ACADEMIC REGULATIONS

COURSE STRUCTURE

AND

DETAILED SYLLABUS

CIVIL ENGINEERING

For

B.TECH. FOUR YEAR DEGREE COURSE

(Applicable for the batches admitted from 2018-2019)

JNTUH COLLEGE OF ENGINEERING HYDERABAD

(Autonomous)

Kukatpally, Hyderabad – 500085

Andhra Pradesh, India
Vision of the Institution

To be recognized as one of the top 10 institutes in the country offering technical education, sustaining and improving its reputation of UG programmes, expanding need based PG and research programmes with global outlook, synergizing teaching and research for societal relevance.

Mission of the Institution

1. To identify technological advancements and build the right level of skills at the right time contributing to the industrial and national growth.
2. To identify and keep abreast with the state of the art technology maintaining its legacy of striving for excellence in higher education.
3. To promote world class research of local relevance to society.
4. With a research community of professors, research fellows and research centres, expand the scale and multidisciplinary character of its research activities.
5. With a global outlook strive for collaborations to network with International Universities and National Institutes of Research and Higher Learning.

Vision of the Department

- The Department of Civil Engineering is committed to raise the intellectual tone of the young students in understanding and incorporating emerging technologies, with an objective of enhancing their competence by applying their proficiency and skill for infrastructure and economic development of the society.

- Mission of the Department:
  1. To strengthen the teaching tools in order to orient students to acquire necessary skills to perform in the field or to handle industrial projects.
  2. To enhance students into knowledgeable, responsible professionals, successful practitioners and lifelong learners in emerging fields for the betterment of society.
  3. To improve the quality of technological education through training, consultancy, research, and innovation.
  4. To identify, evaluate and implement scientifically proven technological solutions.

Program Educational Objectives

<table>
<thead>
<tr>
<th>PEO 1</th>
<th>To provide students with a solid foundation in mathematical, scientific and engineering fundamentals required to solve engineering problems and to pursue and to enroll in advanced studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEO 2</td>
<td>To Impart basic technical knowledge and skills in Civil Engineering and related fields to cater to the emerging technological needs of society.</td>
</tr>
<tr>
<td>PEO 3</td>
<td>To perceive the technical knowhow, adaptability and innovation in their work so as to pursue lifelong learning, and to be leaders, both in their chosen profession and in other activities.</td>
</tr>
<tr>
<td>PEO 4</td>
<td>To Provide expertise in carrying out civil engineering projects by using state-of-art of computing and experimental techniques to develop interdisciplinary approach.</td>
</tr>
<tr>
<td>PEO 5</td>
<td>To Train the student to possess good communication and presentation skills with ability to work in teams and contributing significantly to the technological development of the Nation.</td>
</tr>
</tbody>
</table>
Program Outcomes

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Out Comes

1. Understand the basics of Science, behavioral mechanics and engineering materials required for Engineering systems.

2. Survey, explore, analyze, formulate, design and manage complete Civil Engineering systems by incorporating socio-cultural and environmental needs.

3. Develop social skills required for multidisciplinary and collaborative works.

4. Train professionally to understand the ongoing field problems and their solutions.
# JNTUH College of Engineering Hyderabad

## B.Tech. Four Year Degree Course

### Civil Engineering

#### Course Structure

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Course Code</th>
<th>Course Title</th>
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# Course Structure

## II Year

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### II Semester

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### III YEAR

#### I SEMESTER

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Total Credits: 22

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Professional Elective -I
1. Concrete Technology
2. Elements of Earthquake Engineering
3. Introduction To Offshore Structures

Professional Elective -II
1. Pre-stressed Concrete
2. Optimization techniques in structural engineering
3. Introduction to Composite Materials

Professional Elective -III
1. Irrigation & Hydraulics Structures
2. Geo-environmental Engineering
3. Transportation Engineering-II

Professional Elective –IV
1. Remote Sensing & GIS
2. Design & Drawing of Irrigation Structures
3. Advanced Foundation Engineering

Professional Elective –V
1. Environmental Engineering –II
2. Theory and Applications of Cement Composites
3. Pavement Design

Professional Elective -VI
1. Ground Improvement Techniques
2. Pipe Line Engineering
3. Urban transportation engineering

Open Elective –I
1. Disaster Preparedness & Planning Management

Open Elective –II
1. Remote Sensing & GIS

Open Elective –III
1. Environmental Impact Assessment
MATHEMATICS- I
(Linear Algebra and Calculus)
(For CIVIL, EEE, MECH, ECE, CSE, METT Engineering Branches)
I Year I Semester

L T P C
3 1 0 4

Pre-requisites: Mathematical Knowledge of 12th/Intermediate level

Objectives:
1. Types of matrices and their properties.
2. Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
3. Concept of Eigenvalues and Eigenvectors and to reduce the quadratic form to canonical form.
4. Concept of Sequence.
5. Concept of nature of the series.
6. Geometrical approach to the mean value theorems and their application to the mathematical problems.
7. Evaluation of surface areas and volumes of revolutions of curves.
8. Evaluation of improper integrals using Beta and Gamma functions.
10. Finding maxima and minima of function of two and three variables.

UNIT-I: Matrices
Matrices: Types of Matrices, Symmetric; Hermitian; Skew-symmetric; Skew-Hermitian; orthogonal matrices; Unitary Matrices; Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method; System of linear equations; solving system of Homogeneous and Non-Homogeneous equations, Gauss elimination method; Gauss Seidel Iteration Method.

UNIT-II: Eigenvalues and Eigenvectors
Linear Transformation and Orthogonal Transformation: Eigenvalues and Eigenvectors and their properties: Diagonalization of a matrix; Cayley-Hamilton Theorem (without proof); finding inverse and power of a matrix by Cayley-Hamilton Theorem; Quadratic forms and Nature of the Quadratic Forms; Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

UNIT-III: Sequences & Series
Sequence: Definition of a Sequence, limit; Convergent, Divergent and Oscillatory sequences. Series: Convergent, Divergent and Oscillatory Series; Series of positive terms; Comparison test, p-test, D-Alembert’s ratio test; Raabe’s test; Cauchy’s Integral test; Cauchy’s root test; logarithmic test. Alternating series: Leibnitz test; Alternating Convergent series: Absolute and Conditionally Convergence.

UNIT-IV: Calculus
Mean value theorems: Rolle’s theorem, Lagrange’s Mean value theorem with their Geometrical Interpretation and applications, Cauchy’s Mean value Theorem. Taylor’s Series. Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates), Definition of Improper Integral: Beta and Gamma functions and their applications.

UNIT-V: Multivariable calculus (Partial Differentiation and applications)
Definitions of Limit and continuity. Partial Differentiation; Euler’s Theorem; Total derivative; Jacobian; Functional dependence & independence, Maxima and Minima of functions of two variables and three variables using method of Lagrange multipliers.
Course outcomes:
After learning the contents of this paper the student must be able to
1. Write the matrix representation of a set of linear equations and to analyse the solution of the system of equations
2. Find the Eigenvalues and Eigenvectors
3. Reduce the quadratic form to canonical form using orthogonal transformations.
4. Analyse the nature of sequence and series.
5. Solve the applications on the mean value theorems.
6. Evaluate the improper integrals using Beta and Gamma functions
7. Find the extreme values of functions of two variables with/ without constraints.

