – Square, Pentagon, Hexagon and Circle.

Unit 3 Projections of Points and Lines 10
Projections of Points and Projections of Lines-inclined to one reference plane - inclined to both reference planes, finding the True lengths.

Unit 4 Projections of Planes 10
Projections of regular Plane surfaces inclined to one reference plane and both reference planes and Projection of planes using auxiliary planes.

Unit 5 Projections of Solids 10
Projections of Regular Solids – Cylinder, Cone, Prism and Pyramid - inclined to one reference and both reference planes.

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, Pearson Education

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Understand the concepts of Conic Sections.	L2
2. Understand the concept of Cycloidal Curves, Involutes and the application of industry standards.	L2

3. Understand the Orthographic Projections of Points and Lines and are able to improve their visualization skills so that they can apply these skills in developing the new products. L3
4. Understand and apply Orthographic Projections of Planes wherever necessary and becomes efficient in applying the concept of Auxiliary Projections of Points, Lines and Planes in industrial applications L3
5. Understand and analyze the Orthographic Projections of Solids. L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19A311T.1	3	-	-	-	-	3	2	-	1	2	-	-
19A311T.2	3	-	-	-	-	3	2	-	1	2	-	-
19A311T.3	3	2	-	-	-	3	2	-	1	2	-	-
19A311T.4	3	2	-	-	-	3	2	-	1	2	-	-
19A311T.5	3	-	2	-	2	2	-	3	3	-	-	3

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

Title of the Course	Problem Solving and C programming
Category	ES
Couse Code	19A511T
Year	I B. Tech
Semester	I Semester (Common to CE, EEE, ME, ECE & CSE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	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 9

Problem Solving: 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

Unit 2 9

Introduction to decision control statements: 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.

Unit 3 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.

Unit 4 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.

Unit 5 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.

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 Text Books

1. LET US C, Yeswanth Kanitkar, 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, students 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:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19A511T.1	1	2	2	3	-	1	-	-	-	-	-	-
19A511T.2	3	3	3	3	3	-	-	-	1	-	-	-
19A511T.3	3	2	1	2	1	-	-	-	1	-	-	2
19A511T.4	2	3	2	2	3	-	-	-	1	-	1	2
19A511T.5	3	2	2	2	2	-	-	-	1	-	-	2

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

Title of the Course	Environmental Science
Category	MC
Course Code	19AC16T
Year	I B. Tech
Semester	I Semester (Common to ME, CE, CSE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	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 save earth from the inventions by the engineers.
- 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 9

Definition, Scope and Importance – Need for Public Awareness. NATURAL RESOURCES: Renewable and non-renewable resources – Natural resources and associated problems – Forest resources: Use and over – exploitation, deforestation, dams and their effects on forest and tribal people – Water resources: Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources – Food resources: Changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity – Land Resources: Land degradation, soil erosion - Energy resources: Renewable and non-renewable energy resources, use of alternate energy resources.

Unit 2 Ecosystems, Biodiversity, and its Conservation 9

ECOSYSTEMS: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers –Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

Biodiversity and its Conservation : Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Hot-spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Unit 3 Environmental Pollution and Solid Waste Management 9

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

SOLID WASTE MANAGEMENT: Causes, effects and control measures of urban waste – Role of an individual in prevention of pollution – Pollution case studies.

Unit 4 Social Issues and the Environment 9

Social Issues and the Environment: From Unsustainable to Sustainable development – Water conservation, rain water harvesting, Environmental ethics: Issues and possible solutions –global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust – Wasteland reclamation – Consumerism and waste products – Environment Protection Act – Air (Prevention and Control of Pollution) Act – Water (Prevention and control of Pollution) Act – Wildlife Protection A Act – Forest Conservation Act.

9

Unit 5 Human Population and the Environment

Human Population and the Environment: Population explosion – Family Welfare Programmes – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

Field Work: Visit to a local area to document environmental assets River/forest/ grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc.,

Prescribed Text Books:

1. Text book of Environmental Studies for undergraduate courses, Erach Bharucha for University Grant Commission, University press, New Delhi, 2004.
2. Environmental Studies, Palaniswamy, Second edition, Pearson education, New Delhi, 2014.

Reference Text Books:

1. Environmental Studies, Benny Joseph, Second edition, McGraw Hill Education (India) Private Limited, New Delhi, 2013
2. Environmental Studies from crisis to cure, R. Rajagopalan, Oxford University Press, New Delhi, 2015
3. Environmental Studies: A Text Book for Undergraduates, Dr. K. Mukkanti, S. Chand and Company Ltd, New Delhi, 2010
4. Ecology, Environmental Science and Conservation, J.S. Singh, S.P. Singh and S.R. Gupta, S. Chand and Company Ltd, New Delhi, 2014
5. A Text book of Environmental Studies, Shashi Chawla, Tata McGraw Hill Education, India, 2012

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Explain how natural resources should be used.	L2
2. Identify the importance of protection of different ecosystems 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
19AC16T.1	1	1	-	-	-	3	3	1	-	-	-	3
19AC16T.2	1	2	-	-	-	3	3	1	-	-	-	3
19AC16T.3	-	1	-	-	-	3	3	1	-	-	-	3
19AC16T.4	2	-	-	-	-	3	3	1	-	-	-	3
19AC16T.5	1	-	-	-	-	3	3	1	-	-	-	3

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

Title of the Course	Communicative English Lab
Category	HS
Couse Code	19AC15L
Year	I B. Tech
Semester	I Semester (common to CE, ME, CSE)

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	3	1.5

Course Objectives:

- Students will learn better English pronunciation
- Students will be trained to use language effectively in every day conversations
- Students will be trained to make formal oral presentations using effective strategies in professional life
- Students will be exposed to a variety of self-instructional, learner friendly modes of language learning

Pronunciation 6

Introduction to English speech sounds

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.

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

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.

Minimum Requirement:

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 Text Book: 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
19AC15L.1	-	-	-	-	-	-	-	-	-	2	-	1
19AC15L.2	-	-	-	-	-	-	-	-	-	1	-	2
19AC15L.3	-	-	-	-	-	-	-	-	3	3	-	3
19AC15L.4	-	-	-	-	-	-	-	-	3	2	-	1
19AC15L.5	-	-	-	-	-	-	-	-	1	3	-	3
19AC15L.6	-	-	-	-	-	-	-	-	-	2	-	1

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

Title of the Course	Chemistry of Materials Lab
Category	BS
Course Code	19AC13L
Year	I B.Tech
Semester	I Semester (Common to CE & ME)

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	3	1.5

Course Objectives:

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

List of Experiments

Any TEN of the following experiments must be performed

1. Determination of Hardness of a groundwater sample.
2. Estimation of active chlorine content in Bleaching powder.
3. Determination of calorific value of a fuel by bomb calorimeter
4. Determination of strength of an acid by pH metric method.
5. Determination of Fe (II) in Mohr's salt by potentiometric method.
6. Estimation of calcium in Portland cement
7. Conductometric titration of Acid mixture against Strong base
8. Determination of chromium (VI) in potassium dichromate
9. Preparation of Phenol-formaldehyde resin
10. Preparation of TiO_2/ZnO nano particles.
11. Determination of viscosity of a liquid
12. Determination of surface tension of a liquid
13. Estimation of Ferrous iron by Dichrometry.
14. Determination of copper by Iodometry.
15. SEM / TEM analysis of nano materials

Prescribed Books:

1. Mendham J, Denney RC, Barnes JD, Thomas M and Sivasankar B Vogel's Quantitative Chemical Analysis 6/e, Pearson publishers (2000).
2. N.K Bhasin and Sudha Rani Laboratory Manual on Engineering Chemistry 3/e, Dhanpat Rai Publishing Company (2007).

Course Outcomes:

The student will be able to	Blooms Level of Learning
1. Explain the functioning of instruments such as pH meter, conductivity meter and potentiometer.	L2
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 the calorific value of different fuel samples and synthesize polymers and nano materials.	L5

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19AC13L.1	3	2	2	-	-	-	-	-	-	-	-	-
19AC13L.2	3	2	2	2	-	-	-	-	-	-	-	-
19AC13L.3	3	2	2	2	-	-	-	-	-	-	-	-
19AC13L.4	3	2	2	2	-	-	-	-	-	-	-	-
19AC13L.5	3	2	2	-	-	-	-	-	-	-	-	-

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

Title of the Course	C Programming Lab
Category	ES
Course Code	19A511L
Year	I B.Tech
Semester	I Semester (Common to CE, EEE, ME, ECE & CSE)

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	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 in a modular fashion.
- Manage data using files.

Minimum number of FOUR programmes from each exercise are to be done by students.

Exercise I (week-1): Data types, Variables, Constants and Input and Output.
Exercise 2:(week-2): Operators, Expressions and Type Conversions.
Exercise 3:(week-3): Conditional Statements [two way and multipath].
Exercise 4:(week-4): Loop Control Statements. [for, while and do-While]
Exercise 5:(week-5): Unconditioned JUMP Statements- break, continue, goto.
Exercise 6:(week-6): Declaring Arrays, Referencing Arrays, Array Subscripts. Using for loop for sequential Access.
Exercise 7:(week-7): Multidimensional Arrays
Exercise 8:(week-8): String Basics, String Library Functions and Array of Strings.
Exercise 9:(week-9): Simple user defined functions, Parameter passing methods- pass by value, pass by reference.
Exercise 10:(week-10): Storage classes- Auto, Register, Static and Extern
Exercise 11:(week-11): Recursive Functions, Preprocessor commands.
Exercise 12:(week-12): Array Elements as Function Arguments.
Exercise 13:(week-13): Pointers and structures.
Exercise 14:(week-14): Dynamic memory allocation and error handling.
Exercise 15:(week-15): File handling

Recommended Systems/Software Requirements: Intel based desktop PC with ANSI C/ TURBO C Compiler and Supporting Editors

Prescribed Text Books:

1. C and Data Structures, E.Balaguruswamy, Tata McGraw Hill.
2. LET US C, YeswanthKanitkar, Ninth Edition, BPB Publication.

References:

1. https://www.cprogramming.com/
2. https://www.mycplus.com/tutorials/c-programming-tutorials

Course Outcomes:

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
19A511L.1	3	2	-	2	2	-	-	-	2	2	1	-
19A511L.2	2	2	-	-	-	-	-	-	1	-	-	-
19A511L.3	3	3	3	3	-	-	-	-	1	-	-	3
19A511L.4	3	3	3	3	-	-	-	-	-	-	-	3
19A511L.5	3	3	3	3	-	-	-	-	-	-	-	3

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

Title of the Course	Differential Equations and Vector Calculus
Category	BS
Course Code	19AC21T
Year	I B.Tech
Semester	II Semester (Common to CE,ME,EEE, ECE & CSE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	1	-	4

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 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.

