JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

COURSE STRUCTURE AND SYLLABUS

For

B. TECH CHEMICAL ENGINEERING

(Applicable for batches admitted from 2019-2020)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA - 533 003, Andhra Pradesh, India

FirstRanker.com
Firstranker's choice
www.FirstRanker.com

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

COURSE STRUCTURE - R19

I Year – I SEMESTER

Sl. No	Course Code	Subjects	L	T	P	Credits
1	BS1101	Mathematics – I	3	0	0	3
2	BS1102	Mathematics – II	3	0	0	3
3	BS1112	Physical Chemistry	3	0	0	3
4	ES1101	Programming for Problem Solving Using C	3	0	0	3
5	ES1103	Engineering Drawing	1	0	3	2.5
6	HS1102	English Lab	0	0	3	1.5
7	BS1113	Physical Chemistry Lab	0	0	3	1.5
8	ES1102	Programming for Problem Solving Using C Lab	0	0	3	1.5
9	MC1104	Constitution of India	2	0	0	0
		Total Credits	**15**	**0**	**12**	**19**

I Year – II SEMESTER

Sl. No	Course Code	Subjects	L	T	P	Credits
1	HS1201	English	3	0	0	3
2	BS1203	Mathematics – III	3	0	0	3
3	BS1208	Engineering Physics	3	0	0	3
4	ES1204	Engineering Mechanics	3	0	0	3
5	CH1201	Introduction to Chemical Engineering	3	0	0	3
6	HS1203	Communication Skills Lab	0	0	3	1.5
7	BS1209	Engineering Physics Lab	0	0	3	1.5
8	ES1220	Engineering Workshop & IT Workshop	0	0	4	2
9	PR1201	Engineering Exploration Project	0	0	2	1
10	MC1201	Environmental Science	2	0	0	0
			17	0	12	21

FirstRanker.com
Firstranker's choice
www.FirstRanker.com

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

I Year - I Semester		L	T	P	C
		3	0	0	3
Mathematics-I (BS1101) **(Common to all Branch's for I Year B. Tech)**					

Course Objectives:

- This course will illuminate the students in the concepts of calculus.

- To enlighten the learners in the concept of differential equations and multivariable calculus.

- 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.

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

- utilize mean value theorems to real life problems (L3)

- solve the differential equations related to various engineering fields (L3)

- familiarize with functions of several variables which is useful in optimization (L3)

- Apply double integration techniques in evaluating areas bounded by region (L3)

- students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional and 3-dimensional coordinate systems (L5)

UNIT I: Sequences, Series and Mean value theorems: (10 hrs)

Sequences and Series: Convergences and divergence – Ratio test – Comparison tests – Integral test – Cauchy's root test – Alternate series – Leibnitz's rule.

Mean Value Theorems (without proofs): Rolle's Theorem – Lagrange's mean value theorem – Cauchy's mean value theorem – Taylor's and Maclaurin's theorems with remainders.

UNIT II: Differential equations of first order and first degree: (10 hrs)

Linear differential equations – Bernoulli's equations – Exact equations and equations reducible to exact form.
Applications: Newton's Law of cooling – Law of natural growth and decay – Orthogonal trajectories – Electrical circuits.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

UNIT III: Linear differential equations of higher order: **(10 hrs)**

Non-homogeneous equations of higher order with constant coefficients – with non-homogeneous term of the type e^{ax}, sin ax, cos ax, polynomials in x^n, e^{ax} V(x) and x^nV(x) – Method of Variation of parameters.
Applications: LCR circuit, Simple Harmonic motion.

UNIT IV: Partial differentiation: **(10 hrs)**

Introduction – Homogeneous function – Euler's theorem – Total derivative – Chain rule – Jacobian – Functional dependence – Taylor's and Mc Laurent's series expansion of functions of two variables.
Applications: Maxima and Minima of functions of two variables without constraints and Lagrange's method (with constraints).

UNIT V: Multiple integrals: **(8 hrs)**

Double and Triple integrals – Change of order of integration – Change of variables.
Applications: Finding Areas and Volumes.

Text Books:

1. **B. S. Grewal,** Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. **B. V. Ramana,** Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.

Reference Books:

1. **Erwin Kreyszig,** Advanced Engineering Mathematics, 10th Edition, Wiley-India.
2. **Joel Hass, Christopher Heil and Maurice D. Weir,** Thomas calculus, 14th Edition, Pearson.
3. **Lawrence Turyn,** Advanced Engineering Mathematics, CRC Press, 2013.
4. **Srimantha Pal, S C Bhunia,** Engineering Mathematics, Oxford University Press.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

I Year - I Semester		L	T	P	C
		3	0	0	3
	MATHEMATICS - II (BS1102) **(Common to all Branch's for I Year B. Tech)**				

Course Objectives:

- To instruct the concept of Matrices in solving linear algebraic equations
- To elucidate the different numerical methods to solve nonlinear algebraic equations
- To disseminate the use of different numerical techniques for carrying out numerical integration.
- 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.

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)

- solve system of linear algebraic equations using Gauss elimination, Gauss Jordan, Gauss Seidel (L3)

- evaluate approximating the roots of polynomial and transcendental equations by different algorithms (L5)

- apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals (L3)

- apply different algorithms for approximating the solutions of ordinary differential equations to its analytical computations (L3)

Unit I: Solving systems of linear equations, Eigen values and Eigen vectors: (10 hrs)

Rank of a matrix by echelon form and normal form – Solving system of homogeneous and non-homogeneous equations linear equations – Gauss Elimination for solving system of equations – Eigen values and Eigen vectors and their properties.

Unit-II: Cayley-Hamilton theorem and Quadratic forms: (10 hrs)

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

Singular values of a matrix, singular value decomposition (Ref. Book – 1).

FirstRanker.com
Firstranker's choice
www.FirstRanker.com

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

UNIT III: Iterative methods: (8 hrs)

Introduction – Bisection method – Secant method – Method of false position – Iteration method – Newton-Raphson method (One variable and simultaneous Equations) – Jacobi and Gauss-Seidel methods for solving system of equations.

UNIT IV: Interpolation: (10 hrs)

Introduction – Errors in polynomial interpolation – Finite differences – Forward differences – Backward differences – Central differences – Relations between operators – Newton's forward and backward formulae for interpolation – Interpolation with unequal intervals – Lagrange's interpolation formula – Newton's divide difference formula.

UNIT V: Numerical integration and solution of ordinary differential equations: (10 hrs)

Trapezoidal rule – Simpson's $1/3^{rd}$ and $3/8^{th}$ rule – Solution of ordinary differential equations by Taylor's series – Picard's method of successive approximations – Euler's method – Runge-Kutta method (second and fourth order).

Text Books:

1. **B. S. Grewal,** Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. **B. V. Ramana,** Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.

Reference Books:

1. **David Poole,** Linear Algebra- A modern introduction, 4th Edition, Cengage.
2. **Steven C. Chapra,** Applied Numerical Methods with MATLAB for Engineering and Science, Tata Mc. Graw Hill Education.
3. **M. K. Jain, S. R. K. Iyengar and R. K. Jain,** Numerical Methods for Scientific and Engineering Computation, New Age International Publications.
4. **Lawrence Turyn,** Advanced Engineering Mathematics, CRC Press.