Text Books

References
Prerequisites : Nil

Course Objectives :
The course should enable the students to:
1. Understand the concepts of interference and diffraction.
2. Learn the basic principles of laser and optical fiber.
3. Know about band theory and the classification of materials into three groups.
4. Exposed to present generation engineered materials and their properties.
5. Have knowledge about principles of wave mechanics.

UNIT-I: Wave Optics
Introduction, Huygen’s principle, Superposition of waves, Interference of light by wave front splitting- Young’s double slit experiment, amplitude splitting- Newton’s rings, Fresnel and Fraunhofer diffractions, Fraunhofer diffraction at a single slit and double slit, Diffraction grating: Grating spectrum and resolving power, Introduction to polarization, Double refraction - Construction & working principle of Nicol prism.

UNIT-II: Lasers and Fibre Optics


UNIT-III: Introduction to solids
Introduction, Free electron theory of metals, Classical and quantum free electron theory, Estimation of Fermi energy, Dependence of Fermi level on temperature, Density of states, Bloch's theorem, Kronig – Penny model, E-K diagram, Origin of energy bands, Classification of materials on the basis of energy bands, Direct and Indirect band gaps, Effective mass of electron.

UNIT-IV: Synthesis & Characterization of Nanomaterials
Introduction, nanoscale, Quantum confinement, Surface to volume ratio, Bottom-up Fabrication: Sol-Gel, Precipitation, Combustion Methods; Top-Down Fabrication: Chemical Vapor Deposition, Physical Vapor Deposition, Characterization Techniques (XRD, SEM &TEM) and Applications of nanomaterials.
UNIT-V: Ultrasonics & Acoustics of Buildings

Ultrasonics: Introduction, Production of ultrasonic waves, Magnetostriction method, Piezoelectric method, Detection of ultrasonic waves, Properties of ultrasonic waves, Use of ultrasonics for non-destructive testing, Applications of ultrasonics.

Acoustics of buildings: Introduction, Basic requirements of acoustically good hall, Reverberation and time of reverberation, Sabine’s formula for reverberation time, Measurement of absorption coefficient of a material, Factors affecting the architectural acoustics and their remedies, Acoustic quieting.

Text Books:
1. A textbook of Engineering Physics, Dr. M.N. Avadhanulu, Dr. P. G Kshirsagar – S. Chand
2. Haliday and Resnick, Physics – Wiley

References:
2. Introduction to Solid State Physics by Charles Kittel, Wiley student edition
3. O. Svelto, “Principles of Lasers”.

Course Outcomes:
The student will be able to:
1. Analyze and get knowledge about diffraction grating and polarization.
2. Justify applications and principles of laser and how the graded index optical fiber is more efficient than step index optical fiber in fiber optic communication system.
3. Gain clear knowledge about Fermi level and energy band diagram.
4. Get clear knowledge about fabrication and characterization of nanomaterials.
5. Learn about Principles and applications of ultrasonic waves and acoustics of buildings.
PROGRAMMING FOR PROBLEM SOLVING

I Year B.Tech. I-Semester

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Prerequisites: Nil
Course objectives:
To learn the fundamentals of computers.
To understand the various steps in Program development.
To learn the syntax and semantics of C Programming Language.
To learn the usage of structured programming approach in solving problems.

UNIT – I
Introduction to C Language: Background, Simple C programs, Identifiers, Basic data types, Variables, Constants, Input / Output, Operators. Expressions, Precedence and Associatively, Expression Evaluation, Type conversions, Bit wise operators, Statements, Simple C Programming examples.

UNIT – II
Statements: if and switch statements, Repetition statements – while, for, do-while statements, Loop examples, other statements related to looping – break, continue, go to, Simple C Programming examples.
Designing Structured Programs: Functions, basics, user defined functions, inter function communication, Scope, Storage classes-auto, register, static, extern, scope rules, type qualifiers, recursion- recursive functions, Preprocessor commands, example C programs

UNIT – III
Arrays and Strings: Concepts, using arrays in C, inter function communication, array applications, two – dimensional arrays, multidimensional arrays, C program examples. Concepts, C Strings, String Input / Output functions, arrays of strings, string manipulation functions, string / data conversion, C program examples.

UNIT – IV
Pointers: Introduction (Basic Concepts), Pointers for inter function communication, pointers to pointers, compatibility, memory allocation functions, array of pointers, programming applications, pointers to void, pointers to functions, command –line arguments.
Input and Output: Concept of a file, streams, standard input / output functions, formatted input / output functions, text files and binary files, file input / output operations, file status functions (error handling), C program examples.

UNIT – V
Derived types: Structures – Declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit fields, enumerated types, C programming examples.
Sorting and Searching: Selection sort, Bubble sort, Insertion sort, Linear search and Binary search methods.
Text Books:
3. The C Programming Language by B.W. Kernighan and Dennis M. Ritchie, PHI/Pearson Education

Reference Books:
3. C Programming & Data Structures by P. Dey, M Ghosh R Thereja, Oxford University Press

Course Outcomes:
The student will learn
1. To write algorithms and to draw flowcharts for solving problems.
2. To translate the algorithms/flowcharts to programs (in C language).
3. To code and test a given logic in C programming language.
4. To formulate simple algorithms for arithmetic and logical problems.
5. To decompose a problem into functions and to develop modular reusable code.
6. To use arrays, pointers, strings and structures to formulate algorithms and programs.
7. Searching and sorting problems.
ENGINEERING GRAPHICS

I Year B.Tech.  I-Sem

Pre-requisites: Nil

Course objectives:
1. To provide basic concepts in engineering drawing
2. To impart knowledge about standard principles of orthographic projection of objects
3. To draw sectional views and pictorial views of solids

UNIT–I
INTRODUCTION TO ENGINEERING DRAWING:

UNIT–II
ORTHOGRAPHIC PROJECTIONS:

UNIT–III
Projections of Regular Solids – Auxiliary Views.

UNIT–IV
Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views – Sections of Sphere. Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone

UNIT–V
ISOMETRIC PROJECTIONS:

Text Books:
1. Engineering Drawing by N.D. Bhatt, Charotar
2. Engineering Drawing and Graphics by Rane and Shah, Pearson Edu

Reference Books:
1. A Text Book of Engineering Drawing by Dhawan R K, S. Chand

Course Outcomes:
At the end of the course, the student will be able to:
1. Prepare working drawings to communicate the ideas and information.
2. Read, understand and interpret engineering drawings.
ENGINEERING PHYSICS LAB

I Year B.Tech. I-Sem

Pre-requisites: Engineering Physics

Course Objectives:
1. To help students understand the role of direct observation in physics and to distinguish between inferences based on theory and the outcomes of experiments.
2. To introduce the concepts and techniques which have a wide application in experimental science, but have not been introduced in the standard courses.
3. To teach how to write a technical report which communicates scientific information in a clear and concise manner.