Unit 2 Equations Reducible to Linear Differential Equations and Applications 08

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

Unit 3 Partial Differential Equations 10

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

Unit 4 Vector differentiation and integration 9

Scalar and vector point functions-vector operator del, del applies to scalar point functions-Gradient-del applied to vector point functions-Divergence and Curl-del applied twice to scalar point function-Line integral-circulation-work done-surface integral-flux-volume integral.

Unit 5 Vector integral theorems 6

Green's theorem in the plane (without proof) -Stoke's theorem (without proof) - Divergence theorem (without proof)-Applications

Prescribed Text Books:

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

Reference Books:

1. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2011.
2. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002
3. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Solve the differential equations related to various engineering fields.	L3
2. Formulate 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. Interpret the physical meaning of different operators such as gradient, curl and divergence and estimate the work done against a field, circulation and flux using vector calculus.	L2
5. Evaluate double and triple integrals using Green's, Stoke's and Divergence theorem.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19AC21T.1	3	3	-	-	-	-	-	-	-	-	-	2
19AC21T.2	3	3	-	-	-	-	-	-	-	-	-	2
19AC21T.3	3	3	-	-	-	-	-	-	-	-	-	3
19AC21T.4	3	3	-	-	-	-	-	-	-	-	-	2
19AC21T.5	3	3	-	-	-	-	-	-	-	-	-	3

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

Title of the Course	Engineering Physics
Category	BS
Course Code	19AC23T
Year	I B.Tech
Semester	II Semester (Common to CE & ME)

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	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.
- Familiarize types of sensors for various engineering applications.

Unit 1 Mechanics 9

Basic laws of vectors and scalars-rotational frames-conservative forces- F = - grad V, torque and angular momentum - Newton's laws in inertial and linear accelerating non-inertial frames of reference-rotating frame of reference with constant angular velocity-qualitative explanation of Foucault's pendulum-rigid body-angular velocity vector-centre of mass-gravitation and Kepler's laws(qualitative).

Unit 2 Acoustics and Ultrasonics 11

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.

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.

Unit 3 Dielectric and Magnetic materials 9

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

Unit 4 LASERs and Fiber Optics 8

Introduction- characteristics of lasers-spontaneous and stimulated emission of radiation-Einstein's coefficients-population inversion- 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 - Propagation of electromagnetic waves through optical fiber – modes-importance of V number-attenuation and optical fiber losses-Block diagram of fiber optic communication- Medical Applications.

Unit 5 Sensors 8

Sensors:(Qualitative description only): Different types of sensors and applications; Strain and Pressure sensors-Piezoelectric, magnetostrictive sensors, Fiber optic methods of pressure sensing; Temperature sensors - bimetallic strip, pyro electric detectors, Hall-effect sensor, smoke and fire detectors.

Prescribed Text Books:

1. M K Varma “Introduction to Mechanics”-Universities Press-2015.
2. D.K. Bhattacharya and A. Bhaskaran, “Engineering Physics”- Oxford Publications-2015.

Reference Books:

1. K.Thyagarajan. “Engineering Physics”-Mc Graw Hill Publishing company Ltd,2015.
2. . Ian R Sinclair, Sensors and Transducers, 3rd eds,2001, Elsevier (Newnes).

Course Outcomes:

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 application of ultrasonic’s in various engineering fields.	L2 & L3
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
19AC23T.1	3	2	-	-	-	-	-	-	-	-	-	-
19AC23T.2	3	2	2	-	-	-	-	-	-	-	-	-
19AC23T.3	3	2	2	-	-	-	-	-	-	-	-	2
19AC23T.4	3	2	2	-	-	-	-	-	-	-	-	2
19AC23T.5	3	2	2	-	-	-	-	-	-	-	-	2

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

Title of the Course	Python Programming
Category	ES
Course Code	19A521T
Year	I B.Tech
Semester	II Semester (Common to CE, ME & CSE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	3

Course Objectives:

- To learn basics of computational problem solving, python programming and basic control structures.
- To understand python programming basic constructs like lists, dictionaries, sets and functions
- To learn module design and usage of text files in python programming
- To understand basics of object oriented programming.
- To understand elementary data structures like linked list, stacks and queues.

Unit 1 12

Computational problem solving, Introduction to python programming language, literals, variables and identifiers, operators, expressions and data types.
Control Structures: Control structure importance, Boolean expressions, selection control, and iterative control.

Unit 2 14

Lists: List structures, lists in python, Iterating over lists in python, more on python lists
Dictionaries and sets: Dictionary type in python, Set data type
Functions: Program routines,more on functions

Unit 3 12

Module Design: Modules, Top-Down design, Python modules
Text Files: Text File, Using Text files, String processing, Exception handling

Unit 4 10

Objects and their usage: Software objects
Introduction to Object oriented programming: class, three fundamental features of object oriented programming, encapsulation-what is encapsulation, defining classes in python.

Unit 5 12

Data structures: Introduction to abstract data types, Single Linked List-traversing, searching, prepending, and removing nodes, Stacks-implementing using python list& linked list, Queues-implementing using python list& linked list.

Prescribed Text Books:

1. Introduction to Computer Science Using Python: A Computational Problem-Solving Focus, Charles Dierbach.
2. Data Structures and Algorithms using Python , RanceD.Necaise, Wiley Publications.

Reference Books:

1. Python Programming using problem solving approach, ReemaThareja, Oxford University press
2. Python Programming: An Introduction to Computer Science, John Zelle, Franklin,Beedle&Associates Inc., 3rd Edition
3. Think Python: How to think like a computer Scientist, Allen Downey 2nd Edition O'Reilly Publications.

4. Problem solving with algorithms and data structures using python, Bradley Miller, David L.Ranum, Franklin, Beedle& Associates incorporated, independent publishers.
5. Learning Python, Mark Lutz, O'Reilly Publications 5th Edition
6. Learn Python the Hard Way: A Very Simple Introduction to the Terrifyingly Beautiful World of Computers and Code Zed Shaw,Zed Shaw's Hard Way Series, Third Edition
7. Automate the Boring Stuff with Python: Practical Programming for Total Beginners, Al Sweigart, 1st Edition.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Understand computational problem solving and basic elements of python programming.	L1
2. Understand and apply python programming basic constructs like lists, dictionaries, sets and functions.	L1 & L3
3. Illustrate module design and usage of text files in python programming	L3
4. Understand apply basics of object-oriented programming in python.	L1 & L3
5. Understand and demonstrate elementary data structures.	L1 & L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19A521T.1	3	-	3	-	-	-	-	-	-	-	-	3
19A521T.2	3	-	3	3	-	-	-	-	-	-	-	3
19A521T.3	3	-	3	3	-	-	-	-	-	-	-	3
19A521T.4	3	-	3	3	-	-	-	-	-	-	-	3
19A521T.5	3	-	3	3	-	-	-	-	-	-	-	3

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

Title of the Course	Engineering Graphics - II
Category	ES
Course Code	19A321T
Year	I B.Tech
Semester	II Semester (Common to CE & ME)

Lecture Hours	Tutorial Hours	Practical	Credits
2	-	2	3

Course Objectives: This course will

- Increase an ability to communicate graphically and vorally with the people.
- Prepare the student for future Engineering positions.

PART – A: Manual Drawing

Unit 1 Sections of Solids Theory Hours: 05 Practice sessions: 05

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

Unit 2 Development of Surfaces Theory Hours: 04 Practice sessions: 04

Development of Surfaces of Right Regular Solids – Prisms, Cylinder, Pyramid, Cone and their Sectioned parts

Unit 3 Interpenetration of Solids Theory Hours: 02 Practice sessions: 02

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).

Unit 4 Isometric Projections / Views Theory Hours: 04 Practice sessions: 04

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

Unit 5 Conversion of Views Theory Hours: 05 Practice sessions: 05

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

PART - B

Introduction to CAD: (For Internal Evaluation Weightage only) Theory Hours: 04 Practice sessions: 04

Introduction to CAD and Co-ordinate Systems - Basic Commands: Editing, Moving, Copying, Scaling, Mirroring, Rotating, Erase, Undo, Redo, Trimming – Practicing of Geometrical Constructions: Line, Arc, Circle, Rectangle, Polygons – Dimensioning - Conversion of Isometric Views into Orthographic Views

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, Pearson Education

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Analyze the internal details of an object through sectional views.	L4
2. Develop a sheet which meets the specifications of an object	L3
3. Analyze the image of an intersected solid.	L4
4. Employ freehand 3D pictorial sketching to aid in the visualization process and efficiently communicate ideas graphically.	L4
5. Analyze a drawing and can efficiently communicate ideas graphically.	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19A321T.1	3	-	2	-	2	2	-	3	3	-	-	3	3	-	-
19A321T.2	3	2	3	2	-	2	-	3	3	-	-	-	3	1	-
19A321T.3	3	2	3	2	-	2	-	3	3	-	-	-	3	-	-
19A321T.4	3	2	-	-	-	2	-	3	3	-	-	2	3	1	3
19A321T.5	3	2	3	-	-	2	-	3	3	-	3	3	3	1	3

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

Title of the Course	Engineering Mechanics
Category	ES
Course Code	19A322T
Year	I B.Tech
Semester	II Semester (Common to CE & ME)

Lecture Hours	Tutorial Hours	Lecture Hours	Credits
3	-	-	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.

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.

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, centroidsof 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.

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.

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.

Prescribed Text Books:

1. A Nelson, Engineering Mechanics: Statics and Dynamics,1st edition (July 2017) McGraw Hill publications
2. J.L.Meriam , L.G.Kraige , J.N.Bolton ,Engineering Mechanics-statics, Engineering Mechanics-Dynamics,Wiley India Private Limited, Fifth edition (June 2006)
3. S S Bhavikatti, Engineering Mechanics, New Age International Publishers (December 2016)
4. RK Bansal , Engineering Mechanics, Laxmi Publications,Sixth edition (2015)

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:

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
19A322T.1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19A322T.2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19A322T.3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19A322T.4	3	3	-	-	-	-	-	-	-	-	-	-	2	-	-
19A322T.5	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19A322T.6	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19A322T.7	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET

(An Autonomous Institution)

Title of the Course	Python Programming Lab
Category	ES
Course Code	19A521L
Year	I B.Tech
Semester	II Semester (Common to CE, ME & CSE)

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	3	1.5

Course Objectives:

- To practice basics of computational problem solving, python programming and basic control structures.
- To practice python programming basic constructs like lists, dictionaries, sets and functions
- To practice module design and usage of text files in python programming
- To practice basics of object-oriented programming and elementary data structures.

List of Experiments

1. Install Python ecosystem and execute “Hello World” program.
2. Practice
   a. Python literals,variables,identifiers and data types
   b. Python operators
   c. Input and output statements.
   d. Control statements
3. Practice Python Programs on Numbers
   a. Prime Numbers
   b. Armstrong Numbers
   c. Fibonacci Numbers and Series
   d. Sum of squares for the first n natural numbers.
   e. Reverse of a number
4. Implement python program on temperature conversion
5. Implement the python program to convert age in seconds.
6. Practice python programs on various types of triangle patterns
7. Implement python programs to find factorial and Fibonacci number using recursion
8. Practice python programs on lists
9. Practice python programs on sets and dictionaries
10. Practice python programs on functions and their implementation
11. Practice any one python program on module design
12. Practice python programs on text files, string processing
13. Practice python program on exception handling
14. Implement python programs on
    i)Stacks ii) Queues
15. Implement Single linked list data structure.

Prescribed Text Books:

1. Introduction to Computer Science Using Python: A Computational Problem-Solving Focus, Charles Dierbach
2. Data Structures and Algorithms using Python , Rance D. Necaise, Wiley Publications.

Reference Books:

1. Python Programming using problem solving approach, Reema Thareja, Oxford University press
2. Python Programming: An Introduction to Computer Science, John Zelle, Franklin, Beedle & Associates Inc., 3rd Edition
3. Think Python: How to think like a computer Scientist, Allen Downey 2nd Edition O’Reilly Publications.
4. Problem solving with algorithms and data structures using python, Bradley Miller, David L.Ranum, Franklin, Beedle& Associates incorporated, independent publishers.

5. Learning Python, Mark Lutz, O'Reilly Publications 5th Edition
6. Learn Python the Hard Way: A Very Simple Introduction to the Terrifyingly Beautiful World of Computers and Code Zed Shaw,Zed Shaw's Hard Way Series, Third Edition
7. Automate the Boring Stuff with Python: Practical Programming for Total Beginners, Al Sweigart, 1st Edition.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Use python basic concepts to develop problems to solve computational problems.	L3
2. Apply lists, dictionaries, sets and functions in python programming.	L3
3. Experiment module design and text files in python programming	L3
4. Solve problems using object-oriented concepts, elementary data structures in python programming.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19A521L.1	-	-	3	3	3	-	-	-	-	-	-	-
19A521L.2	-	-	3	3	3	-	-	-	-	-	-	-
19A521L.3	-	-	3	3	3	-	-	-	-	-	-	-
19A521L.4	-	-	3	3	3	-	-	-	-	-	-	-

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

Title of the Course	Engineering Physics Lab
Category	BS
Course Code	19AC23L
Year	I B.Tech
Semester	II Semester (Common to CE & ME)

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	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 application in finding the particle size.
- Illustrate the semiconductor, magnetic and dielectric materials applications
- Identify the various sensor applications.

Note: In the following list of experiments, out of 15 experiments any 10 experiments must be performed in a semester.

List of Experiments:

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

Reference Books:

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.

Course Outcomes:

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 ultrasonic's.	L2
3. Exhibit an ability to use techniques and skills associated with modern engineering tools such as fiber optics and sensors.	L2 & L3
4. Measure properties of a semiconductor, magnetic and dielectric materials.	L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19AC23L.1	3	-	-	-	2	-	-	-	-	-	-	-
19AC23L.2	3	-	-	-	-	-	-	-	-	-	-	-
19AC23L.3	3	2	-	-	2	-	-	-	-	-	-	-
19AC23L.4	3	2	-	-	2	-	-	-	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET

(An Autonomous Institution)

Title of the Course	Engineering & IT Workshop
Category	ES
Course Code	19A323L
Year	I B.Tech
Semester	II Semester (Common to CE & ME)

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	3	1.5

Engineering Workshop

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.

Trades for exercises — Practice hours: 24

Carpentry shop– 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.

Sheet metal shop– Two jobs (exercises) from: Tapered Tray, cylinder, conical funnel from out of 22 or 20 guage G.I. sheet

Fitting shop– Two jobs (exercises) from: square Fit, V-Fit, Semi-circular fit, dove tail fit from M.S. stock

House-wiring– Two jobs (exercises) from: Parallel and Series, Two way switch, Tube –Light connection, Stair case connection

Trades for demonstration:

- Plumbing
- Machine Shop
- Metal Cutting
- Soldering and Brazing

Reference Books:

1. Kannaiah P. and Narayana K.L., Workshop Manual, 3rd Edn, Scitech publishers.
2. John K.C., Mechanical Workshop Practice. 2nd Edn. PHI 2010.
3. Jeyapoovan T.and Pranitha S., Engineering Practices Lab Manual, 3rd Edn. Vikas Pub.2008.

Course Outcomes:

Student will be able to,	Blooms Level of Learning
• Apply wood working skills in real world applications.	L3
• Build different parts with metal sheets used in various appliances.	L3
• Apply fitting operations in various assemblies.	L3
• Apply basic electrical engineering knowledge for house wiring practice.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19A323L.1	3	-	1	-	1	-	-	-	-	-	-	1
19A323L.2	3	-	1	-	1	-	-	-	-	-	-	1
19A323L.3	3	-	1	-	1	-	-	-	-	-	-	1
19A323L.4	2	-	1	-	1	-	-	-	-	-	-	1

IT Workshop

Course Objectives: This course will

- Demonstrate the disassembling and assembling 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.
- Demonstrate the disassembling and assembling of a personal computer system.

Preparing your Computer Practice Hours: 9

Task 1: 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.

Task 2: Assembling a Computer: Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods available (eg: beeps). Students should record the process of assembling and troubleshooting a computer.

Task 3: Install Operating System: Student should install MS Windows on the computer. Students should record the entire installation process.

Internet Practice Hours: 3

Task 4: 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 Facebook, 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.

Productivity tools Practice Hours:3

Task 5: 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.

Task 6: 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.

Task 7: 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, hyperlinking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.

Prescribed Text Books:

1. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
2. Upgrading and Repairing PCs, 22nd Edition, Scott Muller QUE, Pearson Education.
3. Comdex Information Technology Course Kit, Vikas Gupta, WILEY Dreamtech.
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, CiprianRusen, Microsoft Press
3. Troubleshooting, Maintaining & Repairing PCs, 5th Edition, Bigelow, TMH
4. Introduction to computers, Peter Norton, 6/e, Mc Graw Hill

Course Outcomes:

Student will be able to,	Blooms Level of Learning
1. Recognize the peripherals of a computer, perform assembling and disassembling of various components of a computer.	L1 & L3
2. Describe and perform installation and un-installation of Windows operating systems and also perform troubleshooting of various hardware and software components.	L2 & L3
3. Use Web browsers to access Internet, Search Engines.	L3
4. Use word processor; spread sheet, presentation and data storage tools.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19A323L.5	3	3	1	-	3	-	-	-	-	-	-	3
19A323L.6	3	3	1	-	3	-	-	-	-	-	-	3
19A323L.7	3	3	1	-	3	-	-	-	-	-	-	3
19A323L.8	3	3	1	-	3	-	-	-	-	-	-	3

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

Title of the Course	Life Sciences for Engineers
Category	BS
Course Code	19AC34T
Year	II B. Tech
Semester	I Semester (Common to CE, ME, & CSE)

Lecture Hours	Tutorial Hours	Practical	Credits
2	-	-	2

Course Objectives:

- Introduce the molecular basis of life.
- Provide the basis for classification of living organisms.
- Describe the transfer of genetic information.
- Introduce the techniques used for modification of living organisms.
- Describe the applications of biomaterials

Unit 1 Living Organisms 6

Comparison of biological organisms with manmade systems, Classification of living organisms, Cellular basis of life, differences between prokaryotes and eukaryotes, classification on the basis of carbon and energy sources, molecular taxonomy.

Unit 2 Proteins and Enzymes 6

Water, Biomolecules, structure and functions of proteins and nucleic acids, hemoglobin, antibodies and enzymes, Industrial applications of enzymes, Fermentation and its industrial applications.

Unit 3 Human Physiology 6

Bioenergetics, Respiration: Glycolysis and TCA cycle, Electron transport chain and oxidative phosphorylation, Mechanism of photosynthesis, Human physiology, neurons, synaptic and neuromuscular junctions.

Unit 4 Genes and DNA 6

Mendel's laws, gene mapping, Mitosis and Meiosis, single gene disorders in humans, Genetic code, DNA replication, Transcription, Translation.

Unit 5 RNA 6

Recombinant DNA Technology: recombinant vaccines, transgenic microbes, plants and animals, animal cloning, biosensors, biochips.

Prescribed Text Books:

1. N. A. Campbell, J. B. Reece, L. Urry, M. L. Cain and S. A. Wasserman, "Biology: A global approach", Pearson Education Ltd, 2018.
2. Arthur T Johnson, Biology for Engineers, CRC press, 2011.

Reference Books:

1. Alberts Et.Al. The molecular biology of the cell, 6/e, Garland Science, 2014.
2. E. E. Conn, P. K. Stumpf, G. Bruening and R. H. Doi, "Outlines of Biochemistry", John Wiley and Sons, 2009.
3. John Enderle and Joseph Bronzino Introduction to Biomedical Engineering, 3/e, 2012.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Explain catalytic properties of enzymes.	L2
2. Summarize application of enzymes and fermentation in industry.	L2
3. Identify DNA as a genetic material in the molecular basis of information transfer.	L2

4. Apply thermodynamic principles to biological systems. L2
5. Analyze biological processes at the reductionistic level. L4
6. Identify the potential of recombinant DNA technology. L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19AC34T.1												
19AC34T.2												
19AC34T.3												
19AC34T.4												
19AC34T.5												

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

Title of the Course	Partial Differential Equations and Complex Variables
Category	BS
Course Code	19AC31T
Year	II B.Tech
Semester	I Semester (Common to CE, EEE, ME & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	3

Course Objectives:

- To familiarize the transform techniques and complex variables.
- To equip the students to solve application problems in their disciplines.

Unit 1 Laplace transforms 10

Laplace transforms of standard functions- First shifting theorem- change of scale property- multiplication by t^n- division by t- transforms of derivatives and integrals- Laplace transform of Periodic functions. (Without proofs).

Unit 2 Inverse Laplace transforms 8

Inverse Laplace transforms – Convolution theorem. (Without proof).
Applications of Laplace transforms to ordinary differential equations of first and second order with constant coefficients.

Unit 3 Fourier series 6

Fourier series- Dirichlet conditions- functions of any period-odd and even functions - half range series.

Unit 4 Applications of Partial Differential Equations 8

Method of separation of variables- second order partial differential equations- solutions of 1D-wave- 1D-heat and 2D-Laplace equations in Cartesian coordinates.

Unit 5 Complex Variables 8

Differentiability-Analyticity -C-R equations (without proof) - harmonic functions- finding harmonic conjugate. Contour integrals- Cauchy's theorem (without proof) - Cauchy's integral formula-Generalized Cauchy's integral formula (without proof).

Prescribed Text Books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43/e, 2015.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9/e, John Wiley & Sons, 2006

Reference Books:

1. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9/e, Wiley India, 2009.
2. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India,1995.
3. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7/e, Mc-Graw Hill, 2004
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, 2008

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Apply the Laplace transformations for different types of functions	L3
2. Apply the inverse Laplace transformations for different types of functions and solve ordinary differential equations by using Laplace transformation technique.	L3
3. Understand the nature of the Fourier series that represent even and odd functions.	L2

4. Solve the boundary value problems (related to heat, one dimensional wave equation. L3
5. Apply Cauchy-Riemann equations to complex functions in order to determine whether a given continuous function is analytic and evaluate contour integrals. L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19AC31T.1	3	2	-	-	-	-	-	-	-	-	-	2
19AC31T.2	3	2	-	-	-	-	-	-	-	-	-	2
19AC31T.3	3	2	-	-	-	-	-	-	-	-	-	2
19AC31T.4	3	2	-	-	-	-	-	-	-	-	-	2
19AC31T.5	3	3	-	-	-	-	-	-	-	-	-	3

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

Title of the Course	Building Materials and Construction
Category	PC
Course Code	19A131T
Year	II B.Tech
Semester	II Semester (CE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	3

Course Objectives:

- Examining the good materials to be used for the construction work
- Teach to supervision of different types of masonry
- Illustrate the methodology in selection of materials, design and supervision of suitable type of floor and roof

Unit 1 Stones and bricks 8

Properties of building stones – relation to their structural requirements. Classification of stones – Stone quarrying – precautions in blasting, Dressing of stone, Composition of good brick earth, various methods of manufacture of bricks. Comparison between clam burning and kiln burning.

Unit 2 Roofing materials- lime & cement 9

Roofing materials: Characteristics of good tile – manufacturing methods, Types of tiles. Use of Materials like aluminium, gypsum, glass and bituminous materials – their quality.

Lime & cement: Various ingredients of lime – Constituents of lime stone – classification of lime – various methods of manufacture of lime, various ingredients of cement, types of cement

Unit 3 Wood 6

Structure – properties – Seasoning of timber. Classification of various types of woods used in buildings – Defects in timber. Alternative materials for wood, Galvanized Iron, Fiber-reinforced plastics.

Unit 4 Masonry & foundations 8

Masonry: Types of masonry, English and Flemish bonds, Rubble and Ashlar masonry, cavity and partition walls.

Foundations: Shallow foundations – Spread, combined, strap and mat foundations.

Unit 5 Building components & finishings 10

Building components: Lintels, Arches, and stair cases – Types. Different types of floors-Concrete, Mosaic, Terrazo floors, Pitched, flat and curved Roofs. Lean-to-Roof, Coupled Roofs, Trussed roofs- King and Queen Post Trusses.

RCC Roofs.

Finishings: Damp proofing- materials used. Plastering, pointing, white washing and distempering – Painting – Constituents of a paint – Types of paints – Painting of new/old Wood – Varnish – Form work and scaffolding

Prescribed Text Books:

1. Building material by S K Duggal – New Age International Publishers; Second Edition.
2. Building materials by R.S.Rangwala,Charotar publications
3. Building Construction by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi.
4. Building Construction by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi.

Reference Books:

1. R.Chudly "Construction Technology "– Volumes I and II" 2nd Edition, Longman, UK, 1987.
2. Building materials by P.C. Varghese, Prentice-Hall of India private Ltd,

Course Outcomes:

The student will be able to	Blooms Level of Learning
1. Understand about stones and bricks.	L2
2. Understand about different roofing materials and lime, cement	L2
3. Understand about wood, alternating material for wood and its defects	L2

4. Summarize different types of masonry and foundations L2
5. Understand different types of building components and finishing works. L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19A131T.1	-	-	-	3	-	-	2	-	-	-	-	3	-	-	-
19A131T.2	-	-	-	3	-	-	2	-	-	-	-	3	-	-	-
19A131T.3	-	-	-	3	-	-	2	-	-	-	-	3	-	-	-
19A131T.4	-	-	-	3	-	-	2	-	-	-	-	3	-	-	-
19A131T.5	-	-	-	3	-	-		-	-	-	-	3	-	-	-

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

Title of the Course:	Surveying
Category	PC
Course Code	19A132T
Year	II Year
Semester	II Semester (CE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	3

Course Objectives:

- To ensure that the student develops knowledge of the basic and conventional surveying instruments, principles behind them, working of the instruments, plotting of the area from the field measurements, determination of the area and the theory behind curves.
- To ensure that the student develops knowledge in the working of advanced instruments, setting out of curves from the field measurements and basic knowledge on remote sensing.

Unit 1 8

Linear measurements and chain surveying: Principle – Classification - Accuracy and errors - Linear measurements – Direct measurements - Instruments for chaining – Ranging out survey lines – Errors in chaining – Tape corrections - Chain triangulation -Field book - Instruments for setting right angles - Basic problems in chaining - Obstacles for chaining.
Compass: Compass Survey: Types of compass – Bearings - Included angles– Declination - Dip and local attraction.

Unit 2 10

Leveling and contouring: Types of levels - Dumpy level - Temporary and permanent adjustments - Height of instrument and rise and fall methods - Effect of curvature and refraction - Characteristics of contours - Direct and indirect methods of contouring and plotting of contours - Uses of contour maps.
Computation of areas and volumes: Areas: Areas dividing into number oftriangles- By offsets to a base line - By latitudes and departures (D.M.D. and D.P.D) – By coordinates - Areas from maps. Volumes: Volume from cross-section - Embankments and cutting for a level sections - transverse slopes.

Unit 3 6

Theodolite: Description and uses of vernier micrometer – Micro-optic theodolites – Temporary and permanent adjustments of vernier theodolite – Measurement of horizontal and vertical angles – Heights and distances – Traversing – Closing error and distribution – Gale's traverse table – Omitted measurements.

Unit 4 9

Curves : Types of curves - Linear and angular methods of setting out of simple curves – By offsets from long chord – By offsets from tangents - By successive bisection of chords – By offsets from chords produced – Two Theodolite methods, Introduction to EDM, basic concepts & total station.

Unit 5 7

Plane table surveying: Plane Table Survey: Components – Setting – Methods – Radiation– Traversing - Intersection and Resection
Tacheometric surveying: Principle of stadia method – Distance and elevation formulae for staff held vertical–Instrumental constants – Anallactic lens–Tangential method–Use of sub tense bar –Tachometric contouring.

Prescribed Text Books:

1. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Surveying - Vol. I, II and III, 15th Edition, Laxmi Publications (P) Ltd., New Delhi, 2010.
2. S. K. Duggal, Surveying - Vol. I and II, 3rd Edition, Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 2010.

Reference Books:

1. R. Subramanian, Surveying and Leveling, 1stEdition, Oxford University Press, New Delhi, 2010.
2. Chandra, A.M, Plane Surveying, 2nd Edition, New Age International Publishers, New Delhi, 2010.
3. Arora, K. R., Surveying - Vol. I, II and III, 10th Edition, Standard Book House, Delhi, 2011.
4. Arthur R. Benton and Philip J. Taety, Elements of Plane Surveying, 3rd Edition, McGraw Hill, 2010.

Course Outcomes

The student will be able to	Bloom's Level of Learning
1. Measure distances by using chain and angles by using compass.	L4
2. Calculate areas and volumes, reduced levels and to draw contour maps.	L2
3. Compute horizontal angles, vertical angles, heights and distances by using theodolite.	L4
4. Orient and draw the various maps by using plane table and Tacheometric surveying.	L4
5. Setting out a curve by different methods and to familiarize EDM, Total station concepts.	L5,L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19A132T.1	3	-	2	-	3	-	-	-	-	-	-	-	2	3	-
19A132T.2	3	3	2	-	3	-	-	-	-	-	-	-	2	3	-
19A132T.3	3	3	3	-	3	-	-	-	-	-	-	-	2	3	-
19A132T.4	3	3	3	-	3	-	-	-	-	-	-	-	2	3	3
19A132T.5	3	3	3	-	3	-	-	-	-	-	-	-	2	3	3

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

Title of the Course	Mechanics of Materials
Category	PC
Course Code	19A133T
Year	II Year
Semester	I Semester (CE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	3

Course Objectives:

- To enable the student to familiarize about basic properties of materials.
- To enable the student to draw shear force and bending moment diagrams for different types of beams.
- To train the student to compute shear stresses and bending stresses in different cross-sections.
- To demonstrate analytical methods for determining deflection of beams
- To teach the student with basic concepts for determination of principal stresses and strains in various structural elements and to analyze failure mechanisms.

Unit 1 Simple stresses and strains 7

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

Unit 2 Shear force and bending moment 8

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

Unit 3 Flexural stresses & Shear stresses 10

Flexural stresses: Theory of simple bending –Assumptions –Derivation of bending equation: M/I =f/y = E/R Neutral axis– Determination of bending stresses– section modulus of rectangular and circular sections (Solid and Hollow), I, T,L & Channel sections –Design of simple beam sections.
Shear stresses:Derivation of formula– Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T., L & Chanel sections.

Unit 4 Deflection of beams 8

Bending in to a circular arc– slope, deflection and radius of curvature –and Determination of slope and deflection for cantilever and simply supported beams subjected to point loads,-U.D.L. Uniformly varying load.-Mohr's theorems –Moment area method– Macaulay's methods and Double integration method.

Unit 5 Principal stresses and strains& theories of failures 11

Principal stresses and strains: Introduction– Stresses on an inclined section of a bar under axial loading– compound stresses– Normal and tangential stresses on an inclined plane for biaxial stresses– Two perpendicular normal stresses accompanied by a state of simple shear– Mohr's circle of stresses– Principal stresses and strains –Analytical and graphical solutions.
Theories of failures: Introduction– Various Theories of failures like Maximum Principal stress theory– Maximum Principal strain theory–Maximum shear stress theory– Maximum strain energy theory –Maximum shear strain energy theory.

Prescribed Text Books:

1. Mechanics of Materials – Dr. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Laxmi publications.
2. Strength of Materials by R. Subramaniyan, Oxford University Press.
3. Strength of materials by Dr. R. K.Bansal – Laxmi publications.

Reference Books:

1. Mechanics of Solids, by Ferdinand Beer and others– Tata Mc. Grawhill Publications2000
2. Strength of materials by R. K. Rajput, S. Chand & Co, New Delhi.
3. Strength of Materials by S. Ramakrishna and R. Narayan– DhanpatRai Publications.
4. Strength of Materials by Schaum's outline series –Mc.Grawhillb International Editions.

Course Outcomes

The student will be able to	Bloom's Level of Learning
1. Understand various engineering properties of materials.	L2
2. Estimate magnitudes of shear force and bending moment for different types of beams under different under different loads	L4
3. Determine flexural stresses and shear stresses for different cross-sections	L4
4. Determine deflection at any point on a beam under simple or combined loads.	L4
5. Apply failure criteria to implement in design of structural members and able to calculate principle stresses and strains.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19A133T.1	2	3	3	-	-	-	-	-	-	-	-	1	2	2	-
19A133T.2	2	3	3	-	-	-	-	-	-	-	-	1	2	2	-
19A133T.3	2	3	3	-	-	-	-	-	-	-	-	-	2	2	-
19A133T.4	2	3	3	-	-	-	-	-	-	-	-	-	2	2	-
19A133T.5	2	3	3	-	-	-	-	-	-	-	-	1	2	2	-

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

Title of the Course	Fluid Mechanics
Category	PC
Course Code	19A134T
Year	II Year
Semester	I Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	3

Course Objectives:

- To explain concepts of fluid mechanics used in Civil Engineering.
- To explain basics of statics, kinematics and dynamics of fluids and various measuring techniques of hydrostatic forces on objects.
- To impart ability to solve engineering problems in fluid mechanics
- To explain fluid flow through in pipes, tanks and channel
- To enable the students measure quantities of fluid flowing in pipes, tanks and channels

Unit 1 Basic concepts and Definitions 7

Distinction between a fluid and a solid; Dimensions and Units; Fluid properties - Density, Specific weight, Specific gravity, Specific volume, Kinematic and dynamic Viscosity, Vapor Pressure, Cohesion, Adhesion, Surface Tension, Capillarity, Bulk Modulus of Elasticity, Compressibility; Types of fluids - Ideal and real fluids, Newtonian and non-Newtonian fluids; Rheological behavior of fluids.

Unit 2 Fluid statics 6

Fluid Pressure; Pressure at a point; Hydrostatic law; Pascal's law; Atmospheric, Gauge and Absolute pressure; Equation of state; Measurement of pressure - Manometers, Mechanical gauges; Hydrostatic forces on submerged plane and curved surfaces – Total pressure and Centre of pressure; Practical applications – Dams, Gates; Buoyancy; Buoyant force; Centre of Buoyancy; Metacentre; Metacentric height-Theoretical method; Stability conditions.

Unit 3 Fluid Kinematics & Fluid Dynamics 8

Classification of fluid flow - Steady and Unsteady flow, Uniform and Non-Uniform flow, Laminar and turbulent flow, Rotational and Irrigational flow, One, Two and Three dimensional flows; Stream line; path line; streak line and stream tube; Velocity, Acceleration and Rotation of fluid particles; Derivation of Continuity equation – One-dimensional, Three-Dimensional; Stream function; Velocity potential; Flow net – Methods, Uses

Surface and body forces; Euler's equation; Bernoulli's equation; Kinetic Energy correction factor; Applications of Bernoulli's equation - Venturimeter, Orifice meter and Pitot tube; Momentum equation; Momentum correction factor; Applications of Momentum equation - Force on a pipe bend; Vortex Flow – Free and Forces.

Unit 4 Flow through Pipes 10

Reynold's experiment; Energy losses – Major and Minor losses; Laws of fluid friction; Darcy – Weisbach equation; Hydraulic Grade Line and Total Energy Line; Pipes in Series and Parallel; Equivalent pipe; Branched pipe; Flow through a Bye-pass; Siphon; Water hammer in pipes; Pipe networks.

Laminar flow: Laminar flow through circular pipes – Hazen Poiseuille law; Laminar flow between parallel plates – Both plates at rest, One plate moving and Other at rest (Couette flow);

Turbulent flow: Hydro dynamically smooth and rough boundaries; Resistance to flow of fluid in smooth and rough pipes; Moody's diagram

Unit 5 Flow through Orifices and Mouthpieces, Notches, Wiers, Model Analysis 12

Flow through Orifices and Mouthpieces: Types of Orifices and Mouthpieces; Determination of coefficients for Orifice; Flow through large vertical and submerged Orifice; Flow through External, Internal, Convergent-Divergent and Re-entrant Mouthpiece

Flow over Notches and Weirs: Types of Notches and Weirs; Flow over - Rectangular Sharp-crested, Triangular, Trapezoidal Notches and Weirs; Broad-crested Weirs; Submerged Weirs; Proportional Weirs

Dimensional Analysis, Hydraulic similitude and Model Investigation: Methods of Dimensional analysis - Rayleigh Method, Buckingham π-Method; Types of Similarities - Geometric, Kinematic and Dynamic similarity; Dimensionless Numbers; Model laws; Types of Models; Scale Effect in Models

Prescribed Text Books:

1. R. K. Bansal, A text of Fluid mechanics and hydraulic machines, Laxmi Publications (P) Ltd., New Delhi
2. P. M. Modi and S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House
3. C. S. P. Ojha, R. Berndtsson and P. N. Chadramouli, Fluid Mechanics and Machinery, Oxford University Press, 2010.

Reference Books:

1. N. Narayana Pillai, Principles of Fluid Mechanics and Fluid Machines, Universities Press Pvt Ltd, Hyderabad. 3rd Edition 2009.
2. C. S. P. Ojha, R. Berndtsson and P. N. Chadramouli, Fluid Mechanics and Machinery, Oxford University Press, 2010.
3. K. Subrahmanya, Theory and Applications of Fluid Mechanics, Tata McGraw Hill

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Familiarize basic terms used in fluid mechanics and properties of fluids	L2
2. Understand the principles of fluid statics.	L2
3. Understand the principles of kinematics and dynamics	L2
4. Understand flow characteristics and classify the flows through pipes and to estimate losses in pipes.	L2 & L4
5. Measure flow through tanks, canals and model investigations model investigations	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19A134T.1	3	2	-	-	-	-	-	-	-	-	-	-	2	1	-
19A134T.2	2	2	-	-	-	-	-	-	-	-	-	2	2	1	-
19A134T.3	2	2	-	-	-	-	-	-	-	-	-	-	2	1	-
19A134T.4	2	2	-	-	-	-	-	-	-	-	-	2	2	1	-
19A134T.5	3	2	-	-	-	-	-	-	-	-	-	2	2	1	-

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

Title of the Course	Basic Electronics, Electrical & Mechanical technology
Category	CE
Course Code	19235T
Year	II B.Tech
Semester	I Semester

Lecture Hours	Tutorial Hours	Practical	Credits
2	-	-	2

Course Objectives:

- To impart the basic knowledge about the Electric circuits.
- To understand the working of various Electrical Machines.
- To know about various electronic devices and various parts of CRO.
- To understand the welding processes and working principles of welding equipment's and basic principles of refrigeration and air conditioning
- To understand the working principles of IC engines and aircompressors.

Unit 1 Electrical circuits & DC machines 10

Electric current, Potential Difference, Power, Energy, Ohm's law, Kirchoff's laws, Principle of Operation of DC Generator & Motor, Construction and Applications.

Unit 2 AC machines 12

Principle of operation of 1-ø Transformers, Losses, Efficiency, Regulation, Principle of Operation of Alternators, Principle of operation of 3-ø Induction motor, Torque-slips Characteristics and Applications.

Unit 3 Electronics & CRO 10

PN junction diode, symbol, V-I characteristics, applications, Half wave, full wave and bridge rectifiers.
CRO: Block diagram of CRO, Principle of CRT (cathode ray tube), applications of CRO.

Unit 4 8

Welding processes: Introduction to welding - Classification of welding processes – Arc welding and Equipment's-gas welding and equipment's –welding fluxes and filler rods – Submerged arc welding, TIG and MIG processes.
Refrigeration and air conditioning: Terminology of refrigeration and air conditioning —Vapour compression and vapour absorption systems - Basic principles of air conditioning – Room air conditioning systems

Unit 5 8

Internal Combustion Engines: Introduction, Classification and Main components of IC Engines – Working principle of petrol and diesel engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines.
Air Compressors: Working principles of air compressors – Reciprocating air compressor: single and multi-stage compression.

Prescribed Text Books:

1. Electrical Technology by B.L.Thareja
2. Introduction to Electrical Engineering - M.S Naidu and S. Kamakshaiah
3. Mechanical Technology by R.S. Khurmi.
4. Mechanical Technology by Kodandaraman C.P.

Reference Books:

1. Circuits and Networks by A.Sudhakar and shyammohan
2. Circuit Theory by A.Chakrabarthi
3. D.P Kothari and I.J Nagrath, Basic Electrical Engineering, TMH, 3rdEd.2010.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Predict the behavior of electrical circuits.	L1

2. Identify the type of electrical machine used for that particular application. L1 & L3
3. Identify the semi-conductor devices and working principle of CRO L1 & L3
4. Understand the welding processes and working principles of different welding equipment and basic principles of refrigeration and air conditioning. L2
5. Understand the working principles of IC engines and air compressors. L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19A235T.1	3	3	-	-	2	-	-	-	2	2	-	-	2	2	1
19A235T.2	3	3	-	-	2	-	-	-	2	2	-	-	2	3	-
19A235T.3	2	2	-	3	-	-	-	-	2	-	2	-	2	2	3
19A235T.4	3	-	-	-	-	-	3	3	3	-	-	-	3	-	-
19A235T.5	3	-	-	-	-	-	3	3	3	-	-	-	3	-	-

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

Title of the Course	Constitution of India
Category	MC
Couse Code	19AC37T
Year	II B.Tech
Semester	I Semester (Common to CE, CSE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	-

Course Objectives:

- To enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of india and election commission of india.
- To understand the central and state relation financial and administrative

Unit 1 9

Introduction to Indian Constitution: Constitution' meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

Unit 2 9

Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions

Unit 3 9

State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

Unit 4 9

Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation PachayatiRaj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy

Unit 5 9

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission:, Functions of Commissions for the welfare of SC/ST/OBC and women

Prescribed Text Books

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi
2. Subash Kashyap, Indian Constitution, National Book Trust

Reference Books

1. J.A. Siwach, Dynamics of Indian Government & Politics
2. D.C. Gupta, Indian Government and Politics
3. M.V. Pylee, India's Constitution

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Understand historical background of the constitution making and its importance for building a democratic India.	L2
2. Understand the functioning of three wings of the government i.e., executive, legislative and Judiciary.	L2
3. Understand the value of the fundamental rights and duties for becoming good citizen of India.	L2
4. Analyze the decentralization of power between central, state and local self-government.	L3
5. Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19AC37T.1	-	-	-	-	-	-	-	-	-	-	-	3
19AC37T.2	-	-	-	-	-	-	-	-	-	-	-	3
19AC37T.3	-	-	-	-	-	-	-	-	-	-	-	3
19AC37T.4	-	-	-	-	-	-	-	-	-	-	-	3
19AC37T.5	-	-	-	-	-	-	-	-	-	-	-	3

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

Title of the Course	Surveying Lab
Category	PC
Course Code	19A132L
Year	II Year
Semester	I Semester

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	2	1.0

Course Objectives:

- Highlight the purpose of surveying in civil engineering construction.
- Formulate survey observations and perform calculations.
- Explain different types of curves, their requirement and curve setting.
- Train on utilization of surveying instruments like, Total station.

List of Experiments

1. Chaining across obstacles
2. Determination of distance between two inaccessible points with compass.
3. Surveying of a given area by prismatic compass (closed traverse) and plotting after adjustment.
4. Radiation method, intersection methods by plane Table survey
5. Plane table survey; finding the area of a given boundary
6. Two Point Problem by the plane table survey.
7. Fly levelling: Height of the instrument method and rise and fall method.
8. Fly levelling; Longitudinal Section and Cross sections of a given road profile.
9. Theodolite Survey: Determining the Horizontal and Vertical Angles Finding the distance between two inaccessible points.
10. Tachometric survey: Heights and distance problems using tachometric principles.
11. One Exercise on Curve setting.
12. Total Station Determination of area using total station. Traversing and Contouring
13. Total Station: Determination of Remote height

Note: In the following list of experiments, out of 15 experiments any 10 experiments must be performed in a semester.

Course Outcomes:

Student will be able to	Blooms Level of Learning
• Understand basics of surveying and identifying the needs of surveying.	L2
• Apply the knowledge, techniques and survey tools in engineering practices. Identify data collection methods and prepare field notes.	L3
• Translate the knowledge gained for implementation infrastructure facilities.	L3
• Estimate errors in measurements and apply corrections.	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19A132L.1	3	2	2	3	-	-	-	-	-	-	-	2	2	2	2
19A132L.2	3	2	2	3	-	-	-	-	-	-	-	1	2	2	3
19A132L.3	3	2	2	3	-	-	-	-	-	-	-	2		2	3
19A132L.4	3	2	2	3	-	-	-	-	-	-	-	2		2	3
19A132L.5	3	2	2	3	-	-	-	-	-	-	-	2		2	3

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

Title of the Course	Mechanics of Materials Lab
Category	PC
Course Code	19A133L
Year	II Year
Semester	I Semester

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	2	1.0

Course Objectives:

- This course will make the student to understand the behavior of materials and beams under different types of loading.

List of Experiments

1. Tension test.
2. Bending test on (Steel/Wood) Cantilever beam.
3. Bending test on simple support beam.
4. Torsion test.
5. Hardness test.
6. Spring test.
7. Compression test on wood or concrete
8. Impact test
9. Shear test
10. Continuous beam – Deflection test.
11. Verification of Maxwell's Reciprocal theorem

Note: In the following list of experiments, out of 11 experiments any 10 experiments must be performed in a semester.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Evaluate the behavior of material under impact load, tensile, compressive, torsional and shear forces.	L4
2. Determine hardness of metals & flexural strength of various beams.	L4
3. Verify Maxwells Reciprocal Theorem on beams.	L3
4. Analyse the behavior of spring under compression and tensile forces.	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19A133L.1	2	2	-	-	3	-	-	-	-	-	-	-	3	3	2
19A133L.2	2	2	-	-	3	-	-	-	-	-	-	-	3	3	1
19A133L.3	2	2	-	-	3	-	-	-	-	-	-	-	3	3	2
19A133L.4	2	2	-	-	3	-	-	-	-	-	-	-	3	3	1

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

Title of the Course	Fluid Mechanics lab
Category	HS
Course Code	19A134L
Year	II B.Tech
Semester	I Semester

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	2	1

Course Objectives:

- This course will make the student to understand the fluid flow concepts and get familiarity with flow measuring devices.

List of the experiments

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

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Determine the effect of major loss and minor loss on fluid flow.	L4
2. Summarizes the bernouli's equation and Reynolds experiment.	L2
3. Analyse different practical fluid flow measuring devices and utilize fluid mechanics principles in design.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19A134L.1	2	-	3	3	-	-	-	-	-	-	-	-	2	1	-
19A134L.2	2	-	3	3	-	-	-	-	-	-	-	-	2	1	-
19A134L.3	2	-	3	3	-	-	-	-	-	-	-	-	2	1	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course	Numerical Methods & Probability and Statistics
Category	BS
Course Code	19AC41T
Year	II B. Tech
Semester	II Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	3

Course Objectives:

- To familiarize the students with numerical methods of solving the non-linear equations, interpolation, differentiation, integration, and ordinary differential equations.
- To impart knowledge in basic concepts and few techniques in probability and statistics in relation to the engineering applications.

Unit 1 Algebraic and transcendental equations, Interpolation 8

Solutions of algebraic and transcendental equations: Bisection method-Regula-Falsi method - Newton-Raphson method.
Interpolation: Finite differences - forward differences and backward differences-Newton's forward interpolation formula-Newton's backward interpolation formula- Lagrange's interpolation formula.

Unit 2 Numerical Differentiation, Integration and Solutions of Ordinary 8

Numerical Differentiation; Numerical integration - Trapezoidal rule - Simpson's 1/3rd and 3/8 rules.
Numerical Solutions of ordinary differential equations of first order: Taylor's series- Modified Euler's method- Runge-Kutta method of fourth order.

Unit 3 Probability 10

Introduction to probability - Random variables (discrete and continuous) - Mean - Variance
Probability distributions: Binomial distribution, Poisson distribution and normal distribution.

Unit 4 Testing of Hypothesis for Large Sample Tests 6

Large sample tests: test for single mean and difference of means - test for single proportion and difference of proportions.

Unit 5 Testing of Hypothesis for Small Sample Tests 8

Student t-distribution (single mean, two means and paired t-test) - Testing of equality of variances (F-test) - $\chi 2$ - test for goodness of fit - x^2 - test for independence of attributes.

Prescribed Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. P. Kandasamy, K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company, 2/e, Reprint 2012.

Reference Books:

1. Veerarajan T., Engineering Mathematics, Tata McGraw-Hill, New Delhi, 2008.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9/e, John Wiley & Sons, 2006.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Apply the knowledge of numerical methods to solve algebraic and transcendental equations and will acquire the knowledge of interpolation.	L3
2. Understand the techniques of numerical differentiation, numerical integration and numerical solutions of ODE.	L2
3. Apply discrete and continuous probability distributions.	L3
4. Test various hypothetical statements for large samples.	L4
5. Infer the statistical inferential methods based on small sampling tests.	L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19AC41T.1	3	3	-	-	-	-	-	-	-	-	-	2
19AC41T.2	3	3	-	1	-	-	-	-	-	-	-	2
19AC41T.3	3	3	-		-	-	-	-	-	-	-	2
19AC41T.4	3	3	-	2	-	-	-	-	-	-	-	2
19AC41T.5	3	3	-	2	-	-	-	-	-	-	-	2

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

Title of the Course	Building Planning & Environment
Category	ES
Course Code	19A141T
Year	II B. Tech
Semester	II Semester

Lecture Hours	Tutorial Hours	Practical	Credits
2	-	-	2

Course Objectives:

- To ensure the student to be aware of building byelaws.
- To make the student to understand about principles of planning, standards and requirements of Residential building and Public building
- To make the student to understand about CPM and PERT-concepts
- To ensure the student to know about Building environment and its impact.

Unit 1 Building Byelaws and Regulations 8

Introduction –Terminology –Objectives of building byelaws –Floor area ratio (FAR) –Floor space Index (FSI) –Principles underlying building byelaws –classification of buildings –Open space requirements –built up area limitations –Height of Buildings –Wall thickness –lighting and ventilation requirement.

Unit 2 Residential buildings 8

Minimum standards for various parts of buildings –requirements of different rooms and their grouping –characteristics of various types of residential buildings. Principles of planning- architectural principle, Aspects of planning within and with respect to surroundings, Modular planning concept.

Unit 3 Public buildings 8

Planning of Educational institutions, hospitals, dispensaries, Office buildings, banks, industrial buildings, hotels and motels, buildings for recreation.
Elements of Perspective Drawing: Definition, concept and single and two point perspective.

Unit 4 CPM & Project Networking 8

Planning of construction projects – scheduling and monitoring Bar chart – CPM and PERT Network planning – computation of times and floats – their significance.

Unit 5 Introduction to Building Environment 8

Thermal Control-Human Physiology, Heat balance, Metabolism, clothing, Environmental Factors, Thermal comfort standards, Temperature and Humidity extremes, air quality and quantity.
Building Impact on environment- Ozone depletion, Global warming, energy conservation, Green design-Case study.

Prescribed Text Books:

1. Building Planning & Drawing by Dr N. Kumaraswamy and A.Kameswara Rao, Charitor Publications.
2. Planning and Designing and Scheduling- Gurucharan Singh and Jagadish Singh – Standard Publishers.
3. Planning and Designing of Buildings – Y.S.Sane.
4. Building environment-Active and Passive-VaughnBradshaw.
5. Building Environment-Jai simha & Anitha

Reference Books:

1. Sikka, V.B. (2013), A Course in Civil Engineering Drawing, S. K. Kataria & Sons,
2. PERT and CPM – Project planning and control with by Dr.B.C.Punmia & Khandelwal – Laxmi publications.
3. Building by laws bye state and Central Governments and Municipal corporations.

4. 'A' Series & 'B' Series of JNTU Engineering College, Anantapur.
5. Building drawing – M.G.Shah, C.M.Kale, S.Y.Patki

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Understand Building Byelaws & regulations	L2
2. Understand principles of planning, standards and requirements for residential building.	L2
3. Understand principles of planning, standards and requirements for public building.	L2
4. Understand the concept of CPM & PERT.	L2
5. Understand the building environment concepts and its impact on environment.	L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19A141T.1	-	2	3		-	-	-	-	-	-	-	2	2	-	3
19A141T.2	-	2	3		-	-	-	-	-	-	-	2	2	-	3
19A141T.3	-	2	3		-	-	-	-	-	-	-	2	2	-	3
19A141T.4	-	2	3		-	-	-	-	-	-	-	1	2	-	3
19A141T.5	-	2	3		-	-	-	-	-	-	-	1	2	-	3

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

Title of the Course	Managerial Economics and Financial Accounting
Category	HS
Course Code	19AE41T
Year	II B. Tech
Semester	II Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	3

Course Objectives:

- To understand the concepts and tools of economic analysis.
- To apply concepts in real life by developing problem solving skills there exists a relationship between Managerial Economics and Accounting.
- To focus on picking up the basics of Accounting such as Accounting Data and Financial Statements, which constitute the language of Business.
- To make the student familiar with journalisation, interpretation and use of Accounting Data.

Unit 1 Introduction to Managerial Economics 7

Managerial Economics: Meaning and Nature, Definition, Scope, relationship with other areas.
Demand Analysis: Definition and types of Demand, Demand Determinants, and Law of Demand and its exceptions, Elasticity of Demand- types, measurement and Significance, Demand forecasting methods.

Unit 2 Production and Cost Analysis 7

Production: Production Function, Cobb-Douglas Production function, Iso-quants and Iso-costs, MRTS, Least Cost Combination of Inputs, Laws of Returns, Internal and External Economies of Scale.
Cost Analysis: Cost concepts, Determinants of cost, cost-output relationship in short run and Long run.
Break-Even Analysis (BEA): Objectives, Assumptions, Importance, Graphical representation, Limitations, simple numerical problems.

Unit 3 Market Structure and Forms of Business Organizations 6

Markets: Perfect market, imperfect market- Monopoly, Monopolistic and Oligopoly Markets. Price-output determination in perfect competition and monopoly in long run and short run.
Forms of Business Organizations: Definition, Forms of Business Organizations-Private Sector-sole proprietorship, Partnership, Joint Hindu family business, co-operative societies, joint stock companies.
PUBLIC SECTOR- Departmental organizations, public corporations, government companies.

Unit 4 Capital and Capital Budgeting 7

Capital: Definition of Capital and its significance, Types of Capital, Sources of raising Capital.
Capital Budgeting: Definition, Nature and scope of capital budgeting, features of capital budgeting, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method, Profitability Index method (simple problems).

Unit 5 Introduction to Financial Accounting And Analysis 5

Financial Accounting: Accounting definition, Principles of accounting, Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).
Financial Analysis: Definition of Financial Analysis, Ratios and its significance- types- liquidity Ratios, turnover Ratios - solvency Ratios and profitability ratios.

Prescribed Text Books:

1. Gupta: Managerial Economics, TMH, 2009.
2. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2003.
3. A.R Arya Sri Managerial Economics and Financial analysis, Tata Mc Graw Hill
4. M. E. Thukaram Rao., Accounting for Managers, New Age International Publishers.
5. T.S, Reddy and Y. Hari Prasad Reddy, Accounting and Financial Management, Margham Publications.

6. Mehta P.L., Managerial Economics-Analysis, Problems, Cases, S Chand and Sons, New Delhi, 2001.
7. S.A. Siddiqui & A.S Siddiqui. Managerial Economics and Financial analysis, New Age International Pvt.Ltd

Reference Books:

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, PHI, 4th Ed.
3. Suma Damodaran, Managerial Economics, Oxford University Press.
4. Lipsey & Chrystel, Economics, Oxford University Press.
5. Domnick Salvatore: Managerial Economics In a Global Economy, 4th Edition,Thomson.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Predict the demand for a product or product mix of a company & to analyze various factors influencing demand elasticity.	L1
2. Assess the cost behavior, costs useful for managerial decision making and determine Break Even Point (BEP) of an enterprise.	L2
3. Differentiate private & public sector undertakings in their promotion, incorporation, regulation, administration, legal formalities & existence.	L2
4. List features, steps, merits, uses & limitations of Pay Back, ARR, NPV, PI & IRR methods of Capital Budgeting and compute rank of the projects.	L4
5. Analyze, interpret & comment on the financial statements of a business enterprise by using liquidity leverage, coverage and turnover & profitability ratios.	L3 & L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19AE41T.1	3	3	-	-	-	-	-	3	-	-	-	-
19A E41T.2	3	3	-	-	-	-	-	3	-	-	-	-
19A E41T.3	3	3	-	-	-	-	-	3	-	-	-	-
19A E41T.4	-	-	-	-	-	-	-	-	-	3		3
19A E41T.5	-	-	-	-	-	-	-	-	-	3		3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course	Concrete Technology
Category	PC
Course Code	19A142T
Year	II B. Tech
Semester	II Semester (CE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	3

Course Objectives:

- Explain the functional role of ingredients of concrete and apply this knowledge to mix design philosophy
- Develop fundamental knowledge in the fresh and hardened properties of concrete
- Produce the testing methodology to evaluate the properties of concrete during fresh and hardened stage.
- Knowledge on the behaviour of concrete with response to stresses developed.
- Knowledge on the special concretes And design a concrete mix which fulfils the required properties for fresh and hardened concrete.

Unit 1 Ingredients of Concrete 8

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

Unit 2 Properties of Concrete 8

Fresh concrete: Mixing of concrete-workability-factors influencing workability- measurement of workability for conventional concrete (Slump Cone, Compaction Factor and Vee-Bee test) & SCC (V-Funnel, L-Box, U- Box, Slump Flow and J–Ring). Hardened concrete: Water/Cement Ratio(Abram's Law)-Gel Space Ratio-tests on hardened concrete-Destructive Tests (Compression, Split Tensile and Flexural)-Semi Destructive Tests (Core Cutter and Pull out test) and Non Destructive Tests (Rebound Hammer-UPV - Radiological methods) .

Unit 3 Elasticity, Shrinkage and Creep 8

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

Unit 4 : Concrete Mix Design 8

Proportioning of Concrete Mixes-factors influencing - Road Note. No. 4 and IS:10262-2009 Methods- IS 456 provisions on Durability-Quality Control and Statistical Methods – Mix Design of High Strength concrete (using ACI method).

Unit 5 Special Concretes 8

Light Weight Concretes –Light Weight Aggregate Concrete- Cellular Concrete - No Fines Concrete-High Density Concrete – Fiber Reinforced Concrete-Polymer Concrete-Self Compacting Concrete and its Mix Design using EFNARC guidelines.

Prescribed Text Books:

1. A. M. Neville Properties of Concrete, Pearson Publication – 4th Edition
2. S. Shetty, A. K. Jain, A Textbook of Concrete Technology S. Chand and Company Limited, New Delhi

Reference Books:

1. M. L. Gambhir, Concrete Technology, Tata Mc. Graw Hill Publishers, New Delhi
2. N. Krishna Raju, Design of Concrete Mixes, CBS Publishers.
3. P. K. Mehta And J. M. Monteiro, Concrete: Micro Structure, Properties and Materials Mc-Graw Hill Publishers
4. J. Prasad, C.G.K. Nair, Non-Destructive Test and Evaluation of Materials, Tata Mcgraw Hill Publishers, New Delhi.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Understand various ingredients of concrete and their role.	L2
2. Examine knowledge on the fresh and hardened properties of concrete.	L4
3. Summarize durability properties of concrete like elasticity, shrinkage and creep	L2
4. Design concrete mixes using various methods.	L4
5. Perceive special concretes for accomplishing performance levels.	L5

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19A142T.1	-	3	2	3	-	-	-	-	-	-	-	-	2	3	2
19A142T.2	-	3	2	3	-	-	-	-	-	-	-	-	2	3	2
19A142T.3	-	3	2	3	-	-	-	-	-	-	-	-	2	3	2
19A142T.4	-	3	2	2	-	-	-	-	-	-	-	-	2	3	2
19A142T.5	-	3	2	2	-	-	-	-	-	-	-	-	2	3	2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course	Strength of Materials
Category	PC
Course Code	19A143T
Year	II B. Tech
Semester	II Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	3

Course Objectives:
This course will deal with the concepts of stresses and strains in Thin and Thick cylinders, torsion, columns types, direct bending stresses and unsymmetrical bending.

Unit 1 Thin Cylinders & Thick Cylinders 8
Thin cylinders: Thin seamless cylindrical shells –Derivation of formula for longitudinal and circumferential stresses– hoop, longitudinal and Volumetric strains–changes in diameter, and volume of thin cylinders –Thin spherical shells.
Thick cylinders: Introduction Lame's theory for thick cylinders – Derivation of Lame's formulae– distribution of hoop and radial stresses across thickness–design of thick cylinders –compound cylinders–Necessary difference of radii for shrinkage– Thick spherical shells.

Unit 2 Torsion of Circular Shafts & Springs 8
Torsion of circular shafts: Theory of pure torsion– Derivation of Torsion equations: $T/J = q/r = N\theta/L$– Assumptions made in the theory of pure torsion–Torsional moment of resistance–Polar section modulus– Power transmitted by shafts – Combined bending and torsion and end thrust–Design of shafts according to theories of failure.
Springs: Introduction– Types of springs–deflection of close and open coiled helical springs under axial pull and axial couple – springs in series and parallel–Carriage or leaf springs.

Unit 3 Columns and Struts 8
Introduction– Types of columns –Short, medium and long columns– Axially loaded compression members– Crushing load –Euler's theorem for long columns- assumptions- derivation of Euler's critical load formulae for various end conditions– Equivalent length of a column –slenderness ratio–Euler's critical stress –Limitations of Euler's theory– Rankine (Gordon) formula –Long columns subjected to eccentric loading –Secant formula– Empirical formulae –Straight line formula –Prof. Perry's formula.

Unit 4 Direct and Bending Stresses 8
Stresses under the combined action of direct loading and B.M, .core of a section –determination of stresses in the case of chimneys, retaining walls and dams –conditions for stability – stresses due to direct loading and B.M. about both axis.

Unit 5 Unsymmetrical Bending 8
Introduction– Graphical method for locating principal axes –Moments of inertia referred to any set of rectangular axes– Stresses in beams subjected to unsymmetrical bending –Principal axes– Resolution of bending moment into two rectangular axes through the centroid – Location of neutral axis - Deflection of beams under unsymmetrical bending, concept shear center for high channel.

Prescribed Text Books:
1. A Textbook of Strength of materials by R. K. Bansal –Laxmi Publications (P) ltd., New Delhi.
2. Strength of Materials by S.S. Bhavikatti – Vikas Publishers
3. Strength of Materials by B.C.Punmia
4. Strength of materials by R.K.Rajput, S.Chand& Co, NewDelhi.

Reference Books:

1. Strength of Materials by A.R.Basu, Dhanpat Rai& Co, Nai Sarah, NewDelhi..
2. Mechanics of Structures, by S.B.Junnarkar, Charotar PublishingHouse, Anand,Gujrat.
3. Mechanics of Solids, by Ferdinand p Beer and others– Tata Mc. Grawhill Publications2000.
4. Strength of Materials by Schaum's outline series –Mc. Grawhill International Editions.
5. Strength of Materials by S.Ramakrishna and R.Narayan– Dhanpat Raipublications.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Understand types of stresses and strains in Thin cylinders and Thick cylinders and also able to determine them.	L1
2. Analyze the members under torsion, combined torsion and bending moment and also deflection of springs.	L4
3. Summarize types of columns, types of failures occur in the columns and also able to design the columns	L3
4. Determine the stresses in retaining walls, dams and chimneys.	L4
5. Apply knowledge in unsymmetrical bending and also able to determine the stresses in beams due to unsymmetrical bending.	L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19A143T.1	2	3	3	-	-	-	-	-	-	-	-	-	3	3	-
19A143T.2	2	3	3	3	-	-	-	-	-	-	-	-	3	1	-
19A143T.3	2	3	3	3	-	-	-	-	-	-	-	-	3	1	-
19A143T.4	2	3	3	-	-	-	-	-	-	-	-	-	3	1	-
19A143T.5	2	3	3	-	-	-	-	-	-	-	-	-	3	1	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course	Hydraulics Engineering
Category	PC
Course Code	19A144T
Year	II B. Tech
Semester	II Semester (CE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	3

Course Objectives:

- Introduce concepts of boundary layer theory
- To teach principles of uniform and non-uniform flows through open channel.
- To impart knowledge on design of turbines.
- To impart knowledge on design of pumps.

Unit 1 Boundary layer concepts 6

Boundary layer concepts – Thickness ofboundary layer - Characteristics of boundary layer along a thin flat plate - Vonkarmen momentum integral equation - Laminar and turbulent boundary layers(no derivation) - Laminar sub-layer separation of boundary layer - Control of boundary layer- Flow around submerged objects – Drag and lift - Magnus effect.

Unit 2 Open Channel Flow 8

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

Non uniform flow - Dynamic equation for gradually varied flow - Mild, critical, steep, horizontal and adverse slopes – Surface profiles - Direct step method Rapidly varied flow - Hydraulic jump and its applications - Energy dissipation.

Unit 3 Impact of Jets 6

Hydrodynamic force of jets on stationary and moving flat,inclined and curved vanes - Series of vanes - Jet striking centrally and at tip -Velocity triangles at inlet and outlet – Expressions for work done and efficiency -Applications to radial flow turbines.

Unit 4 Hydraulic Turbines 10

Layout of a typical hydropower installation –Heads and efficiencies -classification of turbines -Pelton wheel - Francis turbine -Kaplan turbine - Working, working proportions - Velocity diagrams -Work done and efficiency – Hydraulic design – Runaway speed - Draft tube theory, function and efficiency. Governing of turbines - Surge tanks – Unit quantities and specific speed – Performance characteristics -Geometric similarity -Cavitation, causes, effects.

Unit 5 Centrifugal Pumps & Hydropower Engineering 10

Centrifugal pumps: Pump installation details – Classification -Heads –Losses and efficiencies - Limitation of suction lift – Work done - Minimum startingspeed - Specific speed - Multistage pumps -Pumps in parallel - Performance ofpumps - Characteristic curves -Net positive suction head – Priming devices.

Hydropower engineering: Classification of hydropower plants – Load factor - Utilization factor - Capacity factor – Estimation of hydropower potential.

Prescribed Text Books:

1. P. M. Modi and S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House
2. D. S. Kumar Fluid Mechanics & Fluid Power Engineering, Kataria & Sons.

Reference Books:

1. Rajput, Fluid mechanics and fluid machines , S. Chand & Co
2. K. Subramanya, Open channel Flow, Tata McGraw Hill.
3. Srinivasan, Open channel flow by, Oxford University Press
4. Banga & Sharma, Hydraulic Machines, Khanna Publishers.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Understand the concept of boundary layer theory.	L2
2. Analyze characteristics for uniform and non-uniform flows in open channels.	L4
3. Evaluate the impact of jet on different vanes, work done and its efficiency.	L4
4. Design different types of turbines.	L5
5. Design centrifugal and multi stage pumps.	L5

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19A144T.1	1	2	3	1	-	-	-	-	-	-	-	-	2	3	-
19A144T.2	1	2	3	3	-	-	-	-	-	-	-	-	2	3	-
19A144T.3	1	2	3	3	3	-	-	-	-	-	-	-	2	3	-
19A144T.4	1	2	3	3	3	-	-	-	-	-	-	-	2	3	-
19A144T.5	1	2	3	3	-	-	-	-	-	-	-	-	2	3	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course	Essence of Indian Traditional Knowledge
Category	MC
Course Code	19AC45T
Year	II Year
Semester	II Semester (Common to CE, ME & CSE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	0

Course Objectives:

- To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the Importance of roots of knowledge system.
- To understand the legal framework and traditional knowledge and biological diversity act 2002 and geographical indication act 2003.
- To focus on traditional knowledge and intellectual property mechanism of traditional knowledge and protection.

Unit 1 8

Introduction to traditional knowledge: Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems.

Unit 2 8

Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge vis-à-vis formal knowledge.

Unit 3 8

Protection of traditional knowledge: the need for protecting traditional knowledge Significance of TK, Protection, value of TK in global economy, Role of Government to harness TK.

Unit 4 8

Traditional knowledge and intellectual property: Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FORA for increasing protection of Indian Traditional Knowledge.

Unit 5 8

Traditional knowledge in different sectors: Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK

Prescribed Text Books:

1. Traditional Knowledge System in India, by Amit Jha, 2009.

Reference Books:

1. Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and Vipin Kumar Singh, Pratibha Prakashan 2012.
2. Knowledge Traditions and Practices of India, Kapil Kapoor, Michel Danino.
3. e-resources: https://www.youtube.com/watch?v=LZP1StpYEPM

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Understand the concept of Traditional knowledge and its importance.	L2
2. know the need and importance of protecting traditional knowledge	L1
3. Know the various enactments related to the protection of traditional knowledge.	L1
4. Understand the concepts of Intellectual property to protect the traditional knowledge.	L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19AC45T.1	-	-	-	-	-	-	-	-	-	-	-	3
19AC45T.2	-	-	-	-	-	-	-	-	-	-	-	3
19AC45T.3	-	-	-	-	-	-	-	-	-	-	-	3
19AC45T.4	-	-	-	-	-	-	-	-	-	-	-	3
19AC45T.5	-	-	-	-	-	-	-	-	-	-	-	3

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

Title of the Course	Computer Aided Building Planning Drawing
Category	PC
Course Code	19A141L
Year	II B. Tech
Semester	II Semester (CE)

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	2	1

Course Objectives:

1. This course will enable the students to prepare of submission drawing according to the local bylaws and standards of Residential and public buildings.

List of the experiments

1. Sign conventions and symbols
2. Masonry bonds-English bond, Flemish bond-One brick, one and half brick & two brick walls and joints.
3. Doors- Panelled, glazed and half paneled and glazed.
4. Windows- Panelled and glazed.
5. Roof members- Couple Roof, Collar Roof, King post and Queen post truss.
6. given line diagram with specification to draw, plan, section and elevation-sloped and flat roof buildings
7. Taking standard drawings of a typical single storied building.
8. Perspective view of single storey buildings.
9. Introduction to Auto CAD 3D drawing.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Develop drawing skills for effective demonstration of building details.	L3
2. Draw building plans using Computer Aided Design and Drafting software's.	L4
3. Develop engineering project drawings incorporating details.	L4
4. Design parameters in 2D & amp3D.	L2L4
5. Examine efficacy of CAD design.	L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19A144L.1	-	3	3	-	-	-	-	-	-	-	-	-	2	3	1
19A144L.2	-	3	3	-	-	-	-	-	-	-	-	-	2	3	1
19A144L.3	-	3	3	-	-	-	-	-	-	-	-	-	2	3	1
19A144L.4	-	2	2	-	-	-	-	-	-	-	-	-	2	2	2

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

Title of the Course	Hydraulics Engineering Lab
Category	PC
Course Code	19A144L
Year	II B. Tech
Semester	II Semester (CE)

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	2	1

Course Objectives:

- This course will make the students to determine efficiency and performance test on pumps and turbines.
- Understands impact of jet on vanes and hydraulic jump.

List of the experiments

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

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Calculate the performance analysis in turbines.	L5
2. Select the proper pump to optimize the pumping efficiency.	L5
3. Summarize the impact of jet on vanes and hydraulic jump	L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19A144L.1	2	3	3	-	-	-	-	-	-	-	-	-	2	3	1
19A144L.2	2	3	3	-	-	-	-	-	-	-	-	-	2	3	1
19A144L.3	2	3	3	-	-	-	-	-	-	-	-	-	2	3	1

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

Title of the Course	Concrete Technology lab
Category	PC
Course Code	19A142L
Year	II B. Tech
Semester	II Semester

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	3	1.5

Course Objectives:

- This course will make the student to determine different properties of cement, fresh concrete and hardened concrete.

List of the experiments

1. Fineness of cement
2. Specific gravity of cement
3. Normal Consistency.
4. Initial setting time and final setting time of cement
5. Soundness of cement.
6. Compressive strength of cement.
7. Workability test on concrete by
   A.Compaction factor
   B. Slump cone and
   C.Vee-bee.
8. Young's modulus and compressive strength of concrete.
9. Non-Destructive testing on concrete (for demonstration).
10. Flexural strength of concrete.
11. Water permeability test on concrete.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Assess the different properties of cement.	L5
2. Summarize the concept of workability and testing of concrete.	L2
3. Evaluate the properties of hardened concrete properties.	L5
4. Demonstrate the properties of hardened concrete by non-destructive tests.	L1

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19A142L.1	-	2	3	3	-	-	-	-	-	-	-	2	2	3	3
19A142L.2	-	2	3	3	-	-	-	-	-	-	-	2	2	2	3
19A142L.3	-	2	3	3	-	-	-	-	-	-	-	2	2	2	3
19A142L.4	-	2	3	3	-	-	-	-	-	-	-	2	2	2	3

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

Title of the Course	Civil Engineering Workshop
Category	PC
Course Code	19A145L
Year	II B. Tech
Semester	II Semester

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	3	1.5

Course Objectives:

- This course will enable the student to involve and practice different types of construction works such as setting out a building, masonry, plastering, painting, plumbing, wall putty, tile flooring etc.,

List of Exercises

1. Setting out a building: The student should set out a building (single room only) as per the given building plan using tape only.
2. Setting out a building: The student should set out a building (single room only) as per the given building plan using tape and cross staff.
3. Construct a wall of height 50 cm and wall thickness 1½ bricks using English bond (No mortar required) - corner portion – length of side walls 60 cm.
4. Construct a wall of height 50 cm and wall thickness 2 bricks using English bond (No mortar required) - corner portion – length of side walls 60 cm.
5. Computation of Centre of gravity and Moment of inertia of a given rolled steel section by actual measurements.
6. Installation of plumbing and fixtures like Tap, T-Joint, Elbow, Bend, Threading etc;
7. Plastering and Finishing of wall
8. Application of wall putty and painting a wall
9. Application of base coat and laying of Tile flooring of one square meter
10. Preparation of soil cement blocks for masonry and testing for compressive strength
11. Casting and testing of Fly ash Blocks
12. Preparation of cover blocks for providing cover to reinforcement
13. Model making of different structures like building, bridges and different types of trusses.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Assemble a pipe line as per the piping layout using pipes and accessories.	L3
2. Construct a brick wall using English bond.	L4
3. Mark a line diagram of a building by using chain/tape and other accessories	L3
4. Plaster a given brick surface and paint it and Lay tiles for flooring	L4
5. Model structures like building, bridges and different types of trusses.	L5

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19A145L.1	-	-	-	3	-	-	-	-	-	-	-	3	2	2	3
19A145L.2	-	-	-	3	-	-	-	-	-	-	-	3	3	2	3
19A145L.3	-	-	-	3	-	-	-	-	-	-	-	3	3	2	3
19A145L.4	-	-	-	3	-	-	-	-	-	-	-	3	3	2	3
19A145L.5	-	-	-	3	-	-	-	-	-	-	-	3	2	2	3