FirstRanker.com
Firstranker's choice
www.FirstRanker.com

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

I Year - I Semester		L	T	P	C
		3	0	0	3
	PHYSICAL CHEMISTRY (BS1112)				

Learning objectives:
- To understand the basic concepts of distribution law, phase rule, chemical kinetics, solutions.
- To explain the equilibrium existing between the different phases of a heterogeneous system.
- To study of chemical kinetics explains the rates at which chemical reactions occur and also explains theories of reaction rates.
- To understand total vapor pressure of ideal or non-ideal mixtures of two volatile liquids.
- To study fundamentals of spectroscopy to understand qualitative and quantitative analysis of substances.
- To understand mechanism by which components are separated on GC and HPLC techniques, spectro-photometry and separation techniques.

UNIT-I:

Distribution Law: Nernst Distribution Law–Distribution Coefficient– Explanation and Limitations – Modification–Determination of Equilibrium Constant – Applications

UNIT-II:

Phase Rule: Terms involved in phase rule – types of liquids – derivation of phase rule – phase diagrams of one component system (water and sulphur system), two component system – eutectic point (lead silver system) and three component system–applications.

UNIT-III:

Spectroscopic and separation techniques
Part A : Spectrophotometry: General features of absorption spectroscopy, Beer-Lambert's law and its limitations, absorbance, transmittance and molar absorptivity; Single and double beamspectrophotometers.
Part B: Separation Techniques:
Solvent extraction: Principle and process, Batch extraction, continuous extraction and counter current extraction, application-determination of iron (III).
High performance liquid chromatography (HPLC): principles and applications.
Gas liquid chromatography (GLC): principles and applications.

UNIT-VI:

Chemical Kinetics: Introduction to chemical kinetics – theories of reaction rates –collision theory – modified collision theory –arhenius theory – absolute reaction rate theory (transition state theory) – reaction betweeen ions – influence of solvent (double sphere activated complex and single sphere activated complex) – influence of ionic strength on the rate of the reactions - chain Reactions – hydrogen and bromine, hydrogen and oxygen (steady state treatment) – explosion limits.

FirstRanker.com
Firstranker's choice
www.FirstRanker.com

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

UNIT-V:

Solutions: Liquid-liquid ideal solutions, Raoult's law, ideally dilute solutions, henry's law. non-ideal solutions, vapor pressure - composition and vapor pressure-temperature curves. azeotropes-HCl-H_2O, ethanol-water systems and fractional distillation. partially miscible liquids-phenol-water, trimethylamine-water, nicotine-water systems, effect of impurity on consulate temperature. Immiscible liquids and steam distillation.

Outcomes:

At the end of the course, the students will be able to:
• Apply the principles of extraction to the industrial ternary systems.
• Have an insight into the process of fractional distillation of petroleum, which is one of the major operations in petroleum refineries.
• Understand the various reactions in petrochemical industry.
• Use knowledge of solutions for the separations of liquid mixtures in industry and to develop the theoretical models for solutions.
• Implement the analytical methods to determine the quality of substances involved in process industry and thus help to maintain quality of products.

Text Books:

1. Puri, B. R., Sharma L. R., Pathama M. S., Principles of Physical Chemistry, Vishal Publishing company, 2008.
2. Manas Chanda, Atomic Structure and the Chemical Bond, 4th Edition, Tata-McGraw-Hill, 2000.
3. Bahl, B. S., G. D. Tuli and Arun Bahl, Essentials of Physical Chemistry, 24th Revised Version, Chand & Co, Latest edition.

Reference Books:

1. Peter Atkins, Julia de Paula, Physical Chemistry, 9th Edition, Oxford University Press, 2011.
2. Laidler, K. J., Chemical kinetics, 2nd Edition, McGraw-Hill, 1965.
3. Macmillan, Kapoor, K. L., A textbook of physical chemistry, 2000.
4. John A. Dean, Van Nostrand Reinhold, Chemical separation methods, 1969.
5. Kour, H., An introduction to chromatography, Pragati Publishers, 2007.
6. Sastry, M. N., Separation methods, Himalaya Publications, 3rd Edition, 2005.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

I Year - I Semester		L	T	P	C
		3	0	0	3
	PROGRAMMING FOR PROBLEM SOLVING USING C (ES1101)				

COURSE OBJECTIVES:
The objectives of Programming for Problem Solving Using C are
1) To learn about the computer systems, computing environments, developing of a computer program and Structure of a C Program
2) To gain knowledge of the operators, selection, control statements and repetition in C
3) To learn about the design concepts of arrays, strings, enumerated structure and union types. To learn about their usage.
4) To assimilate about pointers, dynamic memory allocation and know the significance of Preprocessor.
5) To assimilate about File I/O and significance of functions

UNIT I
Introduction to Computers: Creating and running Programs, Computer Numbering System, Storing Integers, Storing Real Numbers
Introduction to the C Language: Background, C Programs, Identifiers, Types, Variable, Constants, Input/output, Programming Examples, Scope, Storage Classes and Type Qualifiers.
Structure of a C Program: Expressions Precedence and Associativity, Side Effects, Evaluating Expressions, Type Conversion Statements, Simple Programs, Command Line Arguments.

UNIT II
Bitwise Operators: Exact Size Integer Types, Logical Bitwise Operators, Shift Operators.
Selection & Making Decisions: Logical Data and Operators, Two Way Selection, Multiway Selection, More Standard Functions
Repetition: Concept of Loop, Pretest and Post-test Loops, Initialization and Updating, Event and Counter Controlled Loops, Loops in C, Other Statements Related to Looping, Looping Applications, Programming Examples

UNIT III
Arrays: Concepts, Using Array in C, Array Application, Two Dimensional Arrays, Multidimensional Arrays, Programming Example – Calculate Averages
Strings: String Concepts, C String, String Input / Output Functions, Arrays of Strings, String Manipulation Functions String/ Data Conversion, A Programming Example – Morse Code
Enumerated, Structure, and Union: The Type Definition (Type def), Enumerated Types, Structure, Unions, and Programming Application

UNIT IV
Pointers: Introduction, Pointers to pointers, Compatibility, L value and R value
Pointer Applications: Arrays, and Pointers, Pointer Arithmetic and Arrays, Memory Allocation Function, Array of Pointers, Programming Application
Processor Commands: Processor Commands

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

UNIT V
Functions: Designing, Structured Programs, Function in C, User Defined Functions, Inter-Function Communication, Standard Functions, Passing Array to Functions, Passing Pointers to Functions, Recursion
Text Input / Output: Files, Streams, Standard Library Input / Output Functions, Formatting Input / Output Functions, Character Input / Output Functions
Binary Input / Output: Text versus Binary Streams, Standard Library, Functions for Files, Converting File Type.

TEXT BOOKS:

1. Programming for Problem Solving, Behrouz A. Forouzan, Richard F.Gilberg, CENGAGE
2. The C Programming Language, Brian W.Kernighan, Dennis M. Ritchie, 2e, Pearson

REFERENCES:

1. Computer Fundamentals and Programming, Sumithabha Das, Mc Graw Hill
2. Programming in C, Ashok N. Kamthane, Amit Kamthane, Pearson
3. Computer Fundamentals and Programming in C, Pradip Dey, Manas Ghosh, OXFORD

COURSE OUTCOMES:

Upon the completion of the course the student will learn
1) To write algorithms and to draw flowcharts for solving problems
2) To convert flowcharts/algorithms to C Programs, compile and debug programs
3) To use different operators, data types and write programs that use two-way/ multi-way selection
4) To select the best loop construct for a given problem
5) To design and implement programs to analyze the different pointer applications
6) To decompose a problem into functions and to develop modular reusable code
7) To apply File I/O operations

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

I Year - I Semester		L	T	P	C
		1	0	3	2.5
	ENGINEERING DRAWING (ES1103)				

Course Objective: Engineering drawing being the principal method of communication for engineers, the objective is to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

Unit I
Objective: To introduce the students to use drawing instruments and to draw polygons, Engg. Curves.
Polygons: Constructing regular polygons by general methods, inscribing and describing polygons on circles.
Curves: Parabola, Ellipse and Hyperbola by general and special methods, cycloids, involutes, tangents & normals for the curves.
Scales: Plain scales, diagonal scales and vernier scales

Unit II
Objective: To introduce the students to use orthographic projections, projections of points & simple lines. To make the students draw the projections of the lines inclined to both the planes.
Orthographic Projections: Reference plane, importance of reference lines, projections of points in various quadrants, projections of lines, line parallel to both the planes, line parallel to one plane and inclined to other plane.
Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclination and traces.

Unit III
Objective: The objective is to make the students draw the projections of the plane inclined to both the planes.
Projections of planes: regular planes perpendicular/parallel to one reference plane and inclined to the other reference plane; inclined to both the reference planes.

Unit IV
Objective: The objective is to make the students draw the projections of the various types of solids in different positions inclined to one of the planes.
Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to both the planes.

Unit V
Objective: The objective is to represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa.
Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

FirstRanker.com
Firstranker's choice
www.FirstRanker.com

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

Computer Aided Design, Drawing practice using Auto CAD, Creating 2D&3D drawings of objects using Auto CAD

Note: In the End Examination there will be no question from CAD.

TEXT BOOKS:

1. Engineering Drawing by N.D. Butt, Chariot Publications
2. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers

REFERENCE BOOKS:

1. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers
2. Engineering Graphics for Degree by K.C. John, PHI Publishers
3. Engineering Graphics by PI Varghese, McGrawHill Publishers
4. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age

Course Outcome: The student will learn how to visualize 2D & 3D objects.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

I Year - I Semester		L	T	P	C
		0	0	3	1.5
ENGLISH LAB (HS1102)					

UNIT I:

Vowels, Consonants, Pronunciation, Phonetic Transcription

UNIT II:

Past tense markers, word stress-di-syllabic words, Poly-Syllabic words

UNIT III:

Rhythm & Intonation

UNIT IV:

Contrastive Stress (Homographs)

UNIT V:

Word Stress: Weak and Strong forms
Stress in compound words

References books:

1. Infotech English, Maruthi Publications (with Compact Disc).
2. Exercises in Spoken English Part 1,2,3,4, OUP and CIEFL.
3. English Pronunciation in use- Mark Hancock, Cambridge University Press.
4. English Phonetics and Phonology-Peter Roach, Cambridge University Press.
5. English Pronunciation in use- Mark Hewings, Cambridge University Press.
6. English Pronunciation Dictionary- Daniel Jones, Cambridge University Press.
7. English Phonetics for Indian Students- P. Bala Subramanian, Mac Millan Publications.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

I Year - I Semester		L	T	P	C
		0	0	3	1.5
	PHYSICAL CHEMISTRY LAB (BS1113)				

(Any 10 of the following listed 15 experiments)

Learning objectives:

Physical Chemistry Laboratory is intended to:
- Understand the concepts learned in theoretical, physical chemistry.
- Emphasize in acquiring accurate data.
- Make data and error analysis.
- Correlate the data to theory.

List of Experiments
1. Determination of density and surface tension of   liquids against air at various temperatures using capillary rise method.
2. Measurement of dielectric constants of pure organic liquids.
3. Determination of conductance of solutions.
4. i.   Determination of viscosities of pure liquids and solutions.
   ii.   Determination of size of the molecule from viscosity measurements.
5. Study of kinetics of the reduction of methylene blue by ascorbic acid.
6. i. Determination of molecular weight by vapor pressure method.
   ii.   Determination of latent heat of vaporization.
7. Kinetics of inversion of using a polarimeter.
8. Determination of vapour liquid equilibrium of binary mixtures.
9. Ternary Liquid Equilibria: determination of binomial curve.
10. Chromatographic methods: Paper chromatography, thin layer chromatography.
11. Adsorption of acetic acid by charcoal.

Out comes:

A student who successfully completes this laboratory course should be able to do the following:
- Can determine accurate   physical, thermodynamical and kinetic properties experimentally.
- Apply theoretical principles and mathematical analysis to the data obtained.
- Work effectively with others in performing experiments and writing reports.
- Understand and practice ethically correct presentation of data.
- Understand and practice proper laboratory safety procedures.
- Gain familiarity with a variety of physico-chemical measurement techniques.

FirstRanker.com
Firstranker's choice
www.FirstRanker.com

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

I Year - I Semester		L	T	P	C
		0	0	3	1.5
PROGRAMMING FOR PROBLEM SOLVING USING C LAB (ES1102)					

Course Objectives:

1) Apply the principles of C language in problem solving.
2) To design flowcharts, algorithms and knowing how to debug programs.
3) To design & develop of C programs using arrays, strings pointers & functions.
4) To review the file operations, preprocessor commands.

Exercise 1:
1. Write a C program to print a block F using hash (#), where the F has a height of six characters and width of five and four characters.
2. Write a C program to compute the perimeter and area of a rectangle with a height of 7 inches and width of 5 inches.
3. Write a C program to display multiple variables.

Exercise 2:
1. Write a C program to calculate the distance between the two points.
2. Write a C program that accepts 4 integers p, q, r, s from the user where r and s are positive and p is even. If q is greater than r and s is greater than p and if the sum of r and s is greater than the sum of p and q print "Correct values", otherwise print "Wrong values".

Exercise 3:
1. Write a C program to convert a string to a long integer.
2. Write a program in C which is a Menu-Driven Program to compute the area of the various geometrical shape.
3. Write a C program to calculate the factorial of a given number.

Exercise 4:
1. Write a program in C to display the n terms of even natural number and their sum.
2. Write a program in C to display the n terms of harmonic series and their sum. $1 + 1/2 + 1/3 + 1/4 + 1/5 ... 1/n$ terms.
3. Write a C program to check whether a given number is an Armstrong number or not.

Exercise 5:
1. Write a program in C to print all unique elements in an array.
2. Write a program in C to separate odd and even integers in separate arrays.
3. Write a program in C to sort elements of array in ascending order.

Exercise 6:
1. Write a program in C for multiplication of two square Matrices.
2. Write a program in C to find transpose of a given matrix.

Exercise 7:
1. Write a program in C to search an element in a row wise and column wise sorted matrix.
2. Write a program in C to print individual characters of string in reverse order.

Exercise 8:
1. Jwrite a program in C to compare two strings without using string library functions.
2. Write a program in C to copy one string to another string.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

Exercise 9:
1. Write a C Program to Store Information Using Structures with Dynamically Memory Allocation
2. Write a program in C to demonstrate how to handle the pointers in the program.

Exercise 10:
1. Write a program in C to demonstrate the use of & (address of) and *(value at address) operator.
2. Write a program in C to add two numbers using pointers.

Exercise 11:
1. Write a program in C to add numbers using call by reference.
2. Write a program in C to find the largest element using Dynamic Memory Allocation.

Exercise 12:
1. Write a program in C to swap elements using call by reference.
2. Write a program in C to count the number of vowels and consonants in a string using a pointer.

Exercise 13:
1. Write a program in C to show how a function returning pointer.
2. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc( ) function.

Exercise 14:
1. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc( ) function. Understand the difference between the above two programs
2. Write a program in C to convert decimal number to binary number using the function.

Exercise 15:
1. Write a program in C to check whether a number is a prime number or not using the function.
2. Write a program in C to get the largest element of an array using the function.

Exercise 16:
1. Write a program in C to append multiple lines at the end of a text file.
2. Write a program in C to copy a file in another name.
3. Write a program in C to remove a file from the disk.

Course Outcomes:

By the end of the Lab, the student

1) Gains Knowledge on various concepts of a C language.
2) Able to draw flowcharts and write algorithms.
3) Able design and development of C problem solving skills.
4) Able to design and develop modular programming skills.
5) Able to trace and debug a program

FirstRanker.com
Firstranker's choice
www.FirstRanker.com

FirstRanker.com
Firstranker's choice

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

I Year - I Semester		L	T	P	C
		2	0	0	0
	CONSTITUTION OF INDIA (MC1104)				

Course Objectives:

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

UNIT-I

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

Learning outcomes:

After completion of this unit student will

- Understand the concept of Indian constitution
- Apply the knowledge on directive principle of state policy
- Analyze the History, features of Indian constitution
- Evaluate Preamble Fundamental Rights and Duties

UNIT-II

Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, LokSabha, RajyaSabha, The Supreme Court and High Court: Powers and Functions;
Learning outcomes:-After completion of this unit student will

- Understand the structure of Indian government
- Differentiate between the state and central government
- Explain the role of President and Prime Minister
- Know the Structure of supreme court and High court

UNIT-III

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

FirstRanker.com
Firstranker's choice
www.FirstRanker.com

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

Learning outcomes:-After completion of this unit student will
- Understand the structure of state government
- Analyze the role Governor and Chief Minister
- Explain the role of state Secretariat
- Differentiate between structure and functions of state secretariat

UNIT-IV

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

Learning outcomes:-After completion of this unit student will

- Understand the local Administration
- Compare and contrast district administration role and importance
- Analyze the role of Myer and elected representatives of Municipalities
- Evaluate Zillapanchayat block level organisation

UNIT-V

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

Learning outcomes:-After completion of this unit student will

- Know the role of Election Commission apply knowledge
- Contrast and compare the role of Chief Election commissioner and Commissiononerate
- Analyze role of state election commission
- Evaluate various commissions of viz SC/ST/OBC and women

References:

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi
2. SubashKashyap, Indian Constitution, National Book Trust
3. J.A. Siwach, Dynamics of Indian Government & Politics
4. D.C. Gupta, Indian Government and Politics
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
6. J.C. Johari, Indian Government andPolitics Hans
7. J. Raj IndianGovernment and Politics
8. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi
9. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

E-resources:

1. nptel.ac.in/courses/109104074/8
2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

Course Outcomes:

At the end of the semester/course, the student will be able to have a clear knowledge on the following:

➢ Understand historical background of the constitution making and its importance for building a democratic India.

➢ Understand the functioning of three wings of the government ie., executive, legislative and judiciary.

➢ Understand the value of the fundamental rights and duties for becoming good citizen of India.

➢ Analyze the decentralization of power between central, state and local self-government.

➢ Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

1. Know the sources, features and principles of Indian Constitution.
2. Learn about Union Government, State government and its administration.
3. Get acquainted with Local administration and Pachayati Raj.
4. Be aware of basic concepts and developments of Human Rights.
5. Gain knowledge on roles and functioning of Election Commission

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

I Year - II Semester		L	T	P	C
		3	0	0	3
	ENGLISH (HS1201)				

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

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 1:
Lesson-1: A Drawer full of happiness from "**Infotech English**", Maruthi Publications
Lesson-2: Deliverance by Premchand from "**The Individual Society**", Pearson Publications.
      (Non-detailed)
Listening: Listening to short audio texts and identifying the topic. Listening to short audio texts and identifying the context and specific pieces of information to answer a series of questions both in speaking and writing.

FirstRanker.com
Firstranker's choice
       www.FirstRanker.com

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests. Self introductions and introducing others.

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

Reading for Writing: Paragraph writing (specific topics) using suitable cohesive devices; linkers, sign posts and transition signals; mechanics of writing - punctuation, capital letters.

Vocabulary: Technical vocabulary from across technical branches (20) GRE Vocabulary (20) (Antonyms and Synonyms, Word applications) Verbal reasoning and sequencing of words.

Grammar: 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.
Pronunciation: Vowels, Consonants, Plural markers and their realizations

Unit 2:

Lesson-1: Nehru's letter to his daughter Indira on her birthday from "**Infotech English**", Maruthi Publications

Lesson-2: Bosom Friend by Hira Bansode from "**The Individual Society**", Pearson Publications. (Non-detailed)

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts, both in speaking and writing.

Speaking: Discussion in pairs/ small groups on specific topics followed by short structured talks. Functional English: Greetings and leave takings.

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

Reading for Writing: Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions.

Vocabulary: Technical vocabulary from across technical branches (20 words). GRE Vocabulary Analogies (20 words) (Antonyms and Synonyms, Word applications)

Grammar: Use of articles and zero article; prepositions.

Pronunciation: Past tense markers, word stress-di-syllabic words

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

Unit 3:

Lesson-1: Stephen Hawking-Positivity 'Benchmark' from **"Infotech English"**, Maruthi Publications

Lesson-2: Shakespeare's Sister by Virginia Woolf from **"The Individual Society"**, Pearson Publications. (Non-detailed)

Listening: Listening for global comprehension and summarizing what is listened to, both in speaking and writing.

Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed. Functional English: Complaining and Apologizing.

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

Reading for Writing: Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions. Letter writing-types, format and principles of letter writing. E-mail etiquette, Writing CV's.

Vocabulary: Technical vocabulary from across technical branches (20 words). GRE Vocabulary (20 words) (Antonyms and Synonyms, Word applications) Association, sequencing of words

Grammar: Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.

Pronunciation: word stress-poly-syllabic words

Unit 4:

Lesson-1: Liking a Tree, Unbowed: Wangari Maathai-biography from **"Infotech English"**, Maruthi Publications

Lesson-2: Telephone Conversation-Wole Soyinka from **"The Individual Society"**, Pearson Publications. (Non-detailed)

Listening: Making predictions while listening to conversations/ transactional dialogues without video (only audio); listening to audio-visual texts.

Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions. Functional English: Permissions, Requesting, Inviting.

Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicative process or display complicated data.

FirstRanker.com
Firstranker's choice
www.FirstRanker.com

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

Reading for Writing: Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables. Writing SOP, writing for media.

Vocabulary: Technical vocabulary from across technical branches (20 words) GRE Vocabulary (20 words) (Antonyms and Synonyms, Word applications) Cloze Encounters.

Grammar: Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of antonyms

Pronunciation: Contrastive Stress

Unit 5:

Lesson-1: Stay Hungry-Stay foolish from "**Infotech English**", Maruthi Publications

Lesson-2: Still I Rise by Maya Angelou from "**The Individual Society**", Pearson Publications. (Non-detailed)

Listening: Identifying key terms, understanding concepts and interpreting the concepts both in speaking and writing.

Speaking: Formal oral presentations on topics from academic contexts - without the use of PPT slides. Functional English: Suggesting/Opinion giving.

Reading: Reading for comprehension. RAP Strategy Intensive reading and Extensive reading techniques.

Reading for Writing: Writing academic proposals- writing research articles: format and style.

Vocabulary: Technical vocabulary from across technical branches (20 words) GRE Vocabulary (20 words) (Antonyms and Synonyms, Word applications) Coherence, matching emotions.

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

Pronunciation: Stress in compound words

Prescribed text books for theory for Semester-I:
1. "**Infotech English**", Maruthi Publications. (Detailed)
2. "**The Individual Society**," Pearson Publications. (Non-detailed)

Reference books:
1. Infotech English, Maruthi Publications. (with Compact Disc)
2. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
3. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
4. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
5. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.

FirstRanker.com
Firstranker's choice
www.FirstRanker.com

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

I Year - II Semester		L	T	P	C
		3	0	0	3
	MATHEMATICS - III (BS1203) **(Common to all Branch's for I Year B. Tech)**				

Course Objectives:
- To familiarize the techniques in partial differential equations.
- 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.

Course Objectives: At the end of the course, the student will be able to
- 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 (L5)
- Apply the Laplace transform for solving differential equations (L3).
- Find or compute the Fourier series of periodic signals (L3)
- Know and be able to apply integral expressions for the forwards and inverse Fourier transform to a range of non-periodic waveforms (L3)
- Identify solution methods for partial differential equations that model physical processes (L3)

UNIT I: Vector calculus: (10 hrs)

Vector Differentiation: Gradient — Directional derivative — Divergence — Curl — Scalar Potential.
Vector Integration: Line integral — Work done — Area — Surface and volume integrals — Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof).

UNIT II:Laplace Transforms: (10 hrs)

Laplace transforms of standard functions — Shifting theorems — Transforms of derivatives and integrals —
Unit step function — Dirac's delta function — Inverse Laplace transforms — Convolution theorem (without proof).
Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms.

UNIT III: Fourier series and Fourier Transforms: (10 hrs)

Fourier Series: Introduction — Periodic functions — Fourier series of periodic function — Dirichlet's conditions — Even and odd functions — Change of interval — Half-range sine and cosine series.

Fourier Transforms: Fourier integral theorem (without proof) — Fourier sine and cosine integrals — Sine and cosine transforms — Properties — inverse transforms — Finite Fourier transforms.

FirstRanker.com
Firstranker's choice
www.FirstRanker.com

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

UNIT IV:PDE of first order: **(8 hrs)**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions — Solutions of first order linear (Lagrange) equation and nonlinear (standard types) equations.

UNIT V: Second order PDE and Applications: **(10 hrs)**

Second order PDE: Solutions of linear partial differential equations with constant coefficients — RHS term of the type e^{ax+by}, $\sin(ax+by)$, $\cos(ax+by)$, $x^m y^n$

Applications of PDE: Method of separation of Variables — Solution of One dimensional Wave, Heat and two-dimensional Laplace equation.

Text Books:

1. **B.S. Grewal,** Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. **B. V. Ramana**, Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.

Reference Books:

1. **Erwin Kreyszig**, Advanced Engineering Mathematics, 10th Edition, Wiley-India.
2. **Dean. G. Duffy**, Advanced Engineering Mathematics with MATLAB, 3rd Edition, CRC Press.
3. **Peter O' Neil**, Advanced Engineering Mathematics, Cengage.
4. **Srimantha Pal, S C Bhunia**, Engineering Mathematics, Oxford University Press.

FirstRanker.com
Firstranker's choice

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

I Year - II Semester		L	T	P	C
		3	0	0	3
	ENIGINEERING PHYSICS (BS1208)				

Course Objectives:

Physics curriculum which is re-oriented to the needs of non-circuital branches of graduate engineering courses offered by JNTUniversity:kakinada that serves as a transit to understand the branch specific advanced topics. The course is designed to:

- Impart concepts of mechanics required to identify forces and moments in mechanical systems by vector representation-extend Newton's second law for inertial and non-inertial frames of reference- study different types of harmonic oscillatory motions.
- Tap the Simple harmonic motion and its adaptability for improved acoustic quality of concert halls- impart concepts of flaw detection techniques using ultrasonics.
- Study the structure- property relationship exhibited by solid materials within the elastic limit.
- Impart knowledge in basic concepts of LASERs along with its Engineering applications- Familiarize types of sensors for various engineering applications
- Explore the knowledge of magnetic and dielectric materials and their utility in appliances.

UNIT-I   (10hrs)

MECHANICS: Basic laws of vectors and scalars, rotational frames-conservative and non – conservative forces , $F = -$ grad V, Newton's laws in inertial and linear accelerating non-inertial frames of reference, rotating frame of reference with constant angular velocity, Harmonic oscillator ; damped harmonic motion ; Forced oscillations and resonance.

Outcome:

The students will be able to
- Identify forces and moments in mechanical systems using scalar and vector techniques
- extend Newton's second law for inertial and non-inertial frame of reference
- explain simple harmonic motion and damped harmonic motions

UNIT-II   (10hrs)

ACOUSTICS & ULTRASONICS: Introduction – Reverberation - Reverberation time - Sabine's formula (Derivation using growth and decay method)–absorption coefficient and its determination- factors affecting acoustics of buildings and their remedies.
Production of ultrasonics by Magnetostriction and piezoelectric methods – Detection of ultrasonics - acoustic grating - Non-Destructive Testing- pulse echo system through transmission and reflection modes - Applications.

FirstRanker.com
Firstranker's choice
www.FirstRanker.com

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

Outcome:
The students will be able to
- explain how sound is propagated in buildings
- analyze acoustic properties of typically used materials in buildings
- recognize sound level disruptors and their use in architectural acoustics
- Use of ultrasonics in flaw detection using NDT technique

UNIT-III   (9hrs)

ELASTICITY:, stress, strain, Hooke's law, stress-strain curve, generalized Hooke's law with and without thermal strains for isotropic materials, different types of moduli and their relations, bending of beams – Bending moment of a beam – Depression of cantilever.

Outcome:
The students will be able to
- Understand the elasticity and plasticity concepts
- Study different types of moduli and their relation
- Analyze the concepts of shearing force and moment of inertia

UNIT-IV   (9hrs)

LASERS & SENSORS: Characteristics–Spontaneous and Stimulated emission of radiation – population inversion - Einstein's coefficients & Relation between them and their significance - Pumping Mechanisms - Ruby laser – Helium Neon laser – Applications.

SENSORS (qualitative description only): Different types of sensors and applications; Strain and Pressure sensors- Piezoelectric, magnetostrictive sensors, Temperature sensor - bimetallic strip, pyroelectric detectors.