LIST OF EXPERIMENTS
1. Melde’s experiment: To determine the frequency of tuning fork.
2. Torsional pendulum: To determine the rigidity modulus of the material of a given wire.
3. Newton’s rings: To determine the radius of curvature of a plano-convex lens by forming Newton’s rings.
4. Diffraction grating: To determine the wavelength of a given source.
5. Dispersive power: To determine the dispersive power of a prism by using spectrometer.
6. Coupled Oscillator: To determine the spring constant by single coupled oscillator.
7. LCR Circuit: To determine the resonant frequency and quality factor of LCR circuit.
8. LASER: To study the L-I & P-I characteristics of LASER sources.
9. Losses in optical fibre: To determine the bending losses of optical fibres.
10. Optical fibre: To determine the numerical aperture of a given fibre.
11. Sonometer: To determine the frequency of AC mains.
12. Stewart – Gee’s experiment: Determination of magnetic field along the axis of a current carrying coil.

Note: Any 8 experiments are to be performed by each student

Learning Outcomes:

By the end of the course students will be able:
1. To make careful experimental observations and draw conclusions from such data.
2. To distinguish between inferences based on theory and the outcomes of experiments.
3. To write a technical report which communicates scientific information in a clear and concise manner.
PROGRAMMING FOR PROBLEM SOLVING LAB

I Year B.Tech. I-Sem

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Pre-requisites: Programming for Problem Solving

Course Objectives:
1. To learn the fundamentals of computers.
2. To understand the various steps in Program development.
3. To learn the syntax and semantics of C Programming Language.
4. To learn the usage of structured programming approach in solving problems.

Week 1:
1. Write a C program to find the sum of individual digits of a positive integer.
2. Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first \( n \) terms of the sequence.
3. Write a C program to generate all the prime numbers between 1 and \( n \), where \( n \) is a value supplied by the user.
4. Write a C program to find the roots of a quadratic equation.

Week 2:
5. Write a C program to find the factorial of a given integer.
6. Write a C program to find the GCD (greatest common divisor) of two given integers.
7. Write a C program to solve Towers of Hanoi problem.
8. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, *, /, % and use Switch Statement)

Week 3:
9. Write a C program to find both the largest and smallest number in a list of integers.
10. Write a C program that uses functions to perform the following:
    i) Addition of Two Matrices
    ii) Multiplication of Two Matrices

Week 4:
11. Write a C program that uses functions to perform the following operations:
    i) To insert a sub-string into a given main string from a given position.
    ii) To delete \( n \) Characters from a given position in a given string.
12. Write a C program to determine if the given string is a palindrome or not
13. Write a C program that displays the position or index in the string \( S \) where the string \( T \) begins, or \(-1\) if \( S \) doesn’t contain \( T \).
14. Write a C program to count the lines, words and characters in a given text.

Week 5:
15. Write a C program to generate Pascal’s triangle.
16. Write a C program to construct a pyramid of numbers.
17. Write a C program to read in two numbers, \( x \) and \( n \), and then compute the sum of this geometric progression: \( 1+x+x^2+x^3+\ldots+\ldots+x^n \)
    For example: if \( n \) is 3 and \( x \) is 5, then the program computes \( 1+5+25+125 \).
    Print \( x \), \( n \), the sum
Perform error checking. For example, the formula does not make sense for negative exponents – if \( n \) is less than 0. Have your program print an error message if \( n < 0 \), then go back and read in the next pair of numbers of without computing the sum. Are any values of \( x \) also illegal? If so, test for them too.

**Week 6:**
18. 2’s complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2’s complement of 11100 is 00100. Write a C program to find the 2’s complement of a binary number.
19. Write a C program to convert a Roman numeral to its decimal equivalent.

**Week 7:**
20. Write a C program that uses functions to perform the following operations:
   i) Reading a complex number
   ii) Writing a complex number
   iii) Addition of two complex numbers
   iii) Multiplication of two complex numbers
   (Note: represent complex number using a structure.)

**Week 8:**
21. i) Write a C program which copies one file to another.
   ii) Write a C program to reverse the first \( n \) characters in a file.
   (Note: The file name and \( n \) are specified on the command line.)
22. i) Write a C program to display the contents of a file.
   ii) Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file)

**Week 9:**
23. Write a C program that implements the following sorting methods to sort a given list of integers in ascending order
   i) Bubble sort  ii) Selection sort  iii) Insertion sort

**Week 10:**
24. Write C programs that use both recursive and non recursive functions to perform the following searching operations for a Key value in a given list of integers:
   i) Linear search  ii) Binary search

**Text Books:**
3. The C Programming Language by B.W. Kernighan and Dennis M.Ritchie, PHI, Pearson Education

**Reference Books:**
3. C Programming & Data Structures by P. Dey, M Ghosh R Thereja, Oxford University Press

**Course Outcomes:**
The student will learn
1. To write algorithms and to draw flowcharts for solving problems.
2. To translate the algorithms/flowcharts to programs (in C language).
3. To code and test a given logic in C programming language.
4. To formulate simple algorithms for arithmetic and logical problems.
5. To decompose a problem into functions and to develop modular reusable code.
6. To use arrays, pointers, strings and structures to formulate algorithms and programs.
7. Searching and sorting problems.
MATHEMATICS- II  
(Advanced Calculus)  
(For CIVIL, EEE, MECH, ECE, CSE, METT Engineering Branches)  
I Year II Semester

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Pre-requisites: Mathematical Knowledge of 12th/ Intermediate level

Objectives: To learn
11. Methods of solving the differential equations of first and higher order.
12. Evaluation of multiple integrals and their applications
13. The physical quantities involved in engineering field related to vector valued functions
14. The basic properties of vector valued functions and their applications to line, surface 
and volume integrals

UNIT-I: First Order ODE  
Exact, linear and Bernoulli’s equations; Applications: Newton’s law of cooling, Law of 
natural growth and decay; Equations not of first degree: equations solvable for p, equations 
solvable for y, equations solvable for x and Clairaut’s type.

UNIT-II: Ordinary Differential Equations of Higher Order  
Second order linear differential equations with constant coefficients: Non-Homogeneous 
terms of the type $e^{ax}, \sin ax, \cos ax$, polynomials in $x$, $e^{ax}V(x)$ and $xV(x)$; method of 
variation of parameters; Equations reducible to linear ODE with constant coefficients: 
Legendre’s equation, Cauchy-Euler equation.

UNIT-III: Multivariable Calculus (Integration)  
Evaluation of Double Integrals (Cartesian and polar coordinates); change of order of 
integration (only Cartesian form); Evaluation of Triple Integrals: Change of variables 
(Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) 
for triple integrals.

Applications: Areas (by double integrals) and volumes (by double integrals and triple 
integrals), Centre of mass and Gravity (constant and variable densities) by double and triple 
integrals (applications involving cubes, sphere and rectangular parallel piped).

UNIT-IV: Vector Differentiation  
Vector point functions and scalar point functions. Gradient, Divergence and Curl. Directional 
derivatives, Tangent plane and normal line. Vector Identities. Scalar potential functions. 
Solenoidal and Irrotational vectors.

UNIT-V: Vector Integration  
Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) 
and their applications.

Course outcomes:
After learning the contents of this paper the student must be able to
8. Identify whether the given differential equation of first order is exact or not
9. Solve higher differential equation and apply the concept of differential equation to real 
world problems
10. Evaluate the multiple integrals and apply the concept to find areas, volumes, centre of 
mass and gravity for cubes, sphere and rectangular parallel piped
15. Evaluate the line, surface and volume integrals and converting them from one 
to another

Text Books
Sons, 2006
References

ENGINEERING CHEMISTRY

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Pre-requisites: Nil

Course Objectives:
1. To bring adaptability to the concepts of chemistry and to acquire the required skills to become a perfect engineer.
2. To impart the basic knowledge of atomic, molecular and electronic modifications which makes the student to understand the technology based on them.
3. To acquire the knowledge of electrochemistry, corrosion and water treatment which are essential for the Engineers and in industry.
4. To acquire the skills pertaining to spectroscopy and to apply them for medical field etc.
5. To impart then knowledge of stereochemistry and synthetic aspects useful for understanding reaction pathways

**Unit-1: Molecular structure and Theories of Bonding:**
Atomic and Molecular orbitals. Linear Combination of Atomic Orbitals (LCAO), molecular orbitals of diatomic molecules, molecular orbital energy level diagrams of N2, O2 and NO molecules. Bond order.

**Unit-2: Water and its treatment:**

**Unit-3: Electrochemistry and corrosion:**
Electrochemical cells – electrode potential, standard electrode potential, types of electrodes – Calomel, Quinhydrone and glass electrode. Nernst equation Determination of pH of a solution by using quinhydrone and glass electrode. Electrochemical series and its applications. Numerical problems. Potentiometric titrations. Batteries – Primary (Lithium cell) and secondary batteries (Lead – acid storage battery and Lithium ion battery).


**Unit-4: Stereochemistry, Reaction Mechanism and synthesis of drug molecules:**
Representation of 3-dimensional structures, Isomers-Structural and stereoisomers, Enantiomers, diastereomers, symmetry and chirality. optical activity Absolute configuration. Conformational analanalysis of n-butane.

Reduction reactions: Reduction of carbonyl compounds using LiAlH4 & NaBH4. Structure, synthesis and pharmaceutical applications of Paracetamol and Aspirin.

**Unit-5: Spectroscopic techniques and applications:**
Spectroscopy) Principle of NMR spectroscopy Chemical shift, chemical shifts of some common organic protons. Introduction to MRI.

**Text Books:**

**Reference Books:**
1. Physical Chemistry, by P.W. Atkins
2. Engineering Chemistry (NPTEL Web-book), by B.L. Tembe, Kamaluddin and M.S. Krishnan
4. Fundamentals of Molecular Spectroscopy, by C.N. Banwell

**Course Outcomes:**
The basic concepts included in this course will help the student to gain:
1. The knowledge of atomic, molecular and electronic changes, band theory related to conductivity.
2. The required principles and concepts of electrochemistry, corrosion and in understanding the problem of water and its treatments.
3. The required skills to get clear concepts on basic spectroscopy and application to medical field etc.
4. The knowledge and configurational and conformational analysis of molecules and reaction mechanisms.

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**ENGINEERING MECHANICS**

**I Year B.Tech. II-Sem**

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**Pre-Requisites: NIL**

**Course Objectives:**
During this course, students should develop the ability to:
1. Work comfortably with basic engineering mechanics concepts required for analyzing staticstructures
2. Identify an appropriate structural system to studying a given problem and isolate it from its environment.
3. Model the problem using good free-body diagrams and accurate equilibrium equations
4. Identify and model various types of loading and support conditions that act on structural systems.
5. Apply pertinent mathematical, physical and engineering mechanical principles to the system to solve and analyze the problem.
6. Understand the meaning of centers of gravity (mass)/centroids and moments of Inertia using integration methods.
7. Communicate the solution to all problems in an organized and coherent manner and elucidate the meaning of the solution in the context of the problem.

UNIT – I: INTRODUCTION OF ENGINEERING MECHANICS

UNIT – II: FRICTION

UNIT – III: CENTROID AND CENTER OF GRAVITY
Centroids – Theorem of Pappus – Centroids of Composite figures – Centre of Gravity of Bodies – Area Moment of Inertia – Polar Moment of Inertia – Transfer Theorems – Moments of Inertia of Composite Figures.

MOMENT OF INERTIA: Moment of Inertia of Areas and Masses - Transfer Formula for Moments of Inertia - Moment of inertia of composite areas and masses.

UNIT – IV: KINEMATICS

UNIT – V: KINETICS

Textbooks:

References:
1. Engineering Mechanics (Statics and Dynamics) by Hibbler; Pearson Education.
5. A textbook of engineering mechanics by R. K. Bansal; Laxmi publications.

Course Outcomes:
At the end of the course, the student will be able to:
1. Solve problems dealing with forces in a plane or in space and equivalent force systems.
2. Solve beam and cable problems and understand distributed force systems.
3. Solve friction problems and determine moments of Inertia and centroid using integration methods.
4. Understand and know how to solve three-dimension force and moment problems.
5. Understand and know how to use vector terminology.
ENGLISH

I Year B.Tech. II-Sem

Pre-Requisites: Nil

INTRODUCTION

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire language skills, the syllabus of English has been designed to develop linguistic, communicative and critical thinking competencies of Engineering students.

In English classes, the focus should be on the skills development in the areas of vocabulary, grammar, reading and writing. For this, the teachers should use the prescribed text for detailed study. The students should be encouraged to read the texts leading to reading comprehension and different passages may be given for practice in the class. The time should be utilized for working out the exercises given after each excerpt, and for supplementing the exercises with authentic materials of a similar kind, for example, newspaper articles, advertisements, promotional material etc. *The focus in this syllabus is on skill development in the areas of Vocabulary, Grammar, Reading and Writing Skills, fostering ideas and practice of language skills in various contexts.*

Learning Objectives

The course will help students to

a. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.

b. Equip students to study academic subjects more effectively and critically using the theoretical and practical components of English syllabus.

c. Develop study skills and communication skills in formal and informal situations.

SYLLABUS

(Note: As the syllabus of English given in AICTE Model Curriculum-2018 for B.Tech First Year is Open-ended, it is required to prepare teaching/learning materials by the teachers collectively in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning and timesaving in the class.)

Unit –I

**Vocabulary Building:** The Concept of Word Formation – The Use of Prefixes and Suffixes.
**Grammar:** Identifying Common Errors in Writing with Reference to Articles and Prepositions.
**Reading:** Reading and Its Importance- Techniques for Effective Reading.
**Basic Writing Skills:** Sentence Structures - Use of Phrases and Clauses in Sentences - Importance of Proper Punctuation - Techniques for Writing Precisely – *Paragraph writing* – Types, Structures and Features of a Paragraph - Creating Coherence.

Unit –II

**Vocabulary:** Synonyms and Antonyms.
**Grammar:** Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.
**Reading:** Improving Comprehension Skills – Techniques for Good Comprehension.

**Unit –III**
**Vocabulary:** Acquaintance with Prefixes and Suffixes from Foreign Languages in English to form Derivatives-Words from Foreign Languages and their Use in English.
**Grammar:** Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.
**Reading:** Sub-skills of Reading- Skimming and Scanning
**Writing:** Writing Introduction and Conclusion - Essay Writing.

**Unit –IV**
**Vocabulary:** Standard Abbreviations in English
**Grammar:** Redundancies and Clichés in Oral and Written Communication.
**Reading:** Comprehension- Intensive Reading and Extensive Reading.
**Writing:** Writing Practices---Précis Writing.

**Unit –V**
**Vocabulary:** Technical Vocabulary and their usage
**Grammar:** Common Errors in English
**Reading:** Reading Comprehension-Exercises for Practice
**Writing:** Technical Reports- Introduction – Characteristics of a Report – Categories of Reports

Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.

**Note:** Listening and Speaking skills which are given under Unit-6 are covered in the syllabus of ELCS Lab Course.

**References:**
(iii) *English: Context and Culture* by Board of Editors published by Orient BlackSwan Pvt. Ltd.

**Course Outcomes**
Students should be able to
1. Use English Language effectively in spoken and written forms.
2. Comprehend the given texts and respond appropriately.
3. Communicate confidently in various contexts and different cultures.
4. The student will acquire basic proficiency in English including reading and listening comprehension, writing, and speaking skills.
ENGINEERING CHEMISTRY LAB

1 Year B.Tech. II-Sem

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Pre-Requisites: Engineering Chemistry

Course Objectives:
The chemistry laboratory course consists of experiments related to the principles of chemistry required to the engineering student. The course will make the student to learn:

1. Estimation of hardness and chloride content in water to check its suitability for drinking purpose.
2. To determine the rate constant of reactions from concentrations as an function of time.
3. The measurement of physical properties like adsorption and viscosity.
4. To synthesize the drug molecules and check the purity of organic molecules by thin layer chromatographic (TLC) technique.

List of Experiments:

1. Determination of total hardness of water by complexometric method using EDTA
2. Estimation of Fe$^{12+}$ by Dichrometry.
3. Estimation of an HCl by Conductometric titrations
4. Estimation of Acetic acid by Conductometric titrations
5. Estimation of HCl by Potentiometric titrations
6. Estimation of Fe$^{2+}$ by Potentiometry using KMnO$_4$
7. Determination of rate constant of acid catalysed hydrolysis of methyl acetate
8. Synthesis of Aspirin and Paracetamol
9. Thin layer chromatography calculation of R$_f$ values. eg ortho and para nitro phenols
10. Determination of acid value of coconut oil
11. Verification of freundlich adsorption isotherm-adsorption of acetic acid on charcoal
12. Determination of viscosity of Coconut oil and ground nut oil by using Ostwald’s viscometer.
14. Determination of partition coefficient of acetic acid between n-butanol and water.

References

1. Senior practical physical chemistry, B.D. Khosla, A. Gulati and V. Garg (R. Chand & Co., Delhi)
2. An introduction to practical chemistry, K.K. Sharma and D. S. Sharma (Vikas publishing, N. Delhi)

Course Outcomes:
The experiments included in the chemistry laboratory will make the student to gain the skills on

1. Determination of parameters like hardness and chloride content in water.
2. Estimation of rate constant of a reaction from concentration – time relationships.
3. Determination of physical properties like adsorption and viscosity.
4. Calculation of R$_f$ values of some organic molecules by TLC technique.
ENGINEERING WORKSHOP

I Year B.Tech. II-Sem

L T P C
1 0 3 2.5

Pre-requisites: Practical skill

Course Objectives:
1. To Study of different hand operated power tools, uses and their demonstration.
2. To gain a good basic working knowledge required for the production of various engineering products.
3. To provide hands on experience about use of different engineering materials, tools, equipment and processes those are common in the engineering field.
4. To develop a right attitude, team working, precision and safety at work place.
5. It explains the construction, function, use and application of different working tools, equipment and machines.
6. To study commonly used carpentry joints.
7. To have practical exposure to various welding and joining processes.
8. Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.
9. To understand the computer hardware and practice the Assembly of computer parts.
10. To practice the process of Installation of operating system windows.

I. TRADES FOR EXERCISES:
(Any six trades from the following with minimum of two exercises in each trade)
1. Carpentry – 2 Lectures
2. Fitting- 1 Lecture
3. Tin-Smithy- 1 Lecture
4. Black Smithy-1 Lecture
5. House-wiring-1 Lecture
6. Foundry- 2 Lectures
7. Plumbing-1 Lecture

II. Trades for Demonstration & Exposure
1. Demonstration of power tools -1 Lecture
2. Welding – 2 Lecture
3. Machine Shop -2 Lectures

III. IT Workshop I: Computer hardware, identification of parts, Disassembly, Assembly of computer to working condition, simple diagnostic exercises.
   IT Workshop II: Installation of operating system windows and linux simple diagnostic exercises.

Text Books:
1. Workshop Practice by B.L. Juneja Cengage Learning

Course Outcomes:
At the end of the course, the student will be able to:
1. Practice on manufacturing of components using workshop trades including pluming, fitting, carpentry, foundry, house wiring and welding.
2. Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
3. Apply basic electrical engineering knowledge for house wiring practice.
ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

I Year B.Tech. II-Sem

Pre-requisites: English

The Language Lab focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

Objectives

- To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning
- To sensitize students to the nuances of English speech sounds, word accent, intonation and rhythm
- To bring about a consistent accent and intelligibility in students’ pronunciation of English by providing an opportunity for practice in speaking
- To improve the fluency of students in spoken English and neutralize their mother tongue influence
- To train students to use language appropriately for public speaking and interviews

Syllabus

English Language and Communication Skills Lab (ELCS) shall have two parts:

a. Computer Assisted Language Learning (CALL) Lab
b. Interactive Communication Skills (ICS) Lab

Listening Skills

Objectives

1. To enable students, develop their listening skills so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions

Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

Speaking Skills

Objectives

1. To involve students in speaking activities in various contexts
2. To enable students express themselves fluently and appropriately in social and professional contexts

- Oral practice: Just A Minute (JAM) Sessions
- Describing objects/situations/people
- Role play – Individual / Group activities

The following course content is prescribed for the English Language and Communication Skills Lab based on Unit-6 of AICTE Model Curriculum 2018 for B.Tech First English. As the syllabus is very limited, it is required to prepare teaching/learning materials by the
teachers collectively in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning and timesaving in the Lab)

Exercise – I
CALL Lab:
Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers of Listening.
ICS Lab:
Understand: Communication at Work Place- Spoken vs. Written language.

Exercise – II
CALL Lab:
Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms in Context.
ICS Lab:

Exercise - III
CALL Lab:
Understand: Intonation- Errors in Pronunciation – the Influence of Mother Tongue (MTI).
Practice: Common Indian Variants in Pronunciation – Differences in British and American Pronunciation.
ICS Lab:
Understand: How to make Formal Presentations.
Practice: Formal Presentations.

Exercise – IV
CALL Lab:
Understand: Listening for General Details.
Practice: Listening Comprehension Tests.
ICS Lab:
Understand: Public Speaking – Exposure to Structured Talks.
Practice: Making a Short Speech – Extempore.

Exercise – V
CALL Lab:
Understand: Listening for Specific Details.
Practice: Listening Comprehension Tests.
ICS Lab:
1. Introduction to Interview Skills.
2. Common errors in speaking.

Minimum Requirement of infrastructural facilities for ELCS Lab:
1. Computer Assisted Language Learning (CALL) Lab:
The Computer Assisted Language Learning Lab has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self-study by students.

System Requirement (Hardware component):
Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:
   i) Computers with Suitable Configuration
   ii) High Fidelity Headphones

2. Interactive Communication Skills (ICS) Lab:
The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public-Address System, a LCD and a projector etc.

Learning Outcomes
Students will be able to attain
- Better understanding of nuances of English language through audio-visual experience and group activities
- Neutralization of accent for intelligibility
- Speaking skills with clarity and confidence which in turn enhances their employability skills
BUILDING MATERIALS, CONSTRUCTION AND PLANNING

II Year B.Tech. I-Sem

L T P C
3 0 0 3

Pre Requisites: NIL

Course Objectives: The objectives of the course is to
- List the construction material.
- Explain different construction techniques
- Understand the building bye-laws
- Highlight the smart building materials

UNIT - I
Stones and Bricks, Tiles: Building stones – classifications and quarrying – properties – structural requirements – dressing.
Bricks – Composition of Brick earth – manufacture and structural requirements, Fly ash, Ceramics.

UNIT – II
Admixtures – mineral & chemical admixtures – uses.

UNIT - III
Building Services: Plumbing Services: Water Distribution, Sanitary – Lines & Fittings;
Ventilations: Functional requirements systems of ventilations. Air-conditioning - Essentials and Types; Acoustics – characteristic – absorption – Acoustic design; Fire protection – Fire Harzards – Classification of fire resistant materials and constructions

UNIT - IV
Mortars, Masonry and Finishing’s
Mortars: Lime and Cement Mortars
Brick masonry – types – bonds; Stone masonry – types; Composite masonry – Brick-stone composite; Concrete, Reinforced brick.
Finishers: Plastering, Pointing, Painting, Claddings – Types – Tiles – ACP.
Form work: Types: Requirements – Standards – Scaffolding – Design; Shoring, Underpinning.

UNIT – V
Building Planning: Principles of Building Planning, Classification of buildings and Building by laws.

Course Outcomes
After the completion of the course student should be able to
- Define the Basic terminology that is used in the industry
- Categorize different building materials, properties and their uses
- Understand the Prevention of damage measures and good workmanship
- Explain different building services
TEXT BOOKS:


REFERENCES:

3. Building Materials by P. C. Varghese, PHI.
4. Building Construction by PC Varghese PHI.
ENGINEERING GEOLOGY

I I Year B.Tech. I-Sem

L T P C
2 0 0 2

Pre Requisites: NIL

Course Objectives: The objective of this Course is
- To give the basics knowledge of Geology that is required for constructing various Civil Engineering Structures, basic Geology, Geological Hazardous and Environmental Geology
- To focus on the core activities of engineering geologists – site characterization and geologic hazard identification and mitigation. Planning and construction of major Civil Engineering projects

UNIT - I
Introduction: Importance of geology from Civil Engineering point of view. Brief study of case histories of failure of some Civil Engineering constructions due to geological draw backs. Importance of Physical geology, Petrology and Structural geology.
Weathering of Rocks: Its effect over the properties of rocks importance of weathering with reference to dams, reservoirs and tunnels weathering of common rock like “Granite”

UNIT - II
Mineralogy: Definition of mineral, Importance of study of minerals, Different methods of study of minerals. Advantages of study of minerals by physical properties. Role of study of physical properties of minerals in the identification of minerals. Study of physical properties of following common rock forming minerals: Feldsper, Quartiz, Flint, Jasper, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc, Calcite. Study of other common economics minerals such as Pyrite, Hematite, Magnetite, Chlorite, Galena, Pyrolusite, Graphite, Magnesite, and Bauxite.

UNIT - III
Structural Geology: Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults uncomformities, and joints - their important types and case studies. Their importance In situ and drift soils, common types of soils, their origin and occurrence in India, Stabilisation of soils. Ground water, Water table, common types of ground water, springs, cone of depression, geological controls of ground water movement, ground water exploration.

UNIT - IV
Earth Quakes: Causes and effects, shield areas and seismic belts. Seismic waves, Richter scale, precautions to be taken for building construction in seismic areas. Landslides, their causes and effect; measures to be taken to prevent their occurrence.
UNIT - V
Geology of Dams, Reservoirs, and Tunnels: Types of dams and bearing of Geology of site in their selection, Geological Considerations in the selection of a dam site. Analysis of dam failures of the past. Factors contributing to the success of a reservoir. Geological factors influencing water Lightness and life of reservoirs - Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations (i.e. Tithological, structural and ground water) in tunneling over break and lining in tunnels.

Course Outcomes: At the end of the course, the student will be able to:
- Site characterization and how to collect, analyze, and report geologic data using standards in engineering practice
- The fundamentals of the engineering properties of Earth materials and fluids.
- Rock mass characterization and the mechanics of planar rock slides and topples

TEXT BOOKS:
1. Engineering Geology by N. Chennakesavulu, McMillan, India Ltd. 2005

REFERENCES:
6. Engineering Geology for Civil Engineers – P.C. Varghese PHI
STRENGTH OF MATERIALS - I

II Year B.Tech. I-Sem

Pre Requisites: Engineering Mechanics

Course Objectives: The objective of this Course is
- To understand the nature of stresses developed in simple geometries such as bars, cantilevers and beams for various types of simple loads
- To calculate the elastic deformation occurring in simple members for different types of loading.
- To show the plane stress transformation with a particular coordinate system for different orientation of the plane.
- To know different failure theories adopted in designing of structural members

UNIT – I
SIMPLE STRESSES AND STRAINS:


UNIT – II
SHEAR FORCE AND BENDING MOMENT:
Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported including overhanging beams subjected to point loads, uniformly distributed load, uniformly varying load, couple and combination of these loads – Point of contraflexure – Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT – III
FLEXURAL STRESSES:
Theory of simple bending – Assumptions – Derivation of bending equation- Section Modulus Determination of flexural/bending stresses of rectangular and circular sections (Solid and Hollow), I,T, Angle and Channel sections – Design of simple beam sections.

SHEAR STRESSES:
Derivation of formula for shear stress distribution – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle and channel sections.

UNIT – IV
DEFLECTION OF BEAMS:
Slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay’s methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, U.D.L, Uniformly varying load and couple - Mohr’s theorems – Moment area method – Application to simple cases.

CONJUGATE BEAM METHOD: Introduction – Concept of conjugate beam method - Difference between a real beam and a conjugate beam - Deflections of determinate beams with constant and different moments of inertia.
UNIT – V
PRINCIPAL STRESSES:
Introduction – Stresses on an oblique plane of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear – Principal stresses – Mohr’s circle of stresses – ellipse of stress - Analytical and graphical solutions.


Course Outcome:
On completion of the course, the student will be able to:

- Describe the concepts and principles, understand the theory of elasticity including strain/displacement and Hooke’s law relationships; and perform calculations, related to the strength of structured and mechanical components.
- Recognize various types loads applied on structural components of simple framing geometries and understand the nature of internal stresses that will develop within the components.
- To evaluate the strains and deformation that will result due to the elastic stresses developed within the materials for simple types of loading.
- Analyze various situations involving structural members subjected to plane stresses by application of Mohr’s circle of stress;
- Frame an idea to design a system, component, or process

TEXT BOOKS:
1) Strength of Materials by R.K Rajput, S.Chand& Company Ltd.
2) Mechanics of Materials by Dr.B.CPunmia, Dr. Ashok Kumar Jain and Dr. Arun Kumar Jain

REFERENCES:
1) Strength of Materials by R. Subramanian, Oxford University Press
2) Mechanics of material by R.C.Hibbeler, Printice Hall publications
3) Engineering Mechanics of Solids by EgorP.Popov,Printice Hall publications
MATHEMATICS - III  
PROBABILITY AND STATISTICS

II Year B.Tech. I-Sem

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Pre Requisites: Mathematics– I

Pre-requisites: Mathematics courses of first year of study.

Objectives: To learn

16. The theory of Probability, and probability distributions of single and multiple random variables
17. The sampling theory and testing of hypothesis and making inferences

UNIT-I: Probability 10 L
Sample Space, Events, Counting Sample Points, Probability of an Event, Additive Rules, Conditional Probability, Independence, and the Product Rule, Bayes’ Rule,


UNIT-II: Mathematical Expectation 10 L
Mean of a Random Variable, Variance and Covariance of Random Variables, Means and Variances of Linear Combinations of Random Variables, Chebyshev’s Theorem.


UNIT-III: Continuous Probability Distributions 10 L
Continuous Uniform Distribution, Normal Distribution, Areas under the Normal Curve, Applications of the Normal Distribution, Normal Approximation to the Binomial, Gamma and Exponential Distributions.


UNIT-IV: Estimation & Tests of Hypotheses 10 L

UNIT-V: Applied Statistics 8 L
Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves; Correlation and regression – Rank correlation.

Course outcomes:
After learning the contents of this paper the student must be able to

- Apply the concepts of probability and distributions to some case studies
- Correlate the material of one unit to the material in other units
Resolve the potential misconceptions and hazards in each topic of study.

Text Books

References
2. Sheldon M Ross, Probability and statistics for Engineers and scientists, academic press.
Pre Requisites: Engineering Mechanics

Course Objectives: The objectives of the course are to

- Introduce the concepts of fluid mechanics useful in Civil Engineering applications
- Provide a first level exposure to the students to fluid statics, kinematics and dynamics.
- learn about the application of mass, energy and momentum conservation laws for fluid flows
- train and analyse engineering problems involving fluids with a mechanistic perspective is essential for the civil engineering students
- To obtain the velocity and pressure variations in various types of simple flows
- to prepare a student to build a good fundamental background useful in the application-intensive courses covering hydraulics, hydraulic machinery and hydrology

UNIT – I
Properties of Fluid
Distinction between a fluid and a solid;
Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; variation of viscosity with temperature, Newton law of viscosity; vapour pressure, boiling point, cavitation; surface tension, capillarity, Bulk modulus of elasticity, compressibility.

Fluid Statics
Fluid Pressure: Pressure at a point, Pascal’s law, pressure variation with temperature, density and altitude.

UNIT - II
Fluid Kinematics
Classification of fluid flow: steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one, two and three dimensional flows; streamlines, pathlines, streak lines and streamtube; streamfunction, velocity potential function. One, two and three dimensional continuity equations in Cartesian coordinates.

Fluid Dynamics
Surface and Body forces - Euler’s and Bernoulli’s equation; Energy correction factor; Momentum equation. Vortex flow – Free and Forced. Bernoulli’s equation to real fluid flows.

UNIT - III
Flow Measurement in Pipes
Practical applications of Bernoulli’s equation: venturimeter, orifice meter and pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend.

Flow Over Notches & Weirs
Flow through rectangular, triangular and trapezoidal notches and weirs; End contractions; Velocity of approach. Broad crested weir.

UNIT – IV
Flow through Pipes
Reynolds experiment, Reynolds number, Loss of head through pipes, Darcy-Wiesbach equation, minor losses, total energy line, hydraulic gradient, Pipes in series, equivalent pipes, pipes in parallel, siphon, branching of pipes, three reservoir problem, power transmission through pipes. Analysis of pipe networks: Hardy Cross method, water hammer in pipes and control measures.

UNIT - V
Laminar & Turbulent Flow
Laminar flow through: circular pipes, annulus and parallel plates.

Boundary Layer Concepts
Boundary Layer Analysis-Assumption and concept of boundary layer theory. Boundary-layer thickness, displacement, momentum & energy thickness, laminar and turbulent boundary layers on a flat plate; Laminar sub-layer, smooth and rough boundaries. Local and average friction coefficients. Separation and Control. Definition of Drag and Lift and types drag, magnus effect.

Course Outcomes (COs): Upon completion of this course, students should be able to:
- Understand the broad principles of fluid statics, kinematics and dynamics
- Understand definitions of the basic terms used in fluid mechanics and characteristics of fluids and its flow
- Understand classifications of fluid flow
- Be able to apply the continuity, momentum and energy principles

TextBooks

References.
4. Fluid mechanics & Hydraulic Machines, Domkundwar & Domkundwar Dhanpat Rai & Co
COMPUTER AIDED CIVIL ENGINEERING DRAWING LAB

II Year B.Tech. I-Sem

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Pre Requisites: Engineering Mechanics

Course Objectives: The objective of this lab is to teach the student usage of Auto cad and basic drawing fundamentals in various civil engineering applications, specially in building drawing.

List of Experiments:

1. Introduction to computer aided drafting and different coordinate system
2. Drawing of Regular shapes using Editor mode
3. Introduction GUI and drawing of regular shapes using GUI
4. Exercise on Draw tools
5. Exercise on Modify tools
6. Exercise on other tools (Layers, dimensions, texting etc.)
7. Drawing of building components like walls, lintels, Doors, and Windows. using CAD software
8. Drawing a plan of Building and dimensioning
9. Drawing a plan of a residential building using layers
10. Developing a 3-D plan from a given 2-D plan
11. Developing sections and elevations for given
    a) Single storied buildings  b) multi storied buildings
12. Auto CAD applications in surveying, mechanics etc.

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

- Use the Autocad commands for drawing 2D & 3D building drawings required for different civil engg applications.
- Plan and draw Civil Engineering Buildings as per aspect and orientation.
- Presenting drawings as per user requirements and preparation of technical report

TEXT BOOKS:

STRENGTH OF MATERIALS LAB

II Year B.Tech. I-Sem

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Pre Requisites: Strength of Materials – Theory

Course Objectives:

- Make measurements of different strains, stress and elastic properties of materials used in Civil Engineering.
- Provide physical observations to complement concepts learnt
- Introduce experimental procedures and common measurement instruments, equipment, devices.
- Exposure to a variety of established material testing procedures and techniques
- Different methods of evaluation and inferences drawn from observations

List of Experiments:

1. Tension test
2. Bending test on (Steel / Wood) Cantilever beam.
3. Bending test on simple support beam.
4. Torsion test
5. Hardness test
6. Spring test
7. Compression test on wood or concrete
8. Impact test
9. Shear test
10. Verification of Maxwell’s Reciprocal theorem on beams.
11. Use of electrical resistance strain gauges

Course Outcomes:

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

- Configure & Operate a data acquisition system using various testing machines of solid materials
- Compute and Analyze engineering values (e.g. stress or strain) from laboratory measurements.
- Write a technical laboratory report
ENGINEERING GEOLOGY LAB

II Year B.Tech. I-Sem

Pre Requisites: Engineering Geology- Theory

Course Objectives: The objective of this lab is that to provide practical knowledge about physical properties of minerals, rocks, drawing of geological maps, showing faults, uniformities etc.

List of Experiments

1. Study of physical properties of minerals.
2. Study of different group of minerals.
3. Study of Crystal and Crystal system.
4. Identification of minerals: Silica group: Quartz, Amethyst, Opal; Feldspar group: Orthoclase, Plagioclase; Cryptocrystalline group: Jasper; Carbonate group: Calcite; Element group: Graphite; Pyroxene group: Talc; Mica group: Muscovite; Amphibole group: Asbestos, Olivine, Hornblende, Magnetite, Hematite, Corundum, Kyanite, Garnet, Galena, Gypsum.
9. Simple structural Geology Problems (Folds, Faults & Unconformities)

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

- Understands the method and ways of investigations required for Civil Engg projects
- Identify the various rocks, minerals depending on geological classifications
- Will able to learn to couple geologic expertise with the engineering properties of rock and unconsolidated materials in the characterization of geologic sites for civil work projects and the quantification of processes such as rock slides and settlement.
- Write a technical laboratory report

LAB EXAMINATION PATTERN:

1. Description and identification of SIX minerals
2. Description and identification of Six (including igneous, sedimentary and metamorphic rocks)
3. Interpretation of a Geological map along with a geological section.
4. Simple strike and Dip problems.
5. Microscopic identification of rocks.
ENVIRONMENTAL SCIENCE

II Year B.Tech. II-Sem

L T P C
2 0 0 0

Pre-Requisites: NIL

Course Objectives: 1. Creating the awareness about environmental problems among students.
2. Imparting basic knowledge about the environment and its allied problems.
3. Developing an attitude of concern for the environment.
4. Motivating students to participate in environment protection and environment improvement.

UNIT-I: MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES: Definition, Scope and Importance – Need for Public Awareness. NATURAL RESOURCES: Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over exploitation, deforestation, case studies – 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, case studies.


UNIT–IV: SOLID WASTE MANAGEMENT: Causes, effects and control measures of urban and industrial wastes. - Role of an individual in prevention of pollution - Pollution case studies - Disaster management: floods, earthquake, cyclone and landslides.


Course Outcomes: At the end of the course, it is expected that students will be able to: 1. Identify and analyze environmental problems as well as the risks associated with these problems 2. Understand what it is to be a steward in the environment Studying how to live their lives in a more sustainable manner
Course Objectives: Objectives of this course are
- To introduce the concept of electrical circuits and its components
- To introduce the concepts of diodes and transistors, and
- To impart the knowledge of various configurations, characteristics and applications.

UNIT- I

UNIT-II
Resonance: Series resonance and Parallel resonance circuits, concept of bandwidth and Q factor, Locus Diagrams for RL, RC and RLC Combinations for Various Parameters.
Network Theorems: Thevenin’s, Norton’s, Maximum Power Transfer, Superposition, Reciprocity, Tellegen’s, Millman’s and Compensation theorems for DC and AC excitations.

UNIT- III
P-N Junction Diode: Diode equation, Energy Band diagram, Volt-Ampere characteristics, Temperature dependence, Ideal versus practical, Static and dynamic resistances, Equivalent circuit, Load line analysis, Diffusion and Transition Capacitances.
Rectifiers and Filters: P-N junction as a rectifier – Half Wave Rectifier, Ripple Factor – Full Wave Rectifier, Bridge Rectifier, Harmonic components in Rectifier Circuits, Filters – Inductor Filters, Capacitor Filters, L-section Filters, π-section Filters.

UNIT- IV
Transistor Configurations: BJT modeling, Hybrid model, Determination of h-parameters from transistor characteristics, Analysis of CE, CB and CC configurations using h-parameters, Comparison of CE, CB and CC configurations.

UNIT- V
Special Purpose Devices: Breakdown Mechanisms in Semi-Conductor Diodes, Zener diode characteristics, Use of Zener diode as simple regulator, Principle of operation and Characteristics of Tunnel Diode (With help of Energy band diagram) and Varactor Diode, Principle of Operation of SCR.
Course Outcomes: After this course, the student will be able

- To analyze and solve problems of electrical circuits using network laws and theorems.
- To identify and characterize diodes and various types of transistors.

Text books:

- Basic Electrical and electronics Engineering – M S Sukija TK Nagasarkar Oxford University
- Basic Electrical and electronics Engineering- D P Kothari. I J Nagarath Mc Graw Hill Education

References:

- Network Theory by Sudhakar, Shyam Mohan Palli, TMH.
BASICS OF MECHANICAL ENGINEERING

II Year B.Tech. II-Sem

Instructional Objectives
To familiarize civil engineering students with the
- Basic machine elements,
- Sources of Energy and Power Generation,
- Various manufacturing processes,
- Power transmission elements, material handling equipment

UNIT I:

Machine Elements: Cams: Types of cams and followers
Introduction to engineering materials-Metals, ceramics, composites-Heat treatment of metals

UNIT-II:

Material handling equipment: Introduction to Belt conveyors, cranes, industrial trucks, bull dozers,

UNIT-III:

Energy:
Power Generation: External and internal combustion engines (layouts, element/component description, advantages, disadvantages, applications).
REFRIGERATION: Mechanical Refrigeration and types – units of refrigeration – Air Refrigeration system, details and principle of operation – calculation of COP
Modes and mechanisms of heat transfer – Basic laws of heat transfer – General discussion about applications of heat transfer.

UNIT IV:

Casting: Types, equipments, applications

UNIT V:

Machine Tools: Introduction to lathe, drilling machine, milling machine, grinding machine-Operations performed
Text Books:


References:

SURVEYING & GEOMATICS

II Year B.Tech. II-Sem

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Course Objectives:
The object of the course student should have the capability to:

- Know the principle and methods of surveying.
- Measure horizontal and vertical distances and angles
- Recording of observation accurately
- Perform calculations based on the observation
- Identification of source of errors and rectification methods
- Apply surveying principles to determine areas and volumes and setting out curves
- Use modern surveying equipment’s for accurate results

UNIT - I
Measurement of Distances and Directions
Linear distances- Approximate methods, Direct Methods- Chains- Tapes, ranging, Tape corrections.
Prismatic Compass- Bearings, included angles, Local Attraction, Magnetic Declination, and dip.

UNIT - II
Leveling- Types of levels and levelling staves, temporary adjustments, methods of levelling, booking and Determination of levels, Effect of Curvature of Earth and Refraction.
Contouring- Characteristics and uses of Contours, methods of contour surveying.
Areas - Determination of areas consisting of irregular boundary and regular boundary.
Volumes - