JNTUA Curriculum
B. Tech Course Structure

Semester - 0 (Theory - 8, Lab - 7) Common for All Branches of Engineering				
S.No	**Course No**	**Course Name**	**Category**	**L-T-P-C**
1		Physical Activities -- Sports, Yoga and Meditation, Plantation	MC	0-0-6-0
2		Career Counselling	MC	2-0-2-0
3		Orientation to all branches -- career options, tools, etc.	MC	3-0-0-0
4		Orientation on admitted Branch -- corresponding labs, tools and platforms	EC	2-0-3-0
5		Proficiency Modules & Productivity Tools	ES	2-1-2-0
6		Assessment on basic aptitude and mathematical skills	MC	2-0-3-0
7		Remedial Training in Foundation Courses	MC	2-1-2-0
8		Human Values & Professional Ethics	MC	3-0-0-0
9		Communication Skills -- focus on Listening, Speaking, Reading, Writing skills	BS	2-1-2-0
10		Concepts of Programming	ES	2-0-2-0

CIVIL ENGINEERING

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Semester - 1 (Theory - 4, Lab - 4)					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	19A54101	Algebra and Calculus	BS	3-0-0	3
2.	19A51101T	Engineering Chemistry	BS	3-0-0	3
3.	19A05101T	Problem Solving & Programming	ES	3-1-0	4
4.	19A52101T	Communicative English 1	HS	2-0-0	2
5.	19A03101	Workshop I	LC	0-0-3	1.5
6.	19A51101P	Engineering Chemistry Lab	BS	0-0-3	1.5
7.	19A05101P	Problem Solving & Programming Lab	ES	0-0-3	1.5
8.	19A52101P	Communicative English 1 Lab	HS	0-0-3	1.5
				Total	**18**

Semester - 2 (Theory - 4, Lab - 5)					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	19A02201T	Basic Electrical & Electronics Engineering	ES	3-1-0	4
2.	19A54201	Differential Equations and Vector Calculus	BS	3-0-0	3
3.	19A56201T	Engineering Physics	BS	3-0-0	3
4.	19A05201T	Artificial Intelligence Tools, Techniques and Applications	ES	2-1-0	3
5.	19A01201	Civil Engineering Workshop	LC	0-0-3	1.5
6.	19A03201	Engineering Graphics & Design	ES	1-0-3	2.5
7.	19A02201P	Basic Electrical & Electronics Engineering Lab	ES	0-0-3	1.5
8.	19A56201P	Engineering Physics Lab	BS	0-0-3	1.5
9.	19A05201P	Artificial Intelligence Tools, Techniques and Applications Lab	ES	0-0-3	1.5
				Total	**21.5**

ELECTRICAL & ELECTRONICS ENGINEERING

*****

Semester - 1 (Theory - 4, Lab - 4)					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	19A54101	Algebra & Calculus	BS	3-0-0	3
2.	19A56101T	Applied Physics	BS	3-0-0	3
3.	19A05101T	Problem Solving & Programming	ES	3-1-0	4
4.	19A52101T	Communicative English 1	HS	2-0-0	2
5.	19A03101	Workshop I	LC	0-0-3	1.5
6.	19A56101P	Applied Physics Lab	BS	0-0-3	1.5
7.	19A05101P	Problem Solving & Programming Lab	ES	0-0-3	1.5
8.	19A52101P	Communicative English 1 Lab	HS	0-0-3	1.5
				Total	**18**

Semester - 2 (Theory - 4, Lab - 5)					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	19A01201T	Basic civil & Mechanical Engineering	ES	3-1-0	4
2.	19A54201	Differential Equations & Multivariable Calculus	BS	3-0-0	3
3.	19A51201T	Chemistry	BS	3-0-0	3
4.	19A05201T	AI Tools, Techniques and Applications	ES	2-1-0	3
5.	19A02202	Electrical & Electronics Engineering Workshop	LC	0-0-3	1.5
6.	19A03201	Engineering Graphics & Design	ES	1-0-3	2.5
7.	19A01201P	Basic civil & Mechanical Engineering Lab	ES	0-0-3	1.5
8.	19A51201P	Chemistry Lab	BS	0-0-3	1.5
9.	19A05201P	Artificial Intelligence Tools, Techniques and Applications Lab	ES	0-0-3	1.5
				Total	**21.5**

MECHANICAL ENGINEERING

*****

Semester - 1 (Theory - 4, Lab - 4)					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	19A54101	Algebra and Calculus	BS	3-0-0	3
2.	19A51101T	Engineering Chemistry	BS	3-0-0	3
3.	19A05101T	Problem Solving & Programming	ES	3-1-0	4
4.	19A52101T	Communicative English 1	HS	2-0-0	2
5.	19A03101	Workshop I	LC	0-0-3	1.5
6.	19A51101P	Engineering Chemistry Lab	BS	0-0-3	1.5
7.	19A05101P	Problem Solving & Programming Lab	ES	0-0-3	1.5
8.	19A52101P	Communicative English 1 Lab	HS	0-0-3	1.5
				Total	**18**

Semester - 2 (Theory - 4, Lab - 5)					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	19A02201T	Basic Electrical & Electronics Engineering	ES	3-1-0	4
2.	19A54201	Differential Equations and Vector Calculus	BS	3-0-0	3
3.	19A56201T	Engineering Physics	BS	3-0-0	3
4.	19A05201T	Artificial Intelligence Tools, Techniques and Applications	ES	2-1-0	3
5.	19A03201	Engineering Graphics & Design	ES	1-0-3	2.5
6.	19A03202	Mechanical Engineering Workshop	LC	0-0-3	1.5
7.	19A02201P	Basic Electrical & Electronics Engineering Lab	ES	0-0-3	1.5
8.	19A56201P	Engineering Physics Lab	BS	0-0-3	1.5
9.	19A05201P	Artificial Intelligence Tools, Techniques and Applications Lab	ES	0-0-3	1.5
				Total	**21.5**

ELECTRONICS & COMMUNICATION ENGINEERING

*****

Semester - 1 (Theory - 4, Lab - 4)					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	19A54101	Algebra & Calculus	BS	3-0-0	3
2.	19A56101T	Applied Physics	BS	3-0-0	3
3.	19A05101T	Problem Solving & Programming	ES	3-1-0	4
4.	19A52101T	Communicative English 1	HS	2-0-0	2
5.	19A03101	Workshop I	LC	0-0-3	1.5
6.	19A56101P	Applied Physics Lab	BS	0-0-3	1.5
7.	19A05101P	Problem Solving & Programming Lab	ES	0-0-3	1.5
8.	19A52101P	Communicative English 1 Lab	HS	0-0-3	1.5
				Total	**18**

Semester - 2 (Theory - 4, Lab - 5)					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	19A02203T	Principles of Electrical Engineering	ES	3-1-0	4
2.	19A54201	Differential Equations & Multivariable Calculus	BS	3-0-0	3
3.	19A51201T	Chemistry	BS	3-0-0	3
4.	19A05201T	AI Tools, Techniques and Applications	ES	2-1-0	3
5.	19A04201	Electronics & Communication Engineering Workshop	LC	0-0-3	1.5
6.	19A03201	Engineering Graphics & Design	ES	1-0-3	2.5
7.	19A02203P	Principles of Electrical Engineering Lab	ES	0-0-3	1.5
8.	19A51201P	Chemistry Lab	BS	0-0-3	1.5
9.	19A05201P	Artificial Intelligence Tools, Techniques and Applications Lab	ES	0-0-3	1.5
				Total	**21.5**

COMPUTER SCIENCE & ENGINEERING

*****

Semester - 1 (Theory - 4, Lab - 4)					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	19A54101	Algebra and Calculus	BS	3-0-0	3
2.	19A56101T	Applied Physics	BS	3-0-0	3
3.	19A05101T	Problem Solving & Programming	ES	3-1-0	4
4.	19A52101T	Communicative English - I	HS	2-0-0	2
5.	19A03101	Workshop - I	LC	0-0-3	1.5
6.	19A56101P	Applied Physics Lab	BS	0-0-3	1.5
7.	19A05101P	Problem Solving & Programming Lab	ES	0-0-3	1.5
8.	19A52101P	Communicative English - I Lab	HS	0-0-3	1.5
				Total	**18**

Semester - 2 (Theory - 4, Lab - 5)					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	19A02201T	Basic Electrical and Electronics Engineering	ES	3-1-0	4
2.	19A54202	Probability and Statistics	BS	3-0-0	3
3.	19A51201T	Chemistry	BS	3-0-0	3
4.	19A05201T	AI Tools, Techniques and Applications	ES	2-1-0	3
5.	19A05202	Computer Science and Engineering Workshop	LC	0-0-3	1.5
6.	19A03201	Engineering Graphics & Design	ES	1-0-3	2.5
7.	19A02201P	Basic Electrical & Electronics Engineering Lab	ES	0-0-3	1.5
8.	19A51201P	Chemistry Lab	BS	0-0-3	1.5
9.	19A05201P	Artificial Intelligence Tools, Techniques and Applications Lab	ES	0-0-3	1.5
				Total	**21.5**

ELECTRONICS & INSTRUMENTATION ENGINEERING

*****

Semester - 1 (Theory - 4, Lab - 4)					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	19A54101	Algebra & Calculus	BS	3-0-0	3
2.	19A56101T	Applied Physics	BS	3-0-0	3
3.	19A05101T	Problem Solving & Programming	ES	3-1-0	4
4.	19A52101T	Communicative English 1	HS	2-0-0	2
5.	19A03101	Workshop I	LC	0-0-3	1.5
6.	19A56101P	Applied Physics Lab	BS	0-0-3	1.5
7.	19A05101P	Problem Solving & Programming Lab	ES	0-0-3	1.5
8.	19A52101P	Communicative English 1 Lab	HS	0-0-3	1.5
				Total	**18**

Semester - 2 (Theory - 4, Lab - 5)					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	19A02203T	Principles of Electrical Engineering	ES	3-1-0	4
2.	19A54201	Differential Equations & Multivariable Calculus	BS	3-0-0	3
3.	19A51201T	Chemistry	BS	3-0-0	3
4.	19A05201T	AI Tools, Techniques and Applications	ES	2-1-0	3
5.	19A10201	Electronics & Instrumentation Engineering Workshop	LC	0-0-3	1.5
6.	19A03201	Engineering Graphics & Design	ES	1-0-3	2.5
7.	19A02203P	Principles of Electrical Engineering Lab	ES	0-0-3	1.5
8.	19A51201P	Chemistry Lab	BS	0-0-3	1.5
9.	19A05201P	Artificial Intelligence Tools, Techniques and Applications Lab	ES	0-0-3	1.5
				Total	**21.5**

INFORMATION TECHNOLOGY

*****

Semester - 1 (Theory - 4, Lab - 4)					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	19A54101	Algebra and Calculus	BS	3-0-0	3
2.	19A56101T	Applied Physics	BS	3-0-0	3
3.	19A05101T	Problem Solving & Programming	ES	3-1-0	4
4.	19A52101T	Communicative English - I	HS	2-0-0	2
5.	19A03101	Workshop - I	LC	0-0-3	1.5
6.	19A56101P	Applied Physics Lab	BS	0-0-3	1.5
7.	19A05101P	Problem Solving & Programming Lab	ES	0-0-3	1.5
8.	19A52101P	Communicative English - I Lab	HS	0-0-3	1.5
				Total	**18**

Semester - 2 (Theory - 4, Lab - 5)					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	19A02201T	Basic Electrical and Electronics Engineering	ES	3-1-0	4
2.	19A54202	Probability and Statistics	BS	3-0-0	3
3.	19A51201T	Chemistry	BS	3-0-0	3
4.	19A05201T	AI Tools, Techniques and Applications	ES	2-1-0	3
5.	19A12201	Information Technology Workshop	LC	0-0-3	1.5
6.	19A03201	Engineering Graphics & Design	ES	1-0-3	2.5
7.	19A02201P	Basic Electrical & Electronics Engineering Lab	ES	0-0-3	1.5
8.	19A51201P	Chemistry Lab	BS	0-0-3	1.5
9.	19A05201P	Artificial Intelligence Tools, Techniques and Applications Lab	ES	0-0-3	1.5
				Total	**21.5**

COMPUTER SCIENCE & SYSTEMS ENGINEERING

*****

Semester - 1 (Theory - 4, Lab - 4)					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	19A54101	Algebra and Calculus	BS	3-0-0	3
2.	19A56101T	Applied Physics	BS	3-0-0	3
3.	19A05101T	Problem Solving & Programming	ES	3-1-0	4
4.	19A52101T	Communicative English - I	HS	2-0-0	2
5.	19A03101	Workshop - I	LC	0-0-3	1.5
6.	19A56101P	Applied Physics Lab	BS	0-0-3	1.5
7.	19A05101P	Problem Solving & Programming Lab	ES	0-0-3	1.5
8.	19A52101P	Communicative English - I Lab	HS	0-0-3	1.5
				Total	**18**

Semester - 2 (Theory - 4, Lab - 5)					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	19A02201T	Basic Electrical and Electronics Engineering	ES	3-1-0	4
2.	19A54202	Probability and Statistics	BS	3-0-0	3
3.	19A51201T	Chemistry	BS	3-0-0	3
4.	19A05201T	AI Tools, Techniques and Applications	ES	2-1-0	3
5.	19A15201	Computer Science & Systems Engineering Workshop	LC	0-0-3	1.5
6.	19A03201	Engineering Graphics & Design	ES	1-0-3	2.5
7.	19A02201P	Basic Electrical & Electronics Engineering Lab	ES	0-0-3	1.5
8.	19A51201P	Chemistry Lab	BS	0-0-3	1.5
9.	19A05201P	Artificial Intelligence Tools, Techniques and Applications Lab	ES	0-0-3	1.5
				Total	**21.5**

FOOD TECHNOLOGY

*****

Semester - 1 (Theory - 4, Lab - 4)					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	19A54101	Algebra and Calculus	BS	3-0-0	3
2.	19A51102T	Fundamental Chemistry	BS	3-0-0	3
3.	19A05101T	Problem Solving & Programming	ES	3-1-0	4
4.	19A52101T	Communicative English 1	HS	2-0-0	2
5.	19A03101	Workshop I	LC	0-0-3	1.5
6.	19A51102P	Fundamental Chemistry Lab	BS	0-0-3	1.5
7.	19A05101P	Problem Solving & Programming Lab	ES	0-0-3	1.5
8.	19A52101P	Communicative English 1 Lab	HS	0-0-3	1.5
				Total	**18**

Semester - 2 (Theory - 4, Lab - 5)					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	19A02201T	Basic Electrical & Electronics Engineering	ES	3-1-0	4
2.	19A54202	Probability and Statistics	BS	3-0-0	3
3.	19A56201T	Engineering Physics	BS	3-0-0	3
4.	19A05201T	Artificial Intelligence Tools, Techniques and Applications	ES	2-1-0	3
5.	19A27201	Food Technology Workshop	LC	0-0-3	1.5
6.	19A03201	Engineering Graphics & Design	ES	1-0-3	2.5
7.	19A02201P	Basic Electrical & Electronics Engineering Lab	ES	0-0-3	1.5
8.	19A56201P	Engineering Physics Lab	BS	0-0-3	1.5
9.	19A05201P	Artificial Intelligence Tools, Techniques and Applications Lab	ES	0-0-3	1.5
				Total	**21.5**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech – I Sem

L	T	P	C
3	0	0	3

(19A54101) Algebra & Calculus

(Common to all branches of Engineering)

Course Objectives:

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

Bridge Course: Limits, continuity, Types of matrices

Unit I: Matrix Operations and Solving Systems of Linear Equations 10 hrs

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

Learning Outcomes:

At the end of this unit, the student will be able to

- solving systems of linear equations, using technology to facilitate row reduction determine the rank, eigenvalues and eigenvectors, diagonal form and different factorizations of a matrix; (L3)
- identify special properties of a matrix, such as positive definite, etc., and use this information to facilitate the calculation of matrix characteristics; (L3)

Unit II: Mean Value Theorems

6 hrs

Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof);

Learning Outcomes:

At the end of this unit, the student will be able to

- Translate the given function as series of Taylor's and Maclaurin's with remainders (L3)
- analyze the behaviour of functions by using mean value theorems (L3)

Unit III: Multivariable calculus

8 hrs

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

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

- Find partial derivatives numerically and symbolically and use them to analyze and interpret the way a function varies. (L3)
- Acquire the Knowledge maxima and minima of functions of several variable (L1)
- Utilize Jacobian of a coordinate transformation to deal with the problems in change of variables (L3)

Unit IV: Double Integrals
8hrs

Double integrals, change of order of integration, double integration in polar coordinates, areas enclosed by plane curves.

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

- Evaluate double integrals of functions of several variables in two dimensions using Cartesian and polar coordinates (L5)
- Apply double integration techniques in evaluating areas bounded by region (L4)

Unit V: Multiple Integrals and Special Functions **8 hrs**

Evaluation of triple integrals, change of variables between Cartesian, cylindrical and spherical polar co-ordinates, Beta and Gamma functions and their properties, relation between beta and gamma functions.

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

- Conclude the use of special function in multiple integrals (L4)
- evaluate multiple integrals in Cartesian, cylindrical and spherical geometries (L5)

Textbooks:

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

References:

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
3. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 201.

Course Outcomes:
At the end of the course, the student will be able to

- develop the use of matrix algebra techniques that is needed by engineers for practical applications (L6)
- Utilize mean value theorems to real life problems (L3)

- familiarize with functions of several variables which is useful in optimization (L3)
- Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems (L5)
- Students will become familiar with 3- dimensional coordinate systems and also learn the utilization of special functions

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B.Tech – II Sem **L T P C**
3 0 0 3

(19A54201) Differential Equations and Vector Calculus

(Civil, Mechanical, EEE, ECE and EIE)

Course Objectives:

1) To enlighten the learners in the concept of differential equations and multivariable calculus.
2) 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 I: Linear Differential Equations of Higher Order

Definitions, complete solution, operator D, rules for finding complimentary function, inverse operator, rules for finding particular integral, method of variation of parameters.

Learning Outcomes:

At the end of this unit, the student will be able to

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

UNIT II: Equations Reducible to Linear Differential Equations and Applications

Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficients, Applications: Mass spring system and L-C-R Circuit problems.

Learning Outcomes:

At the end of this unit, the student will be able to

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

UNIT III: Partial Differential Equations – First order **8 hrs**

First order partial differential equations, solutions of first order linear and non-linear PDEs. Solutions to homogenous and non-homogenous higher order linear partial differential equations.

Learning Outcomes:

At the end of this unit, the student will be able to

- apply a range of techniques to find solutions of standard PDEs (L3)
- outline the basic properties of standard PDEs (L2)

UNIT IV: Multivariable Calculus (Vector differentiation)

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

Learning Outcomes:

At the end of this unit, the student will be able to

- apply del to Scalar and vector point functions (L3)
- illustrate the physical interpretation of Gradient, Divergence and Curl (L3)

UNIT V: Multivariable Calculus (Vector integration)

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof).

Learning Outcomes:

At the end of this unit, the student will be able to

- find the work done in moving a particle along the path over a force field (L4)
- evaluate the rates of fluid flow along and across curves (L4)
- apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals (L3)

Textbooks:

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

References:

1. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2011.
2. Michael Greenberg, Advanced Engineering Mathematics, 2/e, Pearson, 2018
3. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
4. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
5. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.

Course Outcomes:

At the end of the course, the student will be able to

- solve the differential equations related to various engineering fields (L6)
- Identify solution methods for partial differential equations that model physical processes (L3)
- interpret the physical meaning of different operators such as gradient, curl and divergence (L5)
- estimate the work done against a field, circulation and flux using vector calculus (L6)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech – II Sem **L T P C**

3 0 0 3

(19A54202) Probability and Statistics

(Common to CSE, IT and Food Technology)

Course Objectives:

1) To familiarize the students with the foundations of probability and statistical methods
2) To impart probability concepts and statistical methods in various applications Engineering

Unit 1: Descriptive statistics and methods for data science **10 hrs**

Data science, Statistics Introduction, Population vs Sample, Collection of data, primary and secondary data, Type of variable: dependent and independent Categorical and Continuous variables, Data visualization, Measures of Central tendency, Measures of Variability (spread or variance) Skewness Kurtosis, correlation, correlation coefficient, rank correlation, regression coefficients, principle of least squares, method of least squares, regression lines.

Learning Outcomes:

At the end of this unit, the student will be able to

- summarize the basic concepts of data science and its importance in engineering (L2)
- analyze the data quantitatively or categorically , measure of averages, variability (L4)
- adopt correlation methods and principle of least squares, regression analysis (L5)

UNIT 2: Probability **8 hrs**

Probability, probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous), probability density functions, properties, mathematical expectation.

Learning Outcomes:

At the end of this unit, the student will be able to

- define the terms trial, events, sample space, probability, and laws of probability (L1)
- make use of probabilities of events in finite sample spaces from experiments (L3)
- apply Baye's theorem to real time problems (L3)
- explain the notion of random variable, distribution functions and expected value(L2)

UNIT 3: Probability distributions **6 hrs**

Probability distribution - Binomial, Poisson approximation to the binomial distribution and normal distribution-their properties.

Learning Outcomes:

At the end of this unit, the student will be able to

- apply Binomial and Poisson distributions for real data to compute probabilities, theoretical frequencies (L3)
- interpret the properties of normal distribution and its applications (L2)

Unit4: Estimation and Testing of hypothesis, large sample tests 8 hrs

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

Learning Outcomes:

At the end of this unit, the student will be able to

- explain the concept of estimation, interval estimation and confidence intervals (L2)
- apply the concept of hypothesis testing for large samples (L4)

Unit 5: Small sample tests 8 hrs

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

Learning Outcomes:

At the end of this unit, the student will be able to

- apply the concept of testing hypothesis for small samples to draw the inferences (L3)
- estimate the goodness of fit (L5)

Textbooks:

1. Miller and Freunds, Probability and Statistics for Engineers,7/e, Pearson, 2008.
2. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.

Reference Books:

1. S. Ross, a First Course in Probability, Pearson Education India, 2002.
2. W. Feller, an Introduction to Probability Theory and its Applications, 1/e, Wiley, 1968.

Course Learning Outcomes:

Upon successful completion of this course, the student should be able to

- make use of the concepts of probability and their applications (L3)
- apply discrete and continuous probability distributions (L3)
- classify the concepts of data science and its importance (L4)
- interpret the association of characteristics and through correlation and regression tools (L4)
- design the components of a classical hypothesis test (L6)
- infer the statistical inferential methods based on small and large sampling tests (L6)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech – I Sem **L T P C**

3 0 0 3

(19A56101T) Applied Physics

(ECE, CSE, EEE & IT Branches)

Course Objectives:

- To identify the importance of the optical phenomenon i.e. interference, diffraction and polarization related to its Engineering applications.
- To explain the significant concepts of dielectric and magnetic materials this leads to potential applications in the emerging micro devices.
- To impart knowledge in basic concepts of electromagnetic waves and its propagation in optical fibers along with its Engineering applications.
- To identify the importance of semiconductors in the functioning of electronic devices.
- To teach the concepts related to superconductivity which lead to their fascinating applications.
- To familiarize the applications of nanomaterials relevant to engineering branches.

Unit-I : Wave Optics **8hrs**

Interference-Principle of Superposition-Interference of light-Conditions for sustained Interference -Interference in thin films (reflected light)-Newton's Rings-Determination of Wavelength- Engineering applications of Interference

Diffraction-Fraunhofer Diffraction-Single and Double slits - Diffraction Grating – Grating Spectrum -Determination of Wavelength - Engineering applications of diffraction

Polarization-Polarization by double refraction-Nicol's Prism--Half wave and Quarter wave plate-Engineering applications of Polarization.

Unit Outcomes:

The students will be able to

- **explain** the need of coherent sources and the conditions for sustained interference (L2)
- **identify** engineering applications of interference including homodyne and heterodyne detection (L3)
- **analyze** the differences between interference and diffraction with applications (L4)
- **illustrate** the concept of polarization of light and its applications (L2)
- **classify** ordinary polarized light and extraordinary polarized light (L2)

Unit-II : Dielectric and Magnetic Materials **(8hrs)**

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: Ferroelectricity.

Introduction-Magnetic dipole moment-Magnetization-Magnetic susceptibility and permeability-Origin of permanent magnetic moment -Classification of Magnetic materials-Weiss theory of ferromagnetism (qualitative)-Hysteresis-soft and hard magnetic materials-Magnetic device applications (Magnetic bubble memory).

Unit Outcomes:

The students will be able to

- **explain** the concept of dielectric constant and polarization in dielectric materials (L2)
- **summarize** various types of polarization of dielectrics (L2)
- **interpret** Lorentz field and Claussius- Mosotti relation in dielectrics (L2)
- **classify** the magnetic materials based on susceptibility and their temperature dependence (L2)
- **explain** the applications of dielectric and magnetic materials (L2)
- **Apply** the concept of magnetism to magnetic devices (L3)

Unit – III: Electromagnetic Waves and Fiber Optics 10hrs

Divergence and Curl of Electric and Magnetic Fields- Gauss' theorem for divergence and Stokes' theorem for curl- Maxwell's Equations (Quantitative)- Electromagnetic wave propagation (Non-conducting medium) -Poynting's Theorem.

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 wave through optical fiber – modes -importance of V-number-Attenuation, Block Diagram of Fiber optic Communication -Medical Applications-Fiber optic Sensors.

Unit Outcomes:

The students will be able to

- **apply** the Gauss' theorem for divergence and Stokes' theorem for curl (L3)
- **evaluate** the Maxwell's equations, Maxwell's displacement current and correction in Ampere's law (L5)
- **asses** the electromagnetic wave propagation and its power in non-conducting medium (L5)
- **explain** the working principle of optical fibers (L2)
- **classify** optical fibers based on refractive index profile and mode of propagation (L2)
- **identify** the applications of optical fibers in medical, communication and other fields (L2)
- **Apply** the fiber optic concepts in various fields (L3).

Unit – IV: Semiconductors 8 hrs

Origin of energy bands - Classification of solids based on energy bands – Intrinsic semiconductors - density of charge carriers-Fermi energy – Electrical conductivity - extrinsic semiconductors - P-type & N-type - Density of charge carriers - Dependence of Fermi energy on carrier concentration and temperature- Direct and Indirect band gap semiconductors-Hall effect-Hall coefficient - Applications of Hall effect - Drift and Diffusion currents - Continuity equation - Applications of Semiconductors.

Unit Outcomes:

The students will be able to

- **classify** the energy bands of semiconductors (L2)
- **outline** the properties of n-type and p-type semiconductors and charge carriers (L2)
- **interpret** the direct and indirect band gap semiconductors (L2)
- **identify** the type of semiconductor using Hall effect (L2)
- **identify** applications of semiconductors in electronic devices (L2)

Unit – V: Superconductors and Nanomaterials 8 hrs

Superconductors-Properties- Meissner's effect-BCS Theory-Josephson effect (AC &DC)-Types of Super conductors-Applications of superconductors.

Nano materials – Significance of nanoscale – Properties of nanomaterials: Physical, Mechanical, Magnetic, Optical – Synthesis of nanomaterials: Top-down-Ball Milling, Bottom-up -Chemical vapour deposition – characterization of nanomaterials: X-Ray Diffraction (XRD), Scanning Electron Microscope (SEM) - Applications of Nano materials.

Unit Outcomes:

The students will be able to

- **explain** how electrical resistivity of solids changes with temperature (L2)
- **classify** superconductors based on Meissner's effect (L2)
- **explain** Meissner's effect, BCS theory & Josephson effect in superconductors (L2)
- **identify** the nano size dependent properties of nanomaterials (L2)
- **illustrate** the methods for the synthesis and characterization of nanomaterials (L2)
- **Apply** the basic properties of nanomaterials in various Engineering branches (L3).

Text books:

1. M. N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy" AText book of Engineering Physics"- S. Chand Publications, 11th Edition 2019.
2. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2012.

Reference Books:

1. K Thyagarajan " Engineering Physics",- McGraw Hill Publishing Company Ltd, 2016
2. Shatendra Sharma, Jyotsna Sharma, " Engineering Physics", Pearson Education,2018
3. David J.Griffiths, "Introduction to Electrodynamics"- 4/e, Pearson Education,2014
4. T Pradeep "A Text book of Nano Science and Nano Technology"- Tata Mc GrawHill 2013

Course Outcomes:

The students will be able to

- **identify** the wave properties of light and the interaction of energy with the matter (L3)
- **apply** electromagnetic wave propagation in different guided media (L2)
- **asses** the electromagnetic wave propagation and its power in different media (L5)
- **calculate** conductivity of semiconductors (L3)
- **interpret** the difference between normal conductor and superconductor (L2)
- **demonstrate** the application of nanomaterials (L2)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech – I Sem **L T P C**

0 0 3 1.5

(19A56101P) Applied Physics Lab

(ECE, CSE, CSSE, EEE, EIE & IT Branches)

Course Objectives:

- Understands the concepts of interference and diffraction and their applications.
- Understand the role of optical fiber parameters in communication.
- Recognize the importance of energy gap in the study of conductivity and hall effect in a semiconductor.
- Illustrates the magnetic and dielectric materials applications.
- Apply the principles of semiconductors in various electronic devices.

Note: In the following list, out of 15 experiments, any 12 experiments must be performed in a semester

List of Physics Experiments

1. Determine the thickness of the wire using wedge shape method

   Experimental outcomes:

   operates optical instrument like travelling microscope. (L2)

   estimate the thickness of the wire using wedge shape method (L2)

   Identifies the formation of interference fringes due to reflected light from non uniform thin film. (L2)

2. Determination of the radius of curvature of the lens by Newton's ring method

   Experimental outcomes:

   operates optical instrument like travelling microscope. (L2)

   estimate the radius of curvature of the lens (L2)

   Identifies the formation of interference fringes due to reflected light from non uniform thin film. (L2)

   plots the square of the diameter of a ring with no. of rings (L3)

3. Determination of wavelength by plane diffraction grating method

   Experimental outcomes:

   operates optical instrument like spectrometer. (L2)

   estimate the wavelength of the given source (L2)

Identifies the formation of grating spectrum due diffraction. (L2)

4. Dispersive power of a diffraction grating

Experimental outcomes:

operates optical instrument like spectrometer. (L2)

estimate the wavelength of the given source (L2)

Identifies the formation of grating spectrum due diffraction. (L2)

5. Resolving power of a grating

Experimental outcomes:

operates optical instrument like spectrometer. (L2)

estimate the resolving power of the grating (L2)

Illustrates the role of resolving power in various optical instruments. (L3)

6. Determination of dielectric constant by charging and discharging method.

Experimental outcomes:

operates various instruments and connect them as per the circuit. (L2)

estimate the dielectric constant of the given substance. (L2)

Identifies the significance of dielectric constant in various devices. (L2)

7. Magnetic field along the axis of a circular coil carrying current.

Experimental outcomes:

operates various instruments and connect them as per the circuit. (L2)

estimate the magnetic field along the axis of a circular coil carrying current. (L2)

plots the intensity of the magnetic field of circular coil carrying current with distance (L3)

8. To determine the self inductance of the coil (L) using Anderson's bridge.

Experimental outcomes:

operates various instruments and connect them as per the circuit. (L2)

estimate the self inductance of the coil using Anderson's bridge. (L2)

Identifies the significance of self inductance of the coil in electric devices. (L2)

9. Study the variation of B versus H by magnetizing the magnetic material (B-H curve)

Experimental outcomes:

operates various instruments and connect them as per the circuit. (L2)

estimate the hysteresis loss, coercivity and retentivity of the ferromagnetic material.. (L2)

classifies the soft and hard magnetic material based on B-H curve. (L2)
plots the magnetic field H and flux density B (L3)

10. To determine the numerical aperture of a given optical fiber and hence to find its acceptance angle

Experimental outcomes:

operates various instruments and connect them as per the circuit. (L2)

estimate the numerical aperture and acceptance angle of a given optical fiber. (L2)

Identifies the significance of numerical aperture and acceptance angle of a optical fiber in various engineering applications. (L2)

11. Measurement of magnetic susceptibility by Gouy's method

Experimental outcomes:

operates various instruments and connect them as per the circuit. (L2)

estimate the magnetic susceptibility of the given material. (L2)

Identifies the significance of magnetic susceptibilityin various engineering applications. (L2)

12. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.

Experimental outcomes:

operates various instruments and connect them as per the circuit. (L2)

estimate the charge carrier concentration and mobility in a semiconductor. (L2)

Illustrates the applications of hall effect. (L3)

plots the voltage with current and voltage with magnetic field (L3)

13. To determine the resistivity of semiconductor by Four probe method

Experimental outcomes:

operates various instruments and connect them as per the circuit. (L2)

estimate the resistivity of a semiconductor. (L2)

Identifies the importance of Four probe method in finding the resistivity of semiconductor. (L3)

14. To determine the energy gap of a semiconductor

Experimental outcomes:

operates various instruments and connect them as per the circuit. (L2)

estimate the energy gap of a semiconductor. (L2)

Illustrates the engineering applications of energy gap . (L3)

plots **1/T** with log R (L3)

15. Measurement of resistance with varying temperature.
Experimental outcomes:
operates various instruments and connect them as per the circuit. (L2)
estimate the resistance with varying temperature. (L2)
plots **resistance** R with temperature T (L3)

Course Outcomes:

The students will be able to

- **operate** optical instruments like microscope and spectrometer (L2)
- **determine** thickness of a hair/paper with the concept of interference (L2)
- **estimate** the wavelength of different colors using diffraction grating and resolving power (L2)
- **plot** the intensity of the magnetic field of circular coil carrying current with distance (L3)
- **evaluate** the acceptance angle of an optical fiber and numerical aperture (L3)
- **determine** magnetic susceptibility of the material and its losses by B-H curve (L3)
- **determine** the resistivity of the given semiconductor using four probe method (L3)
- **identify** the type of semiconductor i.e., n-type or p-type using hall effect (L3)
- **calculate** the band gap of a given semiconductor (L3)

References:

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

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech – II Sem

L	T	P	C
3	0	0	3

(19A56201T) Engineering Physics

(Civil, Mechanical and Food Technology)

Course Objectives:

- To impart knowledge in basic concepts of mechanics.
- To familiarize the basic concepts of acoustics and ultrasonics with their Engineering applications.
- To explain the significant concepts of dielectric and magnetic materials this leads to potential applications in the emerging micro devices.
- To impart knowledge in basic concepts of optical fibers and LASERs along with its Engineering applications.
- Familiarize types of sensors for various engineering applications

Unit-1: MECHANICS (10 hrs)

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 -center of mass- gravitation and Keplar's Law (Qualitative).

Learning Outcomes:

The students will be able to

- **identify**forces and moments in mechanical systems using scalar and vector techniques (L3)
- **interpret** the equation of motion of a rigid rotating body (torque on a rigid body) (L3)
- **extend** Newton's second law for inertial and non-inertial frame of reference (L2)
- **explain** consideration of Earth's rotation in designing and launching missiles (L2)

Unit-2: ACOUSTICS AND ULTRASONICS (9 hrs)

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

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

Learning Outcomes:

The students will be able to

- **explain** how sound is propagatedin buildings (L2)
- **analyze** acoustic properties of typically used materials in buildings (L4)
- **recognize** sound level disruptors and their use in architectural acoustics (L2)
- **identify** the use of ultrasonics in different fields (L3)

Unit-3 : Dielectric and Magnetic Materials (8hrs)

Introduction--Dielectric polarization-Dielectric polarizability, Susceptibility and Dielectric constant- Types of polarizations: Electronic, Ionic, Orientation Polarizations (Qualitative) - Frequency dependence of polarization-Lorentz (internal) field-Claussius -Mosotti equation-Applications of Dielectrics.

Introduction-Magnetic dipole moment-Magnetization-Magnetic susceptibility and permeability-Origin of permanent magnetic moment -Classification of Magnetic materials-Domain Concepts of ferromagentism-Hysteresis-soft and hard magnetic materials-Magnetic device applications.

Unit Outcomes:

The students will be able to

- **explain** the concept of dielectric constant and polarization in dielectric materials (L2)
- **summarize** Gauss's law in the presence of dielectrics (L2)
- **interpret** dielectric loss, Lorentz field and Claussius- Mosotti relation (L2)
- **classify** the magnetic materials based on susceptibility and their temperature dependence (L2)
- **explain** the applications of dielectric and magnetic materials (L2)

Unit – IV: Lasers and Fiber Optics (10hrs)

Introduction - Characteristics of Laser - Spontaneous and Stimulated emission of radiation - Einstein's coefficients - Population inversion - Pumping Mechanisms - He-Ne laser, Nd-YAG laser - Semiconductor laser - Applications of laser.

Introduction to Optical Fibers-Total Internal Reflection-Construction of optical fibers, Critical angle of propagation-Acceptance angle-Numerical Aperture-Classification of fibers based on Refractive index profile& modes –Propagation of electromagnetic wave through optical fiber-importance of V number- Block Diagram of Fiber optic Communication system -Medical Applications.

Unit Outcomes:

The students will be able to

- **Understand** the basic concepts of LASER light Sources (L2)
- **Apply** the concepts to learn the types of lasers (L3)
- **Identifies** the Engineering applications of lasers (L2)
- **explain** the working principle of optical fibers (L2)
- **classify** optical fibers based on refractive index profile and mode of propagation (L2)
- **identify** the applications of optical fibers in medical, communication and other fields (L2)

Unit – V: Sensors (8 hrs)

Sensors:(qualitative description only): Different types of sensors and applications; Strain and Pressure sensors- Piezoelectric, magnetostrictive sensors, Fibre optic methods of pressure

sensing; Temperature sensors - bimetallic strip, pyroelectric detectors, Hall-effect sensor, smoke and fire detectors.

Learning Outcomes:

The students will be able to

- **identify** different types of sensors and applications (L3)
- **explain** physics behind theworking principles of sensors (L2)
- **select** sensors for different type of applications (L3)

Text Books

1. M.N.Avadhanulu, P.G.Kshirsagar& TVS Arun Murthy" A Text book of Engineering Physics"-S.Chand Publications, 11th Edition 2019
2. Shatendra Sharma, Jyotsna Sharma, " Engineering Physics",Pearson Education,2018

Reference text books:

1. K Thyagarajan " Engineering Physics",- McGraw Hill Publishing Company Ltd, 2016
2. M K Varma "Introduction to Mechanics"-Universities Press-2015.
3. D.K. Bhattacharya and A. Bhaskaran, "Engineering Physics"- Oxford Publications-2015
4. Ian R Sinclair, Sensor and Transducers, 3rd eds, 2001, Elsevier (Newnes)

Course Outcomes:

After completing this course students will be able to

- **explain** physics applied to solve engineering problems (L2)
- **apply** the principles of acoustics in designing of buildings (L3)
- **explains** the applications of ultrasonics in various engineering fields (L2)
- **apply** electromagnetic wave propagation in different Optical Fibers (L2)
- **Apply** the lasers concepts in various applications (L3)
- **Explains** the concepts of dielectric and magnetic materials (L2)
- **identify** the sensors for various engineering applications (L3)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech – II Sem

L	T	P	C
0	0	3	1.5

(19A56201P) Engineering Physics Lab

(Civil, Mechanical and Food Technology)

Course Objectives:

- Understand the role of Optical fiber parameters in engineering applications.
- Recognize the significance of laser by studying its characteristics and its application in finding the particle size.
- Illustrates the magnetic and dielectric materials applications.
- Identifies the various sensor applications.

Note: - In the following list of experiments, out of 15 experiments any 12 experiments must be performed in a semester.

List of Physics Experiments:

16. Determination of wavelength of LASER light using diffraction grating.

    Experimental outcomes:
    operates various instrument (L2)
    estimate the wavelength of laser source (L2)
    Identifies the formation of grating spectrum due diffraction. (L2)

17. Determination of particle size using LASER.

    Experimental outcomes:
    - operates various instrument (L2)
    - estimate the Particles size using laser (L2)
    - Identifies the application of laser (L2)

3. Determination of spring constant of springs using Coupled Oscillator

    Experimental outcomes:
    operatesvarious instrument. (L2)
    estimate thespring constant (L2)
    Identifies the principle of coupled oscillations. (L2)

4. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.

    operatesvarious instruments and connect them as per the circuit. (L2)
    estimate thecharge carrier concentration and mobility in a semiconductor. (L2)
    Illustrates the applications of hall effect. (L3)
    plotsthe voltage with current and voltage with magnetic field (L3)

5. Determination of Dielectric constant of dielectric material using charging and discharging of capacitor.

    Experimental outcomes:
    operatesvarious instruments and connect them as per the circuit. (L2)
    estimate the dielectric constant of the given substance. (L2)

Identifies the significance of dielectric constant in various devices. (L2)

6. Magnetic field along the axis of a circular coil carrying current.
   Experimental outcomes:
   operatesvarious instruments and connect them as per the circuit. (L2)
   estimate the magnetic field along the axis of a circular coil carrying current. (L2)
   plotsthe intensity of the magnetic field of circular coil carrying current with distance (L3)
7. Rigidity modulus of material of a wire-dynamic method (Torsional pendulum)
   Experimental outcomes:
   operatesvarious instruments. (L2)
   estimate therigidity modules of a given wire (L2)
   plotslength of the pendulum (l) with time period T^2 (L3)
8. Determination of hysteresis loss by tracing B-H Curve of ferromagnetic material.
   Experimental outcomes:
   operatesvarious instruments and connect them as per the circuit. (L2)
   estimate thehysteresis loss, coercivity and retentivity of the ferromagnetic material.. (L2)
   classifies the soft and hard magnetic material based on B-H curve. (L2)
   plotsthe magnetic field H and flux density B (L3)
9. To determine the numerical aperture of a given optical fiber and hence to find its acceptance angle
   Experimental outcomes:
   operatesvarious instruments and connect them as per the circuit. (L2)
   estimate thenumerical aperture and acceptance angle of a given optical fiber. (L2)
   Identifies the significance of numerical aperture and acceptance angle of a optical fiber in various engineering applications. (L2)
10. Measurement of magnetic susceptibility by Gouy's method
    Experimental outcomes:
    operatesvarious instruments and connect them as per the circuit. (L2)
    estimate themagnetic susceptibility of the given material. (L2)
    Identifies the significance of magnetic susceptibilityin various engineering applications. (L2)
11. Determination of ultrasonic velocity in liquid (Acoustic grating)
    Experimental outcomes:
    operatesvarious instruments. (L2)
    estimatethe velocity of ultrasonic waves in liquids. (L2)
    Illustrates the basic applications of ultrasonics. (L3)
12. Determination of pressure variation using Strain Guage sensor.
    Experimental outcomes:
    operatesvarious instruments. (L2)
    estimatethe pressure variation using strain guage sensor. (L2)
    Illustrates the applications of strain gauge sensors. (L3)
13. Determination of temperature change using Strain Guage sensor.
    Experimental outcomes:
    operatesvarious instruments. (L2)
    estimatethe temperature variation using strain guage sensor. (L2)

Illustrates the applications of strain gauge sensors. (L3)

14. Determination of pressure variations using optical fiber sensors.
    Experimental outcomes:
    operatesvarious instruments. (L2)
    estimatethe pressure variation using Optical fiber sensor. (L2)
    Illustrates the applications of Optical fiber sensors. (L3)

15. Determination of temperature changes using optical fiber sensors.
    Experimental outcomes:
    operatesvarious instruments. (L2)
    estimatethe temperature variation using Optical fiber sensor. (L2)
    Illustrates the applications of Optical fiber sensors. (L3)

Course Outcomes:
The students will be able to

- **Operate** various optical instruments (L2)
- **Estimate** wavelength of laser and particles size using laser(L2)
- **estimate** the susceptibility and related magnetic parameters of magnetic materials (L2)
- **plot** the intensity of the magnetic field of circular coil carrying current with distance (L3)
- **evaluate** the acceptance angle of an optical fiber and numerical aperture (L3)
- **determine** magnetic susceptibility of the material and its losses by B-H curve (L3)
- **identify** the type of semiconductor i.e., n-type or p-type using hall effect (L3)
- **Apply** the concepts of sensors for various applications (L2)

References:

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

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech – I Sem

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3	0	0	3

(19A51101T) Engineering Chemistry

(MECH and CIVIL)

Course Objectives:

- To familiarize engineering chemistry and its applications
- To impart the concept of soft and hard waters, softening methods of hard water
- To train the students on the principles and applications of electrochemistry, polymers, surface chemistry, and cement

Unit 1: Water Technology (8 hrs)

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

Learning outcomes:
The student will be able to

- **list** the differences between temporary and permanent hardness of water (L1)
- **explain** the principles of reverse osmosis and electrodialysis. (L2)
- **compare** quality of drinking water with BIS and WHO standards. (L2)
- **illustrate** problems associated with hard water - scale and sludge**.** (L2)
- **explain** the working principles of different Industrial water treatment processes (L2)

Unit 2: Electrochemistry and Applications: (10 hrs)

Electrodes – concepts, electrochemical cell, Nernst equation, cell potential calculations.
Primary cells – Fuel cells, hydrogen-oxygen, methanol fuel cells – working of the cells.
Secondary cells – lead acid, nickel-metal hydride and lithium ion batteries- working of the batteries including cell reactions.
Corrosion: Introduction to corrosion, electrochemical theory of corrosion, differential aeration cell corrosion, galvanic corrosion, metal oxide formation by dry electrochemical corrosion, Pilling Bedworth ratios and uses, environmental factors (pH, temperature, DO) affecting corrosion rate, Pourbaix diagrams for iron and aluminium, protection – corrosion inhibitors with specific examples, cathodic and anodic protection, electroplating and electro less plating (Nickel and Copper).

Learning Outcomes:

At the end of this unit, the students will be able to

- **apply** Nernst equation for calculating electrode and cell potentials (L3)
- **apply** Pilling Bedworth rule for corrosion and corrosion prevention (L3)
- **demonstrate** the corrosion prevention methods and factors affecting corrosion (L2)
- **compare** different batteries and their applications (L2)

Unit 3: Polymers and Fuel Chemistry: (12 hrs)

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, copolymerization (stereospecific polymerization) with specific examples and mechanisms of polymer formation.
Thermoplastics and Thermo-sets, Elastomers – applications with specific examples.
Conducting polymers – polyacetylene, polyaniline, polypyrroles – mechanism of conduction and applications.
Fuels – Types of fuels, calorific value, numerical problems based on calorific value; Analysis of coal, refining of petroleum, liquid fuels, fuels for IC engines, knocking and anti-knock agents, Octane and Cetane values, cracking of oils; alternative fuels- propane, methanol and ethanol, bio fuels.

Learning Outcomes:

At the end of this unit, the students will be able to

- **explain** different types of polymers and their applications (L2)
- **demonstrate** the mechanism of conduction in conducting polymers (L2)
- **select** suitable fuels for IC engines (L3)
- **explain** calorific values, octane number, refining of petroleum and cracking of oils (L2)

Unit 4: Cement and Concrete Chemistry: (8 hrs)

Introduction to building materials – Portland cement, constituents, manufacturing process-raw materials for manufacturing process, reactions below 1300 ^{o}C and reactions between 1300 and 1450 ^{o}C, reactions during cooling, grinding or storage, chemical equations, phases of cement clinker (alite, belite, aluminate and ferrite), reactivity of clinker phases, parameters to characterize the clinker formation: lime saturation factor (LSF), silica ratio (SR) and alumina ration (AR), chemistry of setting and hardening of cement (hydration, hydrolysis, equations), scheme of concrete formation, admixtures for concrete improvement – retarders, accelerators, air-entraining agents, grinding agents, super plasticizers, dispersants, etc.
Learning Outcomes:

At the end of this unit, the students will be able to

- **explain** the manufacturing of portland cement (L2)
- **demonstrate** the scheme of concrete formation (L2)

- **identify** the constituents of portland cement (L2)
- **enumerate** the reactions at different temperatures in the manufacture of cement (L2)

Unit 5: Surface Chemistry and Applications: (10 hrs)

Introduction to surface chemistry, colloids, nanometals and nanometal oxides, micelle formation, synthesis of colloids (any two methods with examples), chemical and electrochemical methods (not more than two methods) of preparation of nanometals and metal oxides, stabilization of colloids and nanomaterials by stabilizing agents, characterization of surface by physicochemical methods (SEM, TEM, X-ray diffraction), solid-gas interface, solid-liquid interface, adsorption isotherm, BET equation (no derivation), calculation of specific surface area of solids, numerical problems, functionalization of surface of nanomaterials– applications of colloids and nanomaterials – catalysis, medicine, sensors, etc.

Learning Outcomes:

At the end of this unit, the students will be able to

- **summarize** the applications of SEM, TEM and X-ray diffraction in surface characterization (L2)
- **explain** the synthesis of colloids with examples (L2)
- **outline** the preparation of nanomaterials and metal oxides (L2)
- **identify** the application of colloids and nanomaterials in medicine, sensors and catalysis (L2)

Text books:

1. Jain and Jain, Engineering Chemistry, 16/e, Dhanpat Rai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

Reference books:

1. H.F.W. Taylor, Cement Chemistry, 2/e, Thomas Telford Publications, 1997.
2. D.J. Shaw, Introduction to Colloids and Surface Chemistry, Butterworth-Heineman,1992.
3. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.

Course Outcomes:

At the end of the course, the students will be able to

- **demonstrate** the corrosion prevention methods and factors affecting corrosion (L2)
- **explain** the preparation, properties, and applications of thermoplastics & thermosettings, elastomers & conducting polymers. (L2)
- **explain** calorific values, octane number, refining of petroleum and cracking of oils (L2)
- **explain** the manufacturing of portland cement **and** concrete formation (L2)
- **summarize** the application of SEM, TEM and X-ray diffraction in surface characterization (L2)
- **explain** the principles of spectrometry, GC and HPLC in separation of gaseous and liquid mixtures (L2)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech – I Sem

L	T	P	C
0	0	3	1.5

(19A51101P) Engineering Chemistry Lab

(MECH and CIVIL)

Course Objectives:

- Verify the fundamental concepts with experiments

List of Experiments:

1. Determination of Hardness of a groundwater sample.
2. pH metric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base
3. Determination of cell constant and conductance of solutions
4. Potentiometry - determination of redox potentials and emfs
5. Determination of Strength of an acid in Pb-Acid battery
6. Preparation of a polymer
7. Determination of viscosity of polymer solution using survismeter
8. Determination of percentage of Iron in Cement sample by colorimetry
9. Estimation of Calcium in port land Cement
10. Preparation of nanomaterials
11. Adsorption of acetic acid by charcoal
12. Determination of percentage Moisture content in a coal sample

Course Outcomes:

At the end of the course, the students will be able to

- **determine** the cell constant and conductance of solutions (L3)
- **prepare** advanced polymer materials (L2)
- **determine** the physical properties like surface tension, adsorption and viscosity (L3)
- **estimate** the Iron and Calcium in cement (L3)
- **calculate** the hardness of water (L4)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech – II Sem **L T P C**

3 0 0 3

(19A51201T) Chemistry

(CSE, CSSE, ECE, EIE, EEE and IT)

Course Objectives:

- To familiarize engineering chemistry and its applications
- To train the students on the principles and applications of electrochemistry and polymers
- To introduce instrumental methods, molecular machines and switches

Unit 1: Structure and Bonding Models: (10 hrs)

Planck's quantum theory, dual nature of matter, Schrodinger equation, significance of Ψ and Ψ^2 , applications to hydrogen, particle in a box and their applications for conjugated molecules, molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of O_2 and CO, etc. π-molecular orbitals of butadiene and benzene, calculation of bond order, crystal field theory – salient features – energy level diagrams for transition metal ions – splitting in octahedral and tetrahedral environments, magnetic properties and colour, band theory of solids – band diagrams for conductors, semiconductors and insulators, role of doping on band structures.

Learning Outcomes:

At the end of this unit, the students will be able to

- **apply** Schrodinger wave equation to hydrogen and particle in a box (L3)
- **illustrate** the molecular orbital energy level diagram of different molecular species (L2)
- **explain** the band theory of solids for conductors, semiconductors and insulators (L2)
- **discuss** the magnetic behaviour and colour of complexes (L3)

Unit 2: Electrochemistry and Applications: (10 hrs)

Electrodes – concepts, reference electrodes (Calomel electrode, Ag/AgCl electrode and glass electrode) electrochemical cell, Nernst equation, cell potential calculations, numerical problems, concept of pH, pH meter and applications of pH metry (acid-base titrations), potentiometry-potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations), photovoltaic cell – working and applications, photogalvanic cells with specific examples. Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples.

Primary cells – Zinc-air battery, alkali metal sulphide batteries, Fuel cells, hydrogen-oxygen, methanol fuel cells – working of the cells.

Secondary cells – lead acid, nickel-metal hydride and lithium ion batteries- working of the batteries including cell reactions, button cells,

Learning Outcomes:

At the end of this unit, the students will be able to

- **apply** Nernst equation for calculating electrode and cell potentials (L3)
- **differentiate** between pH metry, potentiometric and conductometric titrations (L2)
- **explain** the theory of construction of battery and fuel cells (L2)
- **solve** problems based on cell potential (L3)

Unit 3: Polymer Chemistry: (10 hrs)

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, copolymerization (stereospecific polymerization) with specific examples and mechanisms of polymer formation.
Plastics - Thermoplastics and Thermosettings, Preparation, properties and applications of – Bakelite, urea-formaldehyde, Nylon-66, carbon fibres, Elastomers–Buna-S, Buna-N–preparation, properties and applications.
Conducting polymers – polyacetylene, polyaniline, polypyrroles – mechanism of conduction and applications.

Learning Outcomes:

At the end of this unit, the students will be able to

- **explain** the different types of polymers and their applications (L2)
- **explain** the preparation, properties and applications of Bakelite, Nylon-66, and carbon fibres (L2)
- **describe** the mechanism of conduction in conducting polymers (L2)
- **discuss** Buna-S and Buna-N elastomers and their applications (L2)

Unit 4: Instrumental Methods and Applications (10 hrs)

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. Principle and applications of pH metry, potentiometry, conductometry, UV-spectroscopy, IR and NMR. Principles of Gas Chromatography (GC) and High Performance Liquid Chromatography (HPLC), separation of gaseous mixtures and liquid mixtures

Learning outcomes:

After completion of Module IV, students will be able to

- **explain** the different types of spectral series in electromagnetic spectrum (L2)
- **understand** the principles of different analytical instruments (L2)
- **explain** the different applications of analytical instruments (L2)

Unit 5: Molecular Machines and Molecular Switches: (10 hrs)

Introduction to supramolecular chemistry, self assembly with suitable examples (self assembly on gold surface), characteristics of molecular motors and machines, energy supply, natural molecular motors and machines, Rotaxanes and Catenanes as artificial molecular machines, prototypes – linear motions in rotaxanes, an acid-base controlled molecular shuttle, a molecular elevator, an autonomous light-powered molecular motor, systems based on catenanes, molecular switches – introduction, cyclodextrin-based switches, in and out switching, back and forth switching, displacement switching, coordination switching and rearrangement switching.

Learning Outcomes:

At the end of this unit, the students will be able to

- **explain** the band theory of solids for conductors, semiconductors and insulators (L2)
- **explain** supramolecular chemistry and self assembly (L2)
- **demonstrate** the application of Rotaxanes and Catenanes as artificial molecular machines (L2)

Text books:

1. Jain and Jain, Engineering Chemistry, 16/e, Dhanpat Rai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

Reference books:

1. J. D. Lee, Concise Inorganic Chemistry, 5/e, Oxford University Press, 2008.
2. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
3. Ben L. Feringa and Wesley R. Browne, Molecular Switches, 2/e, Wiley-VCH, 2011.

Course Outcomes:

At the end of the course, the students will be able to

- **compare** the materials of construction for battery and electrochemical sensors (L2)
- **explain** the preparation, properties, and applications of thermoplastics & thermosettings, elastomers & conducting polymers. (L2)
- **explain** the principles of spectrometry, GC and HPLC in separation of gaseous and liquid mixtures (L2)
- **apply** the principle of supramolecular chemistry in application of molecular machines and switches (L3)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech – II Sem (Computer Science and Engineering) **L T P C**

0 0 3 1.5

(19A51201P)Chemistry Lab

(CSE, CSSE, ECE, EIE, EEE and IT)

Course Objectives:

- Verify the fundamental concepts with experiments

List of Experiments:

1. Measurement of 10Dq by spectrophotometric method
2. Models of potential energy surfaces
3. pH metric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base
4. Determination of cell constant and conductance of solutions
5. Potentiometry - determination of redox potentials and emfs
6. Determination of Strength of an acid in Pb-Acid battery
7. Preparation of a polymer
8. Determination of viscosity of polymer solution using survismeter
9. Verify Lambert-Beer's law
10. Thin layer chromatography
11. Identification of simple organic compounds by IR and NMR
12. HPLC method in separation of gaseous and liquid mixtures

Course Outcomes:

At the end of the course, the students will be able to

- **determine** the cell constant and conductance of solutions (L3)
- **prepare** advanced polymer materials (L2)
- **measure** the strength of an acid present in secondary batteries (L3)
- **analyse** the IR and NMR of some organic compounds (L3)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech – I Sem

L	T	P	C
3	0	0	3

(19A51102T) Fundamental Chemistry

(Food Technology)

Course Objectives:

- To familiarize engineering chemistry and its applications
- To train the students on the principles and applications of electrochemistry and polymers
- To introduce instrumental methods, molecular machines and switches

Unit 1: Structure and Bonding Models: (10 hrs)

Planck's quantum theory, dual nature of matter, Schrodinger equation, significance of Ψ and Ψ^2 , applications to hydrogen, particle in a box and their applications for conjugated molecules, molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of O_2 and CO, etc. π-molecular orbitals of butadiene and benzene, calculation of bond order, crystal field theory – salient features – energy level diagrams for transition metal ions – splitting in octahedral and tetrahedral environments, magnetic properties and colour, band theory of solids – band diagrams for conductors, semiconductors and insulators, role of doping on band structures.

Learning Outcomes:

At the end of this unit, the students will be able to

- **apply** Schrodinger wave equation to hydrogen and particle in a box (L3)
- **illustrate** the molecular orbital energy level diagram of different molecular species (L2)
- **explain** the band theory of solids for conductors, semiconductors and insulators (L2)
- **discuss** the magnetic behaviour and colour of complexes (L3)

Unit 2: Electrochemistry and Applications: (10 hrs)

Electrodes – concepts, reference electrodes (Calomel electrode, Ag/AgCl electrode and glass electrode) electrochemical cell, Nernst equation, cell potential calculations, numerical problems, concept of pH, pH meter and applications of pH metry (acid-base titrations), potentiometry-

potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations), photovoltaic cell – working and applications, photogalvanic cells with specific examples. Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples.

Primary cells – Zinc-air battery, alkali metal sulphide batteries, Fuel cells, hydrogen-oxygen, methanol fuel cells – working of the cells.

Secondary cells – lead acid, nickel-metal hydride and lithium ion batteries- working of the batteries including cell reactions, button cells,

Learning Outcomes:

At the end of this unit, the students will be able to

- **apply** Nernst equation for calculating electrode and cell potentials (L3)
- **differentiate** between pH metry, potentiometric and conductometric titrations (L2)
- **explain** the theory of construction of battery and fuel cells (L2)
- **solve** problems based on cell potential (L3)

Unit 3: Polymer Chemistry: (10 hrs)

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, copolymerization (stereospecific polymerization) with specific examples and mechanisms of polymer formation.

Plastics - Thermoplastics and Thermosettings, Preparation, properties and applications of – Bakelite, urea-formaldehyde, Nylon-66, carbon fibres, Elastomers–Buna-S, Buna-N–preparation, properties and applications.

Conducting polymers – polyacetylene, polyaniline, polypyrroles – mechanism of conduction and applications.

Learning Outcomes:

At the end of this unit, the students will be able to

- **explain** the different types of polymers and their applications (L2)
- **explain** the preparation, properties and applications of Bakelite, Nylon-66, and carbon fibres (L2)
- **describe** the mechanism of conduction in conducting polymers (L2)
- **discuss** Buna-S and Buna-N elastomers and their applications (L2)

Unit 4: Instrumental Methods and Applications (10 hrs)

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. Principle and applications of pH metry, potentiometry, conductometry, UV-spectroscopy, IR and NMR. Principles of Gas Chromatography (GC) and High Performance Liquid Chromatography (HPLC), separation of gaseous mixtures and liquid mixtures

Learning outcomes:
After completion of Module IV, students will be able to

- **explain** the different types of spectral series in electromagnetic spectrum (L2)
- **understand** the principles of different analytical instruments (L2)
- **explain** the different applications of analytical instruments (L2)

Unit 5: Surface Chemistry and Applications: (10 hrs)

Introduction to surface chemistry, colloids, nanometals and nanometal oxides, micelle formation, synthesis of colloids (any two methods with examples), chemical and electrochemical methods (not more than two methods) of preparation of nanometals and metal oxides, stabilization of colloids and nanomaterials by stabilizing agents, characterization of surface by physicochemical methods (SEM, TEM, X-ray diffraction), solid-gas interface, solid-liquid interface, adsorption isotherm, BET equation (no derivation), calculation of specific surface area of solids, numerical problems, functionalization of surface of nanomaterials– applications of colloids and nanomaterials – catalysis, medicine, sensors, etc.

Learning Outcomes:

At the end of this unit, the students will be able to

- **summarize** the applications of SEM, TEM and X-ray diffraction in surface characterization (L2)
- **explain** the synthesis of colloids with examples (L2)
- **outline** the preparation of nanomaterials and metal oxides (L2)
- **identify** the application of colloids and nanomaterials in medicine, sensors and catalysis (L2)

Text books:

1. Jain and Jain, Engineering Chemistry, 16/e, Dhanpat Rai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

Reference books:

1. J. D. Lee, Concise Inorganic Chemistry, 5/e, Oxford University Press, 2008.
2. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
3. Ben L. Feringa and Wesley R. Browne, Molecular Switches, 2/e, Wiley-VCH, 2011.

Course Outcomes:

At the end of the course, the students will be able to

- **compare** the materials of construction for battery and electrochemical sensors (L2)
- **explain** the preparation, properties, and applications of thermoplastics & thermosettings, elastomers & conducting polymers. (L2)
- **explain** the principles of spectrometry, GC and HPLC in separation of gaseous and liquid mixtures (L2)
- **apply** the principle of supramolecular chemistry in application of molecular machines and switches (L3)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech – I Sem

L	T	P	C
0	0	3	1.5

(19A51102P) Fundamental Chemistry Lab

(Food Technology)

Course Objectives:

- Verify the fundamental concepts with experiments

List of Experiments:

1. Measurement of 10Dq by spectrophotometric method
2. Models of potential energy surfaces
3. pH metric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base
4. Determination of cell constant and conductance of solutions
5. Potentiometry - determination of redox potentials and emfs
6. Determination of Strength of an acid in Pb-Acid battery
7. Preparation of a polymer
8. Determination of viscosity of polymer solution using survismeter
9. Verify Lambert-Beer's law
10. Thin layer chromatography
11. Identification of simple organic compounds by IR and NMR
12. HPLC method in separation of gaseous and liquid mixtures
13. Preparation of nanomaterials
14. Adsorption of acetic acid by charcoal

Course Outcomes:

At the end of the course, the students will be able to

- **determine** the cell constant and conductance of solutions (L3)
- **prepare** advanced polymer materials (L2)
- **measure** the strength of an acid present in secondary batteries (L3)
- **analyse** the IR and NMR of some organic compounds (L3)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech – I Sem

L	T	P	C
2	0	0	2

(19A52101T) Communicative English I

(Common to All Branches of Engineering)

Introduction

The course is designed to train students in receptive (listening and reading) as well as productive and interactive (speaking and writing) skills by incorporating a comprehensive, coherent and integrated approach that improves the learners' ability to effectively use English language in academic/ workplace contexts. The shift is from *learning about the language* to *using the language*. On successful completion of the compulsory English language course/s in B.Tech., learners would be confident of appearing for international language qualification/proficiency tests such as IELTS, TOEFL, or BEC, besides being able to express themselves clearly in speech and competently handle the writing tasks and verbal ability component of campus placement tests. Activity based teaching-learning methods would be adopted to ensure that learners would engage in actual use of language both in the classroom and laboratory sessions.

Course Objectives

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

Unit 1 **10 Hours (4L+6P)**

Listening: Identifyingthe topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.**Speaking:**Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others. **Reading:** Skimming to get the main idea of a text; scanning to look for specific pieces of information. **Reading for Writing:**Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph. **Grammar and Vocabulary:** Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countables and uncountables; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentences.

Learning Outcomes

At the end of the module, the learners will be able to

- ➢ understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information
- ➢ ask and answer general questions on familiar topics and introduce oneself/others

- employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information
- recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
- form sentences using proper grammatical structures and correct word forms

Unit 2 **10 Hours (4L+6P)**

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts. **Speaking:** Discussion in pairs/ small groups on specific topics followed by short structured talks.**Reading:** Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together. **Writing:** Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters. **Grammar and Vocabulary:** Cohesive devices - linkers, sign posts and transition signals; use of articles and zero article; prepositions.

Learning Outcomes

At the end of the module, the learners will be able to

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

Unit 3 **10 Hours (4L+6P)**

Listening: Listening for global comprehension and summarizing what is listened to. **Speaking:** Discussing specific topics in pairs or small groups and reporting what is discussed **Reading:** Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.**Writing:** Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions. **Grammar and Vocabulary:** Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.

Learning Outcomes

At the end of the module, the learners will be able to

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

Unit4 **8 Hours (2L+6P)**

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video. **Speaking:** Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions. **Reading:**Studying the use of graphic elements in texts to convey information, reveal

trends/patterns/relationships, communicate processes or display complicated data.**Writing:** Information transfer; describe, compare, contrast, identify significance/trendsbased on information provided in figures/charts/graphs/tables.**Grammar and Vocabulary:**Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of antonyms

Learning Outcomes

At the end of the module, the learners will be able to

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

Unit 5 **8 Hours (2L+6P)**

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

Learning Outcomes

At the end of the module, the learners will be able to

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

***Course Materials would be compiled and provided to learners and teachers**

Reference Books

- Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.
- Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking.* Heinley ELT; 2nd Edition, 2018.
- Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
- Hewings, Martin. *Cambridge Academic English (B2).* CUP, 2012.

Sample Web Resources

Grammar/Listening/Writing
1-language.com
http://www.5minuteenglish.com/

https://www.englishpractice.com/

Grammar/Vocabulary
English Language Learning Online
http://www.bbc.co.uk/learningenglish/
http://www.better-english.com/
http://www.nonstopenglish.com/
https://www.vocabulary.com/
BBC Vocabulary Games
Free Rice Vocabulary Game

Reading
https://www.usingenglish.com/comprehension/
https://www.englishclub.com/reading/short-stories.htm
https://www.english-online.at/

Listening
https://learningenglish.voanews.com/z/3613
http://www.englishmedialab.com/listening.html

Speaking
https://www.talkenglish.com/
BBC Learning English – Pronunciation tips
Merriam-Webster – Perfect pronunciation Exercises

All Skills
https://www.englishclub.com/
http://www.world-english.org/
http://learnenglish.britishcouncil.org/

Online Dictionaries
Cambridge dictionary online
MacMillan dictionary
Oxford learner's dictionaries

Course Outcomes:
At the end of the course, the learners will be able to

- Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
- Apply grammatical structures to formulate sentences and correct word forms
- Analyze discourse markers to speak clearly on a specific topic in informal discussions
- Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.
- Create a coherent paragraph interpreting a figure/graph/chart/table

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech – I Sem

L	T	P	C
0	0	3	1.5

(19A52101P) Communicative English I Lab

(Common to All Branches of Engineering)

Course Objectives

- students will be exposed to a variety of self instructional, learner friendly modes of language learning
- students will cultivate the habit of reading passages from the computer monitor. Thus providing them with the required facility to face computer based competitive exams like GRE, TOEFL, and GMAT etc.
- students will learn better pronunciation through stress, intonation and rhythm
- students will be trained to use language effectively to face interviews, group discussions, public speaking
- students will be initiated into greater use of the computer in resume preparation, report writing, format making etc

Course Outcomes

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

Unit 1

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

Learning Outcomes

At the end of the module, the learners will be able to

- understand different accents spoken by native speakers of English
- employ suitable strategies for skimming and scanning on monitor to get the general idea of a text and locate specific information
- learn different professional registers and specific vocabulary to describe different persons, places and objects

Unit 2

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

Learning Outcomes

At the end of the module, the learners will be able to

- produce a structured talk extemporarily
- comprehend and produce short talks on general topics
- participate in debates and speak clearly on a specific topic using suitable discourse markers

Unit 3

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

Learning Outcomes

At the end of the module, the learners will be able to

- Learn different ways of greeting and introducing oneself/others
- summarize the content with clarity and precision and take notes while listening to a talk/lecture and make use of them to answer questions
- replenish vocabulary with one word substitutes, homonyms, homophones, homographs to reduce errors in speech and writing

Unit4

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

Learning Outcomes

At the end of the module, the learners will be able to

- Learn different ways of asking information and giving directions
- Able to transfer information effectively
- understand non-verbal features of communication

Unit 5

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

Learning Outcomes

At the end of the module, the learners will be able to

- make formal oral presentations using effective strategies
- learn different techniques of précis writing and paraphrasing strategies
- comprehend while reading different texts and edit short texts by correcting common errors

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech – I Sem **L T P C**

3 1 0 4

(19A05101T) Problem Solving and Programming

(Common to All Branches of Engineering)

Course Objectives:

1. To introduce programming using Visual programming tool "Scratch"
2. To teach problem-solving through Flow charting tool - Raptor
3. To elucidate problem-solving using a Python programming language
4. To introduce a function-oriented programming paradigm through python
5. To train in the development of solutions using modular concepts
6. To teach practical pythonic solution patterns

Unit – 1: Visual Programming through Scratch

Scratch: Introduction to programming concepts with scratch, Scratch environment, sprites looks and motion, Angles and directions, repetition and variation, changing costumes, adding background, Input/Output, variables and operators. Working with sounds and sprite communication and creating stories.

Learning Outcomes: Student should be able to

1. Develop a program controlled by a loop. (L3)
2. Experiment with "costumes" to change the appearance of sprites.(L3)
3. Perform Input/Output Operations using scratch. (L3)
4. Compute using common mathematical formulas. (L3)
5. Develop programs by passing messages between sprites. (L3)
6. Use the sprites to make sounds (L3)

Text Book:

https://www.cse.msu.edu/~stockman/ITEC/Scratch/BGC2011Scratch-Rev1.pdf
https://nostarch.com/scratchplayground
http://fusecontent.education.vic.gov.au/9f79537a-66fc-4070-a5ce-e3aa315888a1/scratchreferenceguide14.pdf

Unit – 2: Flowchart design through Raptor

Flow chart symbols, Input/Output, Assignment, operators, conditional if, repetition, function and sub charts. Example problems(section 1) – Finding maximum of 3 numbers, Unit converters, Interest calculators, multiplication tables, GCD of 2 numbers
Example problems(section 2) - Fibonacci generation, prime number generation. Minimum, Maximum and average of n numbers, Linear search, Binary Search.

Learning outcomes: Student should be able to

1. Select flowchart symbols for solving problems. (L1)
2. Develop basic flowcharts for performing Input/Output and Computations (L3)
3. Solve numerical problems using Raptor (L3)

4. Analyse problems by modular approach using Raptor (L4)

Text Book:
https://raptor.martincarlisle.com/

1. Download and Install Raptor software
2. Use the tool to draw flowcharts for the problems given.

Unit – 3 : Introduction to Python
Python – Numbers, Strings, Variables, operators, expressions, statements, String operations, Math function calls, Input/Output statements, Conditional If, while and for loops, User defined Functions, parameters to functions, recursive functions, Turtle Graphics.

Learning outcomes

1. Interpret numbers, strings, variables, operators, expressions and math functions using Python Interactive Mode. (L2)
2. Solve simple problems using control structures, input and output statements. (L3)
3. Develop user-defined functions(recursive and non-recursive). (L3)
4. Build Python programs for section 1 raptor flowcharts. (L3)
5. Develop Python programs for creating various graphical shapes using turtle graphics. (L3)

Text Book:
http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf

Unit – 4 : Data Structures and Idiomatic Programming in Python
Lists, Tuples, Dictionaries, Strings, Files and their libraries. Beautiful Idiomatic approach to solve programming problems.

Learning outcomes: Student should be able to

1. Summarize the features of lists, tuples, dictionaries, strings and files. (L2)
2. Outline the best practices of "Beautiful Idiomatic Python". (L2)
3. Build Python programs for section 2 raptor flowcharts. (L3).
4. Select appropriate data structure for solving a problem (L5)
5. Develop solutions for real life computational problems (L6)

https://zhanxw.com/blog/wp-content/uploads/2013/03/BeautifulCode_2.pdf

Unit – 5 : Event driven Programming
Turtle Bar Chart, Event Driven programming. Key press events, Mouse events, timer events. Chapters 4 to 5 and Chapter 10

Learning outcomes: Student should be able to

1. Develop python programs to draw bar charts using turtle graphics. (L3)
2. Apply event driven programming and timers using Python (L3)

Course outcomes: Student should be able to

1. Design interactive visual programs using Scratch. (L6)
2. Develop flowcharts using raptor to solve the given problems. (L3)
3. Develop Python programs for numerical and text based problems (L3)
4. Develop graphics and event based programming using Python (L3)
5. Develop Python programs using beautiful Pythonic idiomatic practices (L3)
6. Select appropriate programming construct for solving the problem (L5)

Text Books:

1. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd edition, O'Reilly, 2016. Or
http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf

Reference Books:

1. Martin C.Brown, "The Complete Reference: Python", McGraw-Hill, 2018.
2. Kenneth A. Lambert, B.L. Juneja, "Fundamentals of Python", CENGAGE, 2015.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech – I Sem **L T P C**

0 0 3 1.5

(19A05101P) Problem Solving and Programming Lab

(Common to All Branches of Engineering)

Course Objectives:

1. Demonstrate the use of problem solving concept flow chart
2. Illustrate the Python programming constructs through simple programs
3. To train solving computational problems
4. To elucidate solving mathematical problems using Python programming language
5. To implement searching and sorting techniques

Laboratory Experiments

1. Design a script in Scratch to make a sprite to draw geometrical shapes such as Circle, Triangle, Square, Pentagon.
2. Design a script in Scratch to make a sprite to ask the user to enter two different numbers and an arithmetic operator and then calculate and display the result.
3. Construct flowcharts to
    a. calculate the maximum, minimum and average of N numbers
    b. develop a calculator to convert time, distance, area, volume and temperature from one unit to another.
4. Construct flowcharts with separate procedures to
    a. calculate simple and compound interest for various parameters specified by the user
    b. calculate the greatest common divisor using iteration and recursion for two numbers as specified by the user
5. Construct flowcharts with procedures to
    a. generate first N numbers in the Fibonacci series
    b. generate N Prime numbers
6. Design a flowchart to perform Linear search on list of N unsorted numbers(Iterative and recursive)
7. *** Design a flowchart to perform Binary search on list of N sorted numbers(Iterative and recursive)
8. Design a flowchart to determine the number of characters and lines in a text file specified by the user
9. Design a Python script to convert a Binary number to Decimal number and verify if it is a Perfect number.
10. Design a Python script to determine if a given string is a Palindrome using recursion

11. Design a Python script to sort numbers specified in a text file using lists.
12. *** Design a Python script to determine the difference in date for given two dates in YYYY:MM:DD format(0 <= YYYY <= 9999, 1 <= MM <= 12, 1 <= DD <= 31) following the leap year rules.
13. Design a Python Script to determine the Square Root of a given number without using inbuilt functions in Python.
14. *** Design a Python Script to determine the time difference between two given times in HH:MM:SS format.(0 <= HH <= 23, 0 <= MM <= 59, 0 <= SS <= 59)
15. *** Design a Python Script to find the value of (Sine, Cosine, Log, PI, *e*) of a given number using infinite series of the function.
16. *** Design a Python Script to convert a given number to words
17. *** Design a Python Script to convert a given number to roman number.
18. *** Design a Python Script to generate the frequency count of words in a text file.
19. *** Design a Python Script to print a spiral pattern for a 2 dimensional matrix.
20. *** Design a Python Script to implement Gaussian Elimination method.
21. *** Design a Python script to generate statistical reports(Minimum, Maximum, Count, Average, Sum etc) on public datasets.
22. *** Design a Python script using the Turtle graphics library to construct a turtle bar chart representing the grades obtained by N students read from a file categorising them into distinction, first class, second class, third class and failed.

Course outcomes: Student should be able to

1. Design solutions to mathematical problems (L6)
2. Organize the data for solving the problem (L6)
3. Design interactive visual programs using Scratch. (L6)
4. Develop flowcharts using raptor to solve the given problems. (L3)
5. Develop Python programs for manipulating text (L3)
6. Develop graphics and event based programming using Python (L3)
7. Develop Python programs using beautiful Pythonic idiomatic practices (L3)
8. Select appropriate programming construct for solving the problem (L5)

Reference Books:

1. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd edition, O'Reilly, 2016. Or http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf
2. Paul Barry, "Head First Python a Brain Friendly Guide" 2nd Edition, O'Reilly, 2016
3. Dainel Y.Chen "Pandas for Everyone Python Data Analysis" Pearson Education, 2019

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech – I Sem **L T P C**

0 0 3 1.5

(19A03101) WORKSHOP - I

(Common to all branches)

C**ourse Objective:**

To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills

Wood Working:

Familiarity with different types of woods and tools used in wood working and make following joints

a) Half – Lap joint
b) Mortise and Tenon joint
c) Corner Dovetail joint or Bridle joint

Sheet Metal Working:

Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets

a) Tapered tray b) Conical funnel c) Elbow pipe d) Brazing

Fitting:

Familiarity with different types of tools used in fitting and do the following fitting exercises

a) V-fit b) Dovetail fit c) Semi-circular fit
d) Bicycle tire puncture and change of two wheeler tyre

Electrical Wiring:

Familiarities with different types of basic electrical circuits and make the following connections

a) Parallel and series b) Two way switch c) Godown lighting d) Tube light
e) Three phase motor f) Soldering of wires

Course Outcomes:

After completion of this lab the student will be able to

1. apply wood working skills in real world applications. (L3)
2. build different parts with metal sheets in real world applications. (L3)
3. apply fitting operations in various applications. (L3)
4. apply different types of basic electric circuit connections. (L3)
5. demonstrate soldering and brazing. (L2)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech – II Sem **L T P C**

3 1 0 4

(19A02201T) Basic Electrical & Electronics Engineering

Part A: Basic Electrical Engineering

(Civil, Mechanical, CSE, CSSE, IT and Food Technology)

Course Objectives:

1. To introduce basics of electric circuits.
2. To teach DC and AC electrical circuit analysis.
3. To explain working principles of transformers and electrical machines.
4. To impart knowledge on low voltage electrical installations

Unit 1 DC & AC Circuits:

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

Unit Outcomes: Able to

- Recall Kirchoff laws (L1)
- Analyze simple electric circuits with DC excitation (L4)
- Apply network theorems to simple circuits (L3)
- Analyze single phase AC circuits consisting of series RL - RC - RLC combinations (L4)

Unit 2 DC & AC Machines:

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

Unit Outcomes: Able to

- Explain principle and operation of DC Generator & Motor.
- Perform speed control of DC Motor (L2)
- Explain operation of transformer and induction motor. (L2)
- Explain construction & working of induction motor - DC motor

Unit 3 Basics of Power Systems:

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

Unit Outcomes: Able to

- Understand working operation of various generating stations (L2)
- Explain the types of Distribution systems

Text Books:

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

References:

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

Course Outcomes:

- Apply concepts of KVL/KCL in solving DC circuits (L3)
- Choose correct rating of a transformer for a specific application (L5)
- Illustrate working principles of induction motor - DC Motor (L3)
- Identify type of electrical machine based on their operation.(L1)
- Describe working principles of protection devices used in electrical circuits. (L2)

Part B: Basic Electronics Engineering

Course Objectives:

- To provide comprehensive idea about working principle, operation and applications of PN junction & zener diodes, BJT, FET, MOSFET and operational amplifier
- To introduce fundamentals of digital electronics
- To educate on principles of various communication systems
- To teach efficacy of electronic principles which are pervasive in engineering applications

Unit I Analog Electronics

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

BJT construction, operation, configuration and characteristics, JFET and MOSFET construction, operation, characteristics (CS configuration), applications

Operational Amplifiers: Introduction, block diagram, basic op-amp circuits: Inverting, Non Inverting, summer, subtractor, voltage follower.

Unit Outcomes:

- Describe operation and characteristics of diodes and transistors (L2)
- Make use of diodes and transistors in simple, typical circuit applications (L3)
- Understand operation of basic op-amp circuits (L2)

Unit II Digital Electronics

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

Unit Outcomes:

- Explain different logic gates using truth table (L2)
- Distinguish combinational and sequential circuits (L2)

- Analyze various combinational circuits such as adders, multiplexers and decoders (L4)
- Understand functionality of flip-flops, shift registers and counters (L2)

Unit III Communication Systems

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

Unit Outcomes:

- Describe basic elements of a communication system (L2)
- Explain need for modulation and different modulation techniques (L2)
- Understand functioning of various communication systems (L2)

Text Books:

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

References:

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

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech – II Sem (Computer Science and Engineering) **L T P C**

0 0 3 1.5

(19A02201P)Basic Electrical & Electronics Engineering Lab

(Civil, Mechanical, CSE, CSSE, IT and Food Technology)

Part A: Electrical Engineering Lab

Course Objectives:

1. To Verify Kirchoff's laws
2. To verify Superposition theorem.
3. To learn performance characteristics of DC Machines.
4. To perform open circuit & Short Circuit test on 1- Phase Transformer.
5. To Study the I – V Characteristics of Solar PV Cell

List of experiments: -

1. Verification of Kirchhoff laws.
2. Verification of Superposition Theorem.
3. Open circuit characteristics of a DC Shunt Generator.
4. Speed control of DC Shunt Motor.
5. OC & SC test of 1 – Phase Transformer.
6. Brake test on 3 - Phase Induction Motor.
7. I – V Characteristics of Solar PV cell
8. Brake test on DC Shunt Motor.

Course Outcomes: Able to

1. Verify Kirchoff's Laws & Superposition theorem.
2. Perform testing on AC and DC Machines.
3. Study I – V Characteristics of PV Cell

Part B: Electronics Engineering Lab

Course outcomes:

- Describe construction, working and characteristics of diodes, transistors and operational amplifiers (L2)
- Demonstrate how electronic devices are used for applications such as rectification, switching and amplification (L2)

- Build different building blocks in digital electronics using logic gates (L3)
- Explain functionality of flip-flops, shift registers and counters for data processing applications (L2)
- Explain functioning of various communication systems (L2)

List of Experiments:

1. Draw and study the characteristics of Semi-conductor diode and Zener Diode
2. Draw and study the input and output characteristics of Transistor in Common Emitter configuration
3. Draw and study the static and transfer characteristics of FET in Common Source Configuration
4. Construct half wave and full wave rectifier circuits. Find ripple factor and plot their output waveforms with and without filters
5. Study the application of Op-amp as an Inverting amplifier, Non-inverting amplifier, Voltage follower, Summer and Subtractor
6. Realization of logic gates, AND, OR, NOT, NAND, NOR, XOR
7. Realization of Adders, Multiplexers and Decoders using logic gates.
8. Realization of flip-flops using logic gates.
9. Conduct an experiment on AM & FM modulation & demodulation, Plot the corresponding modulated and demodulated signals

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech – II Sem **L T P C**

3 1 0 4

(19A02203T) Principles of Electrical Engineering

(Common to ECE and EIE)

Course Objectives:

- To introduce basics of electric & magnetic circuits.
- To teach DC and AC electrical circuit analysis.
- To explain working principles of transformers and electrical machines.
- To impart knowledge on low voltage electrical installations

Unit 1 DC Circuits

Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems, Maximum power transfer theorem & Reciprocity theorem - Time-domain analysis of first-order RL and RC circuits.

Unit Outcomes:

- Recall Kirchoff Voltage and Current laws (L1)
- Analyze simple electric circuits with dc excitation (L4)
- Apply network theorems to simple circuits with independent sources (L3)
- Analyze first order RL & RC circuits in time domain (L4)

Unit 2 AC Circuits

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), Concept of Resonance in series & parallel circuits, bandwidth and quality factor, Three-phase balanced circuits, voltage and current relations in star and delta connections.

Unit Outcomes:

- Analyze single phase AC circuits consisting of series and parallel RL, RC, RLC combinations (L4)
- Determine conditions for resonance in the series and parallel circuits (L5)
- Interpret voltages and currents in three-phase star - delta connections (L2)
- Solve simple balanced three-phase ac systems (L3)

Unit 3 Transformers

Magnetic materials, BH characteristics, Mutual coupled circuits, Dot Convention in coupled circuits, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency, Auto-transformer and three –phase transformers connections.

Unit Outcomes:

- Understand magnetic materials and their characteristics (L2)

- Compare ideal and practical transformers (L2)
- Determine losses, efficiency, and voltage regulation of a transformer under specific operating conditions (L5)
- Identify the connections of a three phase transformer (L3)

Unit 4 Electrical Machines

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor, Single-phase induction motor, construction, working, torque-speed characteristic and speed control of separately excited dc motor, construction and working of synchronous generators.

Unit Outcomes:

- Illustrate effects of magnetic induction on moving parts (L2)
- Explain construction & working of induction motor, DC motor & synchronous generator (L2)
- Determine motor losses and efficiency (L5)

Unit 5 Electrical Installations

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing, Types of Batteries, Important Characteristics for Batteries, Elementary calculations for energy consumption, power factor improvement and battery backup.

Unit Outcomes:

- Understand working principles of LT Switchgear components (L2)
- Perform elementary calculations for energy consumption, power factor improvement and battery backup (L3)

Text Books:

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.

References:

1. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
2. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
3. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

Course Outcomes:

- Apply concepts of KVL/KCL and network theorems in solving DC circuits (L3)
- Analyze steady state behavior of single phase and three phase AC electrical circuits (L4)
- Choose correct rating and characteristics of a transformer for a specific application (L5)
- Illustrate working principles of induction motor, dc motor and synchronous generator.(L3)
- Identify type of electrical machine based on their construction.(L1)
- Describe working principles of protection devices used in electrical circuits. (L2)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech – II Sem **L T P C**

0 0 3 1.5

(19A02203P) Principles of Electrical Engineering Lab

(Common to ECE and EIE)

List of experiments:

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
2. Verification of Thevenin's and Norton Theorems.
3. Measuring the steady-state and transient time-response of R-L, R-C, and R-L-C circuits to a step change in voltage (transient may be observed on a storage oscilloscope). Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and verification. Observation of phase differences between current and voltage. Resonance in R-L-C circuits.
4. Transformers: Observation of the no-load current waveform on an oscilloscope (non-sinusoidal wave-shape due to B-H curve nonlinearity should be shown along with a discussion about harmonics). Loading of a transformer: measurement of primary and secondary voltages and currents, and power.
5. Three-phase transformers: Star and Delta connections. Voltage and Current relationships (line-line voltage, phase to-neutral voltage, line and phase currents). Phase-shifts between the primary and secondary side. Cumulative three-phase power in balanced three-phase circuits.
6. Verification of Superposition theorem for DC and AC Networks.
7. Verification of Maximum power transfer theorem for DC and AC Networks.
8. Verification of Reciprocity theorem.
9. To determine the performance characteristics of a Shunt Motor.
10. To determine the performance characteristics of a Compound Motor.
11. To determine speed control of DC Shunt Motor.
12. To determine the load characteristics of a Shunt Generator.
13. Synchronous Machine operating as a generator: stand-alone operation with a load. Control of voltage through field excitation.
14. Demonstration of components of LT switchgear.
15. 3 – Phase Power Measurements for balanced loads

Unit Outcomes:

- Get exposure to common electrical components and their ratings (L2)
- Make electrical connections by wires of appropriate ratings (L3)
- Understand usage of common electrical measuring instruments (L2)
- Determine performance characteristics of transformers and electrical machines (L5)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech – II Sem **L T P C**

3 1 0 4

(19A01201T) Basic Civil & Mechanical Engineering (EEE)

Course Objectives:

- Impart basic principles of stress, strain, shear force, bending moment and torsion.
- To teach principles of strain measurement using electrical strain gauges
- Describe technical details of power plants, gas turbines, hydro power plants and non-conventional energy sources.
- Teach different types of drives for power transmission
- Impart concepts of CAD, CAM & CIM

PART - A

UNIT – I:

Basic Definitions of Force – Stress – Strain – Elasticity. Shear force – Bending Moment – Torsion . Simple problems on Shear force Diagram and Bending moment Diagram for cantilever and simply supported beams.

LO 1: understand principles of Stress and Strain.

LO 2: able to draw SFD & BMD for simply supported beams and cantilever beams.

UNIT – II:

Measurement of Strain - Electrical Capacitance and Resistance Strain gauges – multi channel strain indicators. Rosette analysis – Rectangular and Triangular strain rosettes – Wheatstone bridge.

LO 1: understand basic principles of Strain Measurement.

LO 2: Apply the concepts of Strain Rosettes for strain measurement .

UNIT – III:

Characteristics of common building materials – Brick – Types – Testing; Timber – Classification – Seasoning – Defects in Timber ; Glass – Classification – uses; steel and its applications in construction industry.

LO 1: understand common building materials used in construction.

LO 2: Analyze charactestics of common building materials .

Text Books:

1. Shanmugam G and Palanichamy M S, “Basic Civil and Mechanical Engineering”, Tata McGraw Hill Publishing Co., New Delhi.
2. Ramamrutham S., “Basic Civil Engineering”, Dhanpat Rai Publishing Co. (P) Ltd.

References :

1. S.Trymbaka Murthy., "Computer Aided Engineering Drawing" , Universities Press
2. Seetharaman S., "Basic Civil Engineering", Anuradha Agencies.
3. Venugopal K. and Prahu Raja V., "Basic Mechanical Engineering", Anuradha Publishers, Kumbakonam.
4. Er. R. Vaishnavi,Basic Civil and Mechanical Engineering, 2/e, S.Chand Publications.

Course Outcomes:

At the end of the course, student is able to

- Draw SFD and BMD for cantilever and Simply supported beams. ***(L.1)***
- Understand the working principles of electrical resistors and capacitors. ***(L.2)***
- Apply concepts of Rosetta analysis for strain measurements. ***(L.3)***

PART – B

Course Objectives

- Familiarize the sources of energy, power plant economics and environmental aspects.
- Outline the working components of different power plant.
- To teach working principle of hydraulic machinery.
- To familiarize the developments in IC engines.
- To teach combustion process in SI and CI engines.
- Explain the principles of refrigeration and air conditioning.

UNIT – 1

Power Plant Engineering: Introduction – Energy Renewable and Non – Renewable Energy, Sources – Classification of Power Plants based on Sources of Energy – Thermal Power Plant or Steam Power Plant – Hydro Electric Power – Nuclear Fission, Chain Reaction, Layout of Nuclear Power Plant – Diesel Power Plant – Gas Turbine Power Plant – Open Cycle Gas Turbine, Closed Cycle Gas Turbine Power Plant, Comparison of Diesel Power Plant with Gas Turbine Power Plant – Pumps – Classification of Pumps, Centrifugal Pump, Applications of Centrifugal Pump, Priming, Reciprocating Pumps, Single Acting Reciprocating Pump, Working of a Double acting Reciprocating Pump, Comparison of Reciprocating Pump with Centrifugal Pump –Hydraulic Turbine – Classification of Hydraulic Turbines, Impulse Turbine, Reaction Turbine, Difference between Impulse and Reaction Turbine.

Learning Outcomes

At the end of this unit, the student will be able to

- Outline sources of energy, compare and selection of types of power plants (L2).
- Explain working principle and compare types of diesel power plant (L2).
- Explain construction and operation of different pumps (L2).
- Classify pumps based on principle of operation (L1).
- Classify turbines based on principle of operation (L1).

UNIT – 2

I.C Engine: Heat Engine – Types of Heat Engine – External Combustion Engine, IC Engine (Internal Combustion), Classification of I.C. Engine, Two Stroke Petrol Engine, Four Stroke Engine, Valve Timing Diagram, Port Timing Diagram, Comparison of Two Stroke and Four Stroke Engines, Comparison of Petrol Engine and Diesel Engine, Fuel System of a Petrol Engine, Ignition Systems.

Boilers: Classification of Boilers – Simple Vertical Boiler – Cochran Boiler – Babcock and Wilcox Boiler – Benson Boiler – Difference between Fire Tube and Water Tube Boilers – Boiler Mountings – Boiler Accessories – Difference between Boiler Mountings and Accessories.

Learning outcomes:

After completion of this unit, students will be able to

- Understand classification and working of IC engines (L1).
- Compare 2 stroke and 4 stroke, petrol and diesel engines (L3).
- Understand classification and construction of boilers (L1).
- Compare boiler mountings and accessories (L3).

UNIT – 3

Refrigeration and Air Conditioning: Introduction – Terminology of Refrigeration and Air Conditioning – Properties of Refrigerants – List of Commonly used Refrigerants – Types of Refrigerating System – Vapour Compression Refrigeration System – Vapour Absorption Refrigerator – Domestic Refrigerator – Air Conditioning – Application of Air Conditioning – Psychrometry – Window Air Conditioning.

Learning outcomes:
After completion of this unit, students will be able to

1. Analyze the basics cycles of Refrigeration and Air Conditioning Systems (L4).
2. Outline the operation of refrigerators (L2).
3. Identify different refrigerants and applications (L1).

Text Books:

1. Basic Civil and Mechanical Engineering, by Prof.V.Vijayan, Prof.M.Prabhakaran and Er.R.Viashnavi, S.Chand Publication.
2. Elements of Mechanical Engineering Fourth Edition S Trymbaka Murthy, University Press.

Course Outcomes:

At the end of this course, the student will be able to

- Outline sources of energy, power plant economics, and environmental aspects (L2).
- Describe working components of a steam power plant (L2).
- Illustrate the working mechanism of Diesel and Gas turbine power plants (L2).
- Explain different types of pumps and their application (L2).
- Explain working of IC engines with combustion process (L2).
- Possess the knowledge of system components of refrigeration and air conditioning (L3)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech – II Sem **L T P C**

0 0 3 1.5

(19A01201P) Basic civil & Mechanical Engineering Lab

(EEE)

Part – A

Laboratory Experiments:

1. Bending test on (Steel/Wood) Cantilever beam.
2. Bending test on (Steel/Wood) simply supported beam.
3. Use of electrical resistance strain gauges.
4. Compression test on Bricks
5. Water absorption test on Bricks
6. Torsion test.
7. Tests on closed coiled and open coiled helical springs

Part B

Course Objectives:

- Understand the functioning and performance of I.C. Engines
- To find heat losses in various engines

List of Experiments:

1. Load test on four stroke Diesel Engine with mechanical loading.
2. Load test on four stroke Diesel Engine with DC Generator loading.
3. Heat balance test on Four Stroke Diesel Engine.
4. Load test on two stroke petrol engine.
5. A) Study of Valve & Port diagram.
   B) Study of boilers.
6. Performance test on vapour compression refrigeration system.
7. Performance test on vapour absorption refrigeration system.

Course Outcomes

Upon the successful completion of course, students will be able to

- Explain different working cycles of engine.
- Illustrate the working of refrigeration systems
- Evaluate heat balance sheet of IC engine.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech – II Sem

L	T	P	C
1	0	3	2.5

(19A03201) Engineering Graphics & Design

(Common to All Branches of Engineering)

Course Objectives:

- Bring awareness that Engineering Drawing is the Language of Engineers.
- Familiarize how industry communicates technical information.
- Teach the practices for accuracy and clarity in presenting the technical information.
- Develop the engineering imagination essential for successful design.
- Instruct the utility of drafting & modeling packages in orthographic and isometric drawings.
- Train the usage of 2D and 3D modeling.
- Instruct graphical representation of machine components.

Part A: Manual Drawing: (7 Classes)

Introduction to Engineering graphics: Principles of Engineering Graphics and their significance-Conventions in drawing-lettering - BIS conventions.

a) Conic sections including the rectangular hyperbola- general method only,
b) Cycloid, epicycloids and hypocycloid
c) Involutes **(2L + 6P hrs)**

Projection of points, lines and planes: Projection of points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by line. Projections of regular plane surfaces. **(2L + 6P hrs)**

Projections of solids: Projections of regular solids inclined to one or both planes by rotational or auxiliary views method. **(1L + 3P hrs)**

Sections of solids: Section planes and sectional view of right regular solids- prism, cylinder, pyramid and cone. True shapes of the sections. **(1L + 3P hrs)**

Development of surfaces: Development of surfaces of right regular solids-prism, cylinder, pyramid, cone and their sectional parts. **(1L + 6P hrs)**

Part B: Computer Aided Drafting: (6 Classes)

Introduction to AutoCAD: Basic drawing and editing commands: line, circle, rectangle, erase, view, undo, redo, snap, object editing, moving, copying, rotating, scaling, mirroring, layers,

templates, polylines, trimming, extending, stretching, fillets, arrays, dimensions. **(1L + 3P hrs)**

Dimensioning principles and conventional representations.

Orthographic Projections: Systems of projections, conventions and application to orthographic projections. **(3L + 9P hrs)**

Isometric Projections: Principles of isometric projection- Isometric scale; Isometric views: lines, planes, simple solids. **(2L + 6P hrs)**

Text Books:

1. K.L.Narayana & P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.
2. Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers, 2000

Reference Books:

1. Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2009
2. N.D.Bhatt, Engineering Drawing, 53/e, Charotar Publishers, 2016.
3. Shah and Rana, Engineering Drawing, 2/e, Pearson Education, 2009
4. K.C.John, Engineering Graphics, 2/e, PHI, 2013
5. Basant Agarwal & C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

Course Outcomes:

After completing the course, the student will be able to

- draw various curves applied in engineering. (L2)
- show projections of solids and sections graphically. (L2)
- draw the development of surfaces of solids. (L3)
- use computers as a drafting tool. (L2)
- draw isometric and orthographic drawings using CAD packages. (L3)

Note:

1. Manual (part A) and Computer Aided Drafting (part B) classes can be held in alternative weeks for optimal utilization of computer facilities.
2. External examinations to be conducted both manual and computer mode with equal weight of marks.

Additional Sources

1. Youtube: http-sewor,Carleton.cag,kardos/88403/drawings.html conic sections-online, red woods.edu

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech – II Sem **L T P C**
2 1 0 3

(19A05201T) Artificial Intelligence Tools, Techniques and Applications

(Common to All Branches of Engineering)

Course Objectives:

The objectives of this course are to

- Expose fundamental concepts in AI
- Demonstrate the capability to create simple AI applications using Natural Language Processing, Audio engineering & Speech, Computer Vision, pattern recognition and machine learning.
- Present various modeling and formulation techniques to solve problems using AI techniques.
- Introduce state-of-art AI tools and techniques to solve various problems faced by Engineers in design and analysis.

Unit I: Fundamentals of AI

What is AI, Applications of AI, Speech and Voice Recognition,

Advanced search , Constraint satisfaction problems , Knowledge representation and reasoning, Non-standard logics, Uncertain and probabilistic reasoning

Machine Learning: Supervised Learning,Unsupervised Learning,Semi-Supervised Learning, Reinforcement Learning, Linear Regression

Natural Language Processing: Natural language Understanding, Sentiment Analysis, Segmentation and recognition, Speech Recognition, Text-to-Speech

Speech Recognition and Synthesis: Speech Fundamentals, Speech Analysis,

Speech Modeling, Speech Recognition, Speech Synthesis**.**

Image Processing & Computer Vision: What is Image processing, Image Noise, Removal of Noise from Images, Color Enhancement,Segmentation, Edge Detection, Optical Character Recognition, Feature Detection & Recognition

Learning Outcomes:

At the end of this unit the student will be able to

- Understand the importance of AI. (L2)
- Understand concepts of Machine Learning algorithms and their limitations. (L2)
- Explain the concepts of NLP,Computer Vision and Image Processing. (L2)

Unit II: BOT Technologies and Virtual Assistants:

Chatbots: What is Chatbot, NLP in the cloud, NL Interface, How to Build a Chatbot, How has chatbot transformed user experience, Designing elements, best practices for chatbot development.

Virtual Assistants: What is a Virtual Assistant

Learning Outcomes:

- Explain the best practices for Chatbot development (L2)
- Develop Chatbots based on the requirements. (L4)

Unit III: Image Processing & Computer Vision :

Image formation, Fourier transforms, Geometric transformations, Global Optimization, Object detection, Face recognition, Instance recognition, Feature detection and matching, Segmentation, Recognition Databases and test sets

Applications: Automation, Agriculture[Crop and Soil Monitoring, Predictive Analytics], Retail and Retail Security[Amazon Go]

Learning Outcomes:

- Build different applications using Image Processing & Computer Vision. (L3)
- Apply various algorithms for digital image processing and computer vision. (L3)
- Manage image databases using detection tools for classification. (L3)
- Analyse complex problems involving image processing, such as quality control, visual surveillance, multimodal human-machine interfaces, and image compression. (L4)

Unit IV: Deep Learning & Neural Networks

What is Deep Learning , What is Neural Network, Different types of Neural networks(CNN,RNN), Supervised learning with CNN, Logistic regression, forward propagation ,cost function, error backpropagation.

APIs Using Softwares

- Tensorflow
- Pytorch
- Keras

Learning Outcomes:

- Understand the application of Neural Networks (L2)
- Analyse different types of deep learning algorithms (L4)

Unit V: Smart Applications

Smart Manufacturing, Smart Agriculture, Smart Grids, Smart Transportation and Autonomous Vehicles, Smart Homes, Smart Cities.

Learning Outcomes:

- Understand smart solutions for various domains (L2)

Textbooks:

1. Tom Markiewicz & Josh Zheng,Getting started with Artificial Intelligence,Published by O'Reilly Media,2017
2. Stuart J. Russell and Peter Norvig,Artificial Intelligence A Modern Approach

Reference Books:

1. Aurélien Géron,Hands on Machine Learning with Scikit-Learn and TensorFlow [Concepts, Tools, and Techniques to Build Intelligent Systems], Published by O'Reilly Media,2017

Course Outcomes:

- Understand the importance of AI. (L2)
- Understand concepts of Machine Learning algorithms and their limitations. (L2)
- Develop Chatbots based on the requirements. (L4)
- Analyse complex problems involving image processing, such as quality control, visual surveillance, multimodal human-machine interfaces, and image compression. (L4)
- Understand the application of Neural Networks (L2)
- Understand smart solutions for various domains (L2)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech – II Sem

L	T	P	C
0	0	3	1.5

(19A05201P) Artificial Intelligence Tools, Techniques and Applications Lab

(Common to All Branches of Engineering)

Practical Experiments:

1. Supervisely - Perform Data Labelling for various images using object recognition
2. Lobe.ai - Build custom models using the visual tool for Object recognition and sentiment analysis that can convert facial expressions into emoticons
3. Teachable Machine - In Browser Object Recognition through Brain.JS
4. Liv.ai - App for Speech recognition and Synthesis through APIs
5. Building a Chatbot using AWS Lex, Pandora bots
6. Configure an existing Neural Network by manipulating various parameters involved
7. Build a virtual assistant for Wikipedia using Wolfram Alpha and Python
8. Build a Convolutional Neural Network for Cat vs Dog Image Classification

- Speech recognition
- Image recognition
- Object tagging videos
- Self-driving cars
- Sentiment analysis
- Detection of flaws
- Text summarization
- Mobile image and video processing
- Air, land, and sea drones

What are the areas of artificial intelligence?

Major sub-fields of AI now include: Machine Learning, Neural Networks, Evolutionary Computation, Vision, Robotics, Expert Systems, Speech Processing, Natural Language Processing, and Planning.

Tensorflow:

https://www.tensorflow.org/

Pytorch:

https://pytorch.org/

https://github.com/pytorch

Keras:

https://keras.io/

https://github.com/keras-team

Theano:

http://deeplearning.net/software/theano/

https://github.com/Theano/Theano

Cafee2:

https://caffe2.ai/

https://github.com/caffe2

Deeplearning4j:

https://deeplearning4j.org/

Scikit-learn:https://scikit-learn.org/stable/

https://github.com/scikit-learn/scikit-learn

Deep Learning.Ai:

https://www.deeplearning.ai/

OpenCv:

https://opencv.org/

https://github.com/qqwweee/keras-yolo3

YOLO:

https://www.pyimagesearch.com/2018/11/12/yolo-object-detection-with-opencv/

nVIDIA:CUDA

https://developer.nvidia.com/cuda-math-library

Examples:

Maze Game Solving

Image Recognition:

Real-time face detection and emotion/gender classification

Real-time multi-person pose estimation

Real-time analysis of behavior of crowded area

Visual question answering

Computer Vision:

Healthcare:CNNs to detect diseases from MRI

Agriculture:spot crop diseases, predict crop yields

Financial services

Audio,Speech processing

Composing Music

Deep speech application by mozilla

Google Assistant

Alexa

Siri

Chatbots

Online Classes

E commerce and customer care services

AI News Reader using NLP

Course Outcomes:

- Understand the importance of AI. (L2)
- Understand concepts of Machine Learning algorithms and their limitations. (L2)
- Develop Chatbots based on the requirements. (L4)
- Analyse complex problems involving image processing, such as quality control, visual surveillance, multimodal human-machine interfaces, and image compression. (L4)
- Understand the application of Neural Networks (L2)
- Understand smart solutions for various domains (L2)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech – II Sem (Civil Engineering)

L	T	P	C
0	0	3	1.5

(19A01201) Civil Engineering Workshop

1) Setting out of a building: The student should set out a building (single room only) as per the given building plan using tape only.

2) Setting out of 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

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech – II Sem (Electrical & Electronics Engineering) **L T P C**

0 0 3 1.5

(19A02202) Electrical & Electronics Engineering Workshop

Course Objectives for Workshop:

1. To know about different tools, abbreviations and symbols in Electrical Engineering
2. To learn about types of measuring instruments to measure electrical quantities
3. To gain knowledge on different types of earthing and earth resistance
4. To study different types of wiring

Syllabus:

1. Study of Introduction to Electrical tools, symbols and abbreviations
2. Study of types of sizes of wires and making "T" joint and straight joint for wires
3. Measurements of Electrical quantities (like Voltage, Current, Power, Power factor in RLC circuits)
4. Study of measurements of Energy (using Single phase and Three phase Energy meter) by connecting different loads
5. Study of earthing and measurement of earth resistance
6. Study and performance of residential wiring (using Energy meter, Fuses, Switches, Indicator, Lamps, etc.)
7. Study of Fluorescent lamp wiring
8. Study of various electrical gadgets (CFL and LED)
9. Study of PV Cell
10. Study of Induction motor and Transformer
11. Assembly of choke or small transformer
12. Study of trouble shooting of electrical equipments (fan, iron box, mixer-grinder, etc.)
13. Introduction to basics of Electronic components: Solder practice, Multi meter, Power supply
14. Measurement of wire guages using guage meter
15. Identification of color code, resistors, ICs, Transistors, capacitors, diodes, SCRs, IGBTs etc.

References:

1. Lab manual of Electrical Engineering by TTTI, Chennai.

Course Outcomes for Workshop:

1. Able to demonstrate knowledge on different tools, abbreviations and symbols used in Electrical Engineering
2. Able to measure different electrical quantities using measuring instruments
3. Able to demonstrate how to trouble shoot the electrical equipments (like fan, grinder, motor, etc.)
4. Able to do wiring and earthing for residential houses

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech – II Sem (Mechanical Engineering)

L	T	P	C
0	0	3	1.5

(19A03202) Mechanical Engineering Workshop

Course Objectives:

1. Familiarize moulding and casting skills.
2. Train on different types welding joints.
3. Develop assemble or disassembly skills.
4. Make plastic components.
5. Familiarize with use power tools.
6. Demonstrate assembly of computer and installation of software

Foundry Practice: (2 Sessions)

i. a) Determination of average grain size for sand sample using sieve shaker
   b) Preparation of a green sand mould using single piece pattern

ii. Preparation of a green sand mould using split piece pattern with core and demonstration of casting.

Welding Practice: (2 Sessions)

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

Assembling/Disassembling Practice: (3 Sessions)

i. Bicycle
ii. Clutch and carburetor
iii. Two wheeler engine parts
iv. Desktop Computer and installation of Operating system Software

Manufacture of a Plastic Component (2 Sessions)

i. Use of injection moulding machine
ii. FRP composite using hand layup method
iii. Joining of plastic components

Manufacturing any two domestic utility products with any material by above methods (2 Sessions)

Use of Power Tools (2 Sessions)

Drilling, Cutting, Planing, Finishing, Etc,. on wood or metals

Text books:

1. K. Venkata Reddy Workshop Mannual 6th Ed., B.S. Publishers, 2013.
2. B.L. Juneja Workshop practice 1st Ed., Cengage, 2015.

Course Outcomes:

After completion of this lab student will be able to

- make moulds for sand casting. (L3)
- develop different weld joints. (L3)
- assemble or disassemble of machine components. (L3)
- make plastic components. (L3)
- use power tools for different applications. (L3)
- Assemble computer and installation of software (L3)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech – II Sem **L T P C**

0 0 3 1.5

(19A04201) Electronics & Communication Engineering Workshop
(19A10201) Electronics & Instrumentation Engineering Workshop

Course Objectives:

- To introduce electronic components, measuring instruments and tools used in electronic workshop.
- To equip with the knowledge of understanding data sheets of electronic components
- To give practical experience on soldering the electronic components on a PCB
- To introduce EDA tools
- To know about the internal parts of a computer, assembling a computer from the parts, preparing a computer for use by installing the operating system
- To provide training on Productivity tools like word processors, spreadsheets, presentations
- To provide knowledge in understanding working of various communication systems

List of Exercises / Experiments

1. Familiarization of commonly used Electronic Workshop Tools : Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, screwdriver set, wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc.
   - Provide some exercises so that electronics hardware tools and instruments are learned to be used by the students

2. Familiarization of Electronic Measuring Instruments like Voltmeters, Ammeters, multimeter, LCR-Q meter, Power Supplies, CRO, DSO, Function Generator, Frequency counter.
   - Provide some exercises so that electronic measuring instruments are learned to be used by the students

3. Electronic Components: Familiarization/Identification of electronic components (Resistors, Capacitors, Inductors, Diodes, transistors, IC's etc.) – Functionality, type, size, color coding, package, symbol, cost etc.

4. Testing of electronic components like Resistor, Capacitor, Diode, Transistor, ICs etc.
   - Compare values of components like resistors, inductors, capacitors etc with the measured values by using electronic instruments

5. Study of Cathode Ray Oscilloscope (CRO)
   - Find the Amplitude and Frequency of a signal
   - Measure the Unknown Frequency & Phase difference of signals using Lissajous figures

6. Interpret data sheets of discrete components and IC's.
   - Write important specifications/ratings of components & ICs and submit it in the form of a report

7. Introduction to EDA Tools: MULTISIM/PSPICE/TINA schematic capture tool, Learning of basic functions of creating a new project, getting and placing parts, connecting placed parts, simulating the schematic, plotting and analyzing the results.
    - Provide some exercises so that students are familiarized in using EDA tools

8. Assembling and Testing of simple electronic circuits on breadboards; identifying the components and its location on the PCB, soldering of the components, testing the assembled circuit for correct functionality.

9. Familiarization with Computer Hardware & Operating System:
    - 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.
    - 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 trouble shooting a computer.
    - Install Operating system on the computer. Students should record the entire installation process.

10. Familiarization with Office Tools
    - Word Processor: Able to create documents using the word processor tool. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied.
    - Spreadsheet: 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.
    - Presentations: creating, opening, saving and running the presentations, Selecting the style for slides, formatting the slides with different fonts, colors, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyper-linking, running the slide show, setting the timing for slide show.

11. Familiarization of PA system with different microphones, loud speakers, mixer etc. Represent the same in the form of diagrams, write specifications and submit it in the form of a report.

12. Understand working of various Communication Systems like Television, Satellite Transmitter & Receiver, Radio Receiver, Mobile Phone. Prepare demo boards/charts of various communication systems.

Course Outcomes:

- Identify discrete components and ICs (L3)
- Assemble simple electronic circuits over a PCB (L3)
- Testing of various components (L4)
- Interpret specifications (ratings) of the component (L5)
- Demonstrate disassembling and assembling a Personal Computer and make the computer ready to use (L2)
- Make use of Office tools for preparing documents, spread sheets and presentations (L3)
- Demonstrate working of various communication systems (L2)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech – II Sem **L T P C**

0 0 3 1.5

(19A05202) Computer Science and Engineering Workshop
(19A15201) Computer Science & Systems Engineering Workshop
(19A12201) Information Technology Workshop

Course Objectives:

1. Introduce the internal parts of a computer, peripherals, I/O ports, connecting cables
2. Introduce the Concept of Algorithm and use it to solve computational problems
3. Identify the computational and non-computational problems
4. Teach the syntax and semantics of C Programming language
5. Demonstrate the use of Control structures of C Programming language
6. Illustrate the methodology for solving Computational problems
7. Introduce the programming environment

The core objective of any engineering discipline is problem solving. In Computer science and Engineering we solve computational problems. The steps in solving the problem are

1. Understand the problem
2. Analyze the problem
3. Design solutions for the problem using algorithmic approach
4. Implement the solution using a programming language

The following theory will help in understanding the computing environment, solve the problems and implement using C language. The workshop should have Learn by Practice environment. Problems are to be solved, Algorithms are to be written and implemented using C Programming language. The following concepts are to be discussed as and when necessary

Computer Hardware

PC parts, Input/Output devices, I/O ports and interfaces, main memory, cache memory and secondary storage technologies, digital storage basics, networking components and speeds, Assembling of computers, Installation of operating system, Networking of Computers.

Problem solving

The problem-solving aspect, top-down design, implementation of algorithms, the efficiency of algorithms, the analysis of algorithms.

Algorithms: Exchanging the values of two variables, counting, summation of a set of numbers, factorial computation, sine function computation, generation of the Fibonacci sequence, reversing the digits of an integer, Finding the square root of a number, the smallest divisor of a number, the greatest common divisor of two integers, generating prime numbers, Array order reversal, finding the maximum number in a set, removal of duplicates from an order array, finding the k^{th} smallest element, Sorting by selection, sorting by exchange, sorting by insertion, sorting by partitioning, binary search

Overview of C Programming Language

Variables, data types, operators, expressions, evaluation of expressions, Control Flow statements, scope of variables, Functions, Preprocessing, Recursion, Arrays, Pointers, pointers and functions, Command line arguments, structures, structures and unions, bitfields, self-referential structures, Standard and Formatted I/O, File access, Error handling

Laboratory Experiments#

1. **Assemble and disassemble parts of a Computer**
2. Design a C program which reverses the number
3. Design a C program which finds the second maximum number among the given list of numbers.
4. Construct a program which finds the kth smallest number among the given list of numbers.
5. Design an algorithm and implement using C language the following exchanges

   a ← b ← c ← d

6. Develop a C Program which counts the number of positive and negative numbers separately and also compute the sum of them.

7. Implement the C program which computes the sum of the first n terms of the series

   Sum = 1 – 3 + 5 -7 + 9

8. Design a C program which determines the numbers whose factorial values are between 5000 and 32565.

9. Design an algorithm and implement using a C program which finds the sum of the infinite series

   $1 – x^2/2! + x^4/4! – x^6/6! + ...$

10 Design a C program to print the sequence of numbers in which each number is the sum of the three most recent predecessors. Assume first three numbers as 0, 1, and 1.

11. Implement a C program which converts a hexadecimal, octal and binary number to decimal number and vice versa.

12. Develop an algorithm which computes the all the factors between 1 to 100 for a given number and implement it using C.

13. Construct an algorithm which computes the sum of the factorials of numbers between m and n.

14. Design a C program which reverses the elements of the array.

15. Given a list of n numbers, Design an algorithm which prints the number of stars equivalent to the value of the number. The starts for each number should be printed horizontally.

16. Implement the sorting algorithms a. Insertion sort b. Exchange sort c. Selection sort

d.. Partitioning sort.

17. Illustrate the use of auto, static, register and external variables.

18. Design algorithm and implement the operations creation, insertion, deletion, traversing on a singly linked list.

19. Develop a C program which takes two numbers as command line arguments and finds all the common factors of those two numbers.

20. Design a C program which sorts the strings using array of pointers.

The above list is not exhaustive. Instructors may add some experiments to the above list. Moreover, 50% of the experiments are to be changed every academic year. Instructors can choose the experiments, provided those experiments are not repetitions.

Course Outcomes

Student should be able to

1. Identify the different peripherals, ports and connecting cables in a PC (L2)
2. Illustrate the working of a Computer (L3)
3. Select the components of a Computer in the market (L4)
4. Solve Computational problems (L3)
5. Apply Algorithmic approach to solving problems (L3)
6. Analyze the algorithms (L4)
7. Recognize the programming elements of C Programming language (L1)
8. Select the control structure for solving the problem (L6)
9. Apply modular approach for solving the problem (L3)
10. Solve mathematical problems using C Programming language (L3)
11. Structure the individual data elements to simplify the solutions (L6)
12. Facilitate efficient memory utilization (L6)
13. Apply appropriate sorting algorithm to simplify solution to the problem (L3)
14. Collect data and process it (L4)
15. Organize the data (L6)
16. Construct a Computer given its parts (L6)
17. Select the right control structure for solving the problem (L6)

18. Analyze different sorting algorithms (L4)
19. Design solutions for computational problems (L6)
20. Develop C programs which utilize the memory efficiently using programming constructs like pointers.

Text Books:

1. Peter Norton, "Introduction to Computers", 6th edtion, McGraw-Hill, 2006.
2. R.G. Dromey, "How to Solve it by Computer", Pearson, 2014.
3. Brian W. Kernighan, and Dennis M. Ritchie, "The C Programming Language", 2nd Edition, Pearson, 2018.
4. B. Govindarajulu, "IBM PC and Clones Hardware Trouble shooting and Maintenance", 2nd edition, Tata McGraw-Hill, 2002.

References:

1. Pradip Dey, Manas Ghosh " Programming in C" Oxford Higher Education.
2. P.Chenna Reddy, " Computer Fundamentals and C Programming" 2018, BSP Publications
3. Ron Gilster, PC Hardware A Beginner's Guide", Osborne/McGraw-Hill, 2001.
4. RS Bichkar " Programming with C" Universities Press.
5. https://explorersposts.grc.nasa.gov/post631/2006-2007/computer_basics/ComputerPorts.doc
6. https://explorersposts.grc.nasa.gov/post631/2006-2007/bitsnbyte/Digital_Storage_Basics.doc

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech – II Sem (Food Technology)

L	T	P	C
0	0	3	1.5

(19A27201) Food Technology Workshop

Course Objectives:

1. To create basic awareness on traditional processing methods and their importance in processing of foods.
2. To know physico-chemical changes during these processing methods.

1. Soaking
2. Boiling
3. Smoking
4. Curing
5. Grilling
6. Drying
7. Steaming
8. Roasting
9. Simmering
10. Stewing
11. Frying

Learning Outcomes:

Gain knowledge on primary processing methods
Learn the changes occurred during processing