Outcome:
The students will be able to
- **Understand** the basic concepts of LASER light Sources
- Study Different types of laser systems
- Identify different types of sensors and their working principles

UNIT-V   (10hrs)

MAGNETISM & DIELECTRICS: Introduction – Magnetic dipole moment – Magnetization- Magnetic susceptibility and permeability – Origin of permanent magnetic moment – Bohr Magneton - Classification of magnetic materials (Dia, Para and Ferro) – Domain concept of Ferromagnetism - Hysteresis – soft and hard magnetic materials – Applications of Ferromagnetic materials.

Introduction - Dielectric polarization – Dielectric polarizability, Susceptibility and Dielectric constant-types of polarizations: Electronic and Ionic (Quantitative), Orientational polarizations (qualitative)-Lorentz internal field – Claussius_Mossoti equation- Frequency dependence of polarization - Applications of dielectrics.

FirstRanker.com
Firstranker's choice
www.FirstRanker.com

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

Outcome:

The students will be able to

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

Text Books:

1. "Engineering Mechanics" by Manoj K Harbola, Cengage Publications 2nd Eds.
2. "A text book of Engineering Physics" by P G Kshirsagar & M N Avadhanulu, S Chand & Company Ltd.
3. "Engineering Physics" by R K Gaur and S L Gupta, Dhanpat Rai Publications.
4. "Sensor and Transducers" by Ian R Sinclair, Elsevier (Newnes) 3rd Eds.

Reference Books:

1. "Engineering Physics" by M R Srinivasan, New Age International Publishers.
2. "Lectures on Physics" by Richard P Feynman, Pearson Publishers, New Millennium Eds.
3. "Lasers and Non-linear Optics" by B B Laud, New Age International Publishers (3rd Eds.).

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

I Year - II Semester		L	T	P	C
		3	0	0	3
	ENIGINEERING MECHANICS (BS1204)				

Objectives: The students completing this course are expected to understand the concepts of forces and its resolution in different planes, resultant of force system, Forces acting on a body, their free body diagrams using graphical methods. They are required to understand the concepts of centre of gravity and moments of inertia and their application, Analysis of frames and trusses, different types of motion, friction and application of work - energy method.

UNIT – I

Objectives: The students are to be exposed to the concepts of force and friction, direction and its application.
Introduction to Engg. Mechanics – Basic Concepts.
Systems of Forces: Coplanar Concurrent Forces – Components in Space – Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems.
Friction: Introduction, limiting friction and impending motion, coulomb's laws of dry friction, coefficient of friction, cone of friction

UNIT II
Objectives: The students are to be exposed to application of free body diagrams. Solution to problems using graphical methods and law of triangle of forces.
Equilibrium of Systems of Forces: Free Body Diagrams, , Lami's Theorm, Equations of Equilibrium of Coplanar Systems, Graphical method for the equilibrium, Triangle law of forces, converse of the law of polygon of forces condition of equilibrium, Equations of Equilibrium for Spatial System of forces, Numerical examples on spatial system of forces using vector approach, Analysis of plane trusses.

UNIT – III
Objectives : The students are to be exposed to concepts of centre of gravity. The students are to be exposed to concepts of moment of inertia and polar moment of inertia including transfer methods and their applications.
Centroid: Centroids of simple figures (from basic principles) – Centroids of Composite Figures
Centre of Gravity: Centre of gravity of simple body (from basic principles), centre of gravity of composite bodies, Pappus theorems.
Area moments of Inertia: Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia. **Mass Moment of Inertia:** Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies.

UNIT – IV
Objectives: The students are to be exposed to motion in straight line and in curvilinear paths, its velocity and acceleration computation and methods of representing plane motion.
Rectilinear and Curvilinear motion of a particle: Kinematics and Kinetics- Work Energy method and applications to particle motion- Impulse momentum method.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

UNIT – V

Objectives: The students are to be exposed to rigid motion kinematics and kinetics

Rigid body Motion: Kinematics and kinetics of translation, Rotation about fixed axis and plane motion, Work Energy method and Impulse momentum method.

TEXT BOOK:

1. Engg. Mechanics - S.Timoshenko & D.H.Young., 4th Edn - , Mc Graw Hill publications.

Course outcomes:

1. The student should be able to draw free body diagrams for FBDs for particles and rigid bodies in plane and space and problems to solve the unknown forces, orientations and geometric parameters.
2. He should be able to determine centroid for lines, areas and center of gravity for volumes and their composites.
3. He should be able to determine area and mass movement of inertia for composite sections
4. He should be able to analyze motion of particles and rigid bodies and apply the principles of motion, work energy and impulse – momentum.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

I Year - II Semester		L	T	P	C
		3	0	0	3
INTRODUCTION TO CHEMICAL ENGINEERING (CH1201)					

OBJECTIVES:

- To introduce the concepts that will enable the transition from science to chemical engineering.
- Explanation of role of Chemical Engineers in everyday life and the importance of Chemical Engineering.
- To learn the various Unit Operations and Unit Processes used in Chemical industries.
- To learn the role of Chemical Engineers in environmental and safety aspects in process industries.

UNIT-I

Introduction, Chemical Engineering in everyday life, Lab scale to plant scale, Versatility of a Chemical/Petrochemical Engineer, Role of Chemical Engineers in Petroleum refinery, Chemical, Petrochemical, Nanotechnology, Energy and environment.

Batch Processing, Transition from batch to continuous processing, Case study: Any chemical industry, Role of basic sciences in Chemical Engineering (Introduction) (Text Book 1 & 2)

UNIT-II

Introduction & Basic concepts of analysis of processes, unit operations, basic laws, units and dimensions, partial pressure, vapour pressure. Solutions, concentration measurements, humidity and saturation. Material and Energy balances, Design & control of chemical systems.

Flow of fluids: Introduction, nature of fluid, viscosity, velocity profile, flow field, types of fluid motion, laminar and turbulent flow, flow of a fluid past a solid surface, Reciprocating, rotary, and centrifugal pumps. (Text Book 2 & 3)

UNIT-III

Heat transfer: Conduction, convection (omit correlations for calculation of heat transfer coefficients, heat transfer with change in phase) and radiation.

Heat transfer equipment (double pipe & Shell and tube heat exchanger), evaporation, long tube vertical type and forced circulation type evaporators, multiple effect evaporation, methods of feeding. (Text Book 1 & 3)

FirstRanker.com
Firstranker's choice
www.FirstRanker.com

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

UNIT-IV

Mass transfer: Introduction, Laws of diffusion, contact patterns, classification of separation processes and applications, basic definitions of separation processes, VLE, LLE, boiling point diagram. (Text Book 3)

Basic Concepts in Mass transfer Operations: Distillation, Extraction & leaching, crystallization, drying, absorption. (Text book 2 & 3).

UNIT-V

Introduction to mechanical operations: Size reduction, filtration, basic differences between agitation and mixing. Introduction to environmental pollution: types and their effect. Safety in chemical process industries with case studies.

Types of reactions and reactors.Introduction to Process plant design & Economics (Text Book 1, 2 & 3).

Text Books:

1. Chemical Engineering-An Introduction, Morton M.Denn, Cambridge University Press, 2013.
2. Introduction to Chemical Engineering, S. Pushpavanam, PHI learning Pvt. Ltd., 2012.
3. Introduction to Chemical Engineering, Walter L. Badger, Julius T, Banchero, TMH Publications, 2008.

Reference Book:

1. Unit operations in Chemical Engineering, W.L. McCabe and J.C. Smith and Peter Harriott, McGraw Hill, 5th Ed. 1993.

Outcomes:

The student will be able to explain:

- The role of Chemical Engineers in everyday life and the importance of Chemical Engineering.

- The role of various Unit Operations and Unit Processes in Chemical industries.

- The role of Chemical Engineers in environmental and safety aspects in process industries.

FirstRanker.com
Firstranker's choice
www.FirstRanker.com

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

I Year - II Semester		L	T	P	C
		0	0	3	1.5
	COMMUNICATION SKILLS LAB (HS1203)				

UNIT I:
Oral Activity: JAM, Hypothetical Situations, Self/Peer Profile
Common Errors in Pronunciation, Neutralising Accent

UNIT II:
Oral Activity: Telephonic Etiquette, Role Plays
Poster Presentations

UNIT III:
Oral Activity: Oral Presentation skills, Public speaking
Data Interpretation

UNIT IV:
Oral Activity: Group Discussions: Do's and Don'ts- Types, Modalities

UNIT V:
Oral Activity: Interview Skills: Preparatory Techniques, Frequently asked questions, Mock Interviews.
Pronunciation: Connected speech (Pausing, Tempo, Tone, Fluency etc.,)

References:

1. Infotech English, Maruthi Publications (with Compact Disc).
2. Exercises in Spoken English Part 1,2,3,4, OUP and CIEFL.
3. English Pronunciation in use- Mark Hancock, Cambridge University Press.
4. English Phonetics and Phonology-Peter Roach, Cambridge University Press.
5. English Pronunciation in use- Mark Hewings, Cambridge University Press.
6. English Pronunciation Dictionary- Daniel Jones, Cambridge University Press.
7. English Phonetics for Indian Students- P. Bala Subramanian, Mac Millan Publications.
8. Technical Communication- Meenakshi Raman, Sangeeta Sharma, Oxford University Press.
9. Technical Communication- Gajendrea Singh Chauhan, Smita Kashiramka, Cengage Publications.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

I Year - II Semester		L	T	P	C
		0	0	3	1.5
	ENGINEERING PHYSICS LAB (BS1209)				

(Any 10 of the following listed 15 experiments)

LIST OF EXPERIMENTS:

1. Determination of Rigidity modulus of a material- Torsional Pendulum.

2. Determination of Young's modulus by method of single cantilever oscillations.

3. Determination of Acceleration due to Gravity and Radius of Gyration - Compound Pendulum.

4. Verification of laws of vibrations in stretched strings – Sonometer.

5. Determination of spring constant of springs using coupled oscillators.

6. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus

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

8. Measurement of magnetic susceptibility by Gouy's method.

9. Determination of ultrasonic velocity in liquid (Acoustic Grating)

10. Determination of dielectric constant by charging and discharging method

11. Determination of wavelength of Laser by diffraction grating

12. Determination of particle size using Laser.

13. Determeination of Pressure variation using strain Gauge sensor.

14. Determination of Moment of Inertia of a Fly Wheel.

15. Determination of Velocity of sound –Volume Resoantor.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

I Year - II Semester		L	T	P	C
		0	0	4	2
ENGINEERING WORKSHOP & IT WORKSHOP					

Engg Workshop

Course Objective: To impart hands-on practice on basic engineering trades and skills.

Note: At least two exercises to be done from each trade.

Trade:

1.Carpentry	1. T-Lap Joint	
	2. Cross Lap Joint	
	3. Dovetail Joint	
	4. Mortise and Tenon Joint	
2.Fitting	1. Vee Fit	
	2. Square Fit	
	3. Half Round Fit	
	4. Dovetail Fit	
3.Black Smithy	1. Round rod to Square	
	2. S-Hook	
	3. Round Rod to Flat Ring	
	4. Round Rod to Square headed bolt	
4.House Wiring	1. Parallel / Series Connection of three bulbs	
	2. Stair Case wiring	
	3. Florescent Lamp Fitting	
	4. Measurement of Earth Resistance	
5.Tin Smithy	1. Taper Tray	
	2. Square Box without lid	
	3. Open Scoop	
	4. Funnel	
6.IT Workshop	1.Assembly & Disassembly of Computer	

IT Workshop

COURSE OBJECTIVES:

The objective of IT Workshop is to

1. Explain the internal parts of a computer, peripherals, I/O ports, connecting cables
2. Demonstrate basic command line interface commands on Linux
3. Teach the usage of Internet for productivity and self paced lifelong learning
4. Describe about Compression, Multimedia and Antivirus tools
5. Demonstrate Office Tools such as Word processors, Spreadsheets and Presentation tools

Computer Hardware:

Experiment 1: Identification of peripherals of a PC, Laptop, Server and Smart Phones:
Prepare a report containing the block diagram along with the configuration of each component and its functionality, Input/ Output devices, I/O ports and interfaces, main memory, cache memory and secondary storage technologies, digital storage basics, networking components and speeds.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

Operating Systems:

Experiment 2: Internet Services:
- Web Browser usage and advanced settings like LAN, proxy, content, privacy, security, cookies, extensions/ plugins
- Antivirus installation, configuring a firewall, blocking pop-ups
- Email creation and usage, Creating a Digital Profile on LinkedIn
- Source control on Github, Hackerrank, Codechef, HackerEarth, etc
- Google hangout/ Skype/ gotomeeting video conferencing
- archive.org for accessing archived resources on the web

Productivity Tools:

Experiment 3: Demonstration and Practice on archival and compression tools
- scanning and image editing tools
- OCR and text extraction
- audio players, recording using Mic, editing, podcast preparation
- video players, recording using webcam/camcorder, editing
- podcast, screencast, vodcast, webcasting

Office Tools:
Experiment 4: Demonstration and Practice on Text Editors like Notepad++, Sublime Text, Atom, Brackets, Visual code, etc
Experiment 5: Demonstration and practice on Microsoft Word, Power Point
Experiment 6: Demonstration and practice on Microsoft Excel.
Experiment 7: Demonstration and practice on LaTeX and produce professional pdf documents.
Experiment 8: Cloud based productivity enhancement and collaboration tools:
- Store, sync, and share files with ease in the cloud using Google Drive
- Document creation and editing text documents in your web browser using Google docs
- Handle task lists, create project plans, analyze data with charts and filters using Google Sheets
- Create pitch decks, project presentations, training modules using Google Slides
- Manage event registrations, create quizzes, analyze responses using Google Forms
- Build public sites, internal project hubs using Google Sites
- Online collaboration through cross-platform support using Jamboard
- Keep track of important events, sharing one's schedule, and create multiple calendars using Google Calendar

TEXT BOOKS:

1. Computer Fundamentals, Anita Goel, Pearson Education, 2017
2. PC Hardware Trouble Shooting Made Easy, TMH

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

REFERENCES:
1. Essential Computer and IT Fundamentals for Engineering and Science Students, Dr.N.B.Vekateswarlu, S.Chand

WEB RESOURCES:

1. https://explorersposts.grc.nasa.gov/post631/2006-2007/computer_basics/ComputerPorts.doc
2. https://explorersposts.grc.nasa.gov/post631/2006-2007/bitsnbyte/Digital_Storage_Basics.doc
3. https://www.thegeekstuff.com/2009/07/linux-ls-command-examples
4. https://www.pcsuggest.com/basic-linux-commands/
5. https://www.vmware.com/pdf/VMwarePlayerManual10.pdf
6. https://geek-university.com/vmware-player/manually-install-a-guest-operating-system/
7. https://gsuite.google.com/learning-center/products/#!/

COURSE OUTCOMES:

Students should be able to:
1. Assemble and disassemble components of a PC
2. Construct a fully functional virtual machine, Summarize various Linux operating system commands,
3. Secure a computer from cyber threats, Learn and practice programming skill in Github, Hacker rank, Codechef, Hacker Earth etc.
4. Recognize characters & extract text from scanned images, Create audio files and podcasts
5. Create video tutorials and publishing, Use office tools for documentation, Build interactive presentations, Build websites, Create quizzes & analyze responses.

FirstRanker.com
Firstranker's choice
www.FirstRanker.com

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

I Year - II Semester		L	T	P	C
		0	0	2	1
	ENGINEERING EXPLORATION PROJECT (PR1201)				

COURSE OBJECTIVES:

- Build mindsets & foundations essential for designers
- Learn about the Human-Centered Design methodology and understand their real-world applications
- Use Design Thinking for problem solving methodology for investigating illdefined problems.
- Undergo several design challenges and work towards the final design challenge

Apply Design Thinking on the following Streams to

- Project Stream 1: Electronics, Robotics, IOT and Sensors
- Project Stream 2: Computer Science and IT Applications
- Project Stream 3: Mechanical and Electrical tools
- Project Stream4: Eco-friendly solutions for waste management, infrastructure, safety, alternative energy sources, Agriculture, Environmental science and other fields of engineering.

HOW TO PURSUE THE PROJECT WORK?

- The first part will be learning-based-masking students to embrace the methodology by exploring all the phases of design thinking through the wallet/ bag challenge and podcasts.
- The second part will be more discussion-based and will focus on building some necessary skills as designers and learning about complementary material for human- centered design.
- The class will then divide into teams and they will be working with one another for about 2 – 3 weeks. These teams and design challenges will be the basis for the final project and final presentation to be presented.
- The teams start with **Design Challenge** and go through all the phases more in depth from coming up with the right question to empathizing to ideating to prototyping and to testing.
- Outside of class, students will also be gathering the requirements, identifying the challenges, usability, importance etc
- At the end, Students are required to submit the final reports, and will be evaluated by the faculty.

TASKS TO BE DONE:

Task 1: Everyone is a Designer

- Understand class objectives & harness the designer mindset

Task 2: The Wallet/Bag Challenge and Podcast

- Gain a quick introduction to the design thinking methodology
- Go through all stages of the methodology through a simple design challenge
- Podcast: Observe, Listen and Engage with the surrounding environment and identify a design challenge.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

Task 3: Teams & Problems
- Start Design Challenge and learn about teams & problems through this
- Foster team collaboration, find inspiration from the environment and learn how to identify problems

Task 4: Empathizing
- Continue Design Challenge and learn empathy
- Learn techniques on how to empathize with users
- Go to the field and interview people in their environments
- Submit Activity Card

Task 5: Ideating
- Continue Design Challenge and learn how to brainstorm effectively
- Encourage exploration and foster spaces for brainstorming
- Submit Activity Card

Task 6: Prototyping
- Continue Design Challenge and learn how to create effective prototypes
- Build tangible models and use them as communication tools
- Start giving constructive feedback to classmates and teammates
- Submit Activity Card

Task 7: Testing
- Finish Design Challenge and iterate prototypes and ideas through user feedback
- Evolve ideas and prototypes through user feedback and constructive criticism
- Get peer feedback on individual and group performance
- Submit Activity Card

Task 8:
- Final Report Submission and Presentation

Note: The colleges may arrange for Guest Speakers from Various Design Fields: Graphic Design, Industrial Design, Architecture, Product Design, Organizational Design, etc to enrich the students with Design Thinking Concept.

REFERENCES:
1. Tom Kelly, *The Art of Innovation: Lessons in Creativity From IDEO, America's Leading Design Firm* (Profile Books, 2002)
2. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation (HarperBusiness, 2009)
3. Jeanne Liedtka, Randy Salzman, and Daisy Azer, Design Thinking for the Greater Good: Innovation in the Social Sector (Columbia Business School Publishing, 2017)

OTHER USEFUL DESIGN THINKING FRAMEWORKS AND METHODOLOGIES:
- Human-Centered Design Toolkit (IDEO); https://www.ideo.com/post/design-kit
- Design Thinking Boot Camp Bootleg (Stanford D-School); https://dschool.stanford.edu/resources/the-bootcamp-bootleg
- Collective Action Toolkit (frogdesign); https://www.frogdesign.com/wpcontent/
  - uploads/2016/03/CAT_2.0_English.pdf
- Design Thinking for Educators (IDEO); https://designthinkingforeducators.com/

FirstRanker.com
Firstranker's choice
www.FirstRanker.com

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

I Year - II Semester		L	T	P	C
		2	0	0	0
ENVIRONMENTAL SCIENCE (MC1201)					

Learning Objectives:
The objectives of the course are to impart:
- Overall understanding of the natural resources.
- Basic understanding of the ecosystem and its diversity.
- Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities.
- An understanding of the environmental impact of developmental activities.
- Awareness on the social issues, environmental legislation and global treaties.

UNIT-I:
Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance – Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, acid rains, ozone layer depletion, population growth and explosion, effects;. Role of information technology in environment and human health.
Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem; Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids; Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

UNIT-II:
Natural Resources: Natural resources and associated problems.
Forest resources: Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people.
Water resources: Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems.
Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.
Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.
Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources.
Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification; Role of an individual in conservation of natural resources; Equitable use of resources for sustainable lifestyles.

UNIT-III:
Biodiversity and its conservation: Definition: genetic, species and ecosystem diversity-classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-sports of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts. - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

FirstRanker.com
Firstranker's choice
www.FirstRanker.com

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CHEMICAL ENGINEERING

UNIT – IV

Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies, Sustainable Life Studies. Impact of Fire Crackers on Men and his well being.

Solid Waste Management: Sources, Classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products, Biomedical, Hazardous and e – waste management.

UNIT – V

Social Issues and the Environment: Urban problems related to energy -Water conservation, rain water harvesting-Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Environmental Protection Act -Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation. -Public awareness.

UNIT – VI

Environmental Management: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism, Green Campus – Green business and Green politics.

The student should Visit an Industry / Ecosystem and submit a report individually on any issues related to Environmental Studies course and make a power point presentation.

Text Books:

1. Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada
2. Environmental Studies, R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.
3. Environmental Studies, P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai

Reference:

1. Text Book of Environmental Studies, Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
2. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi
3. Environmental Studies, Benny Joseph, Tata McGraw Hill Co, New Delhi
4. Perspectives in Environment Studies, Anubha Kaushik, C P Kaushik, New Age International Publishers, 2014

FirstRanker.com
Firstranker's choice
www.FirstRanker.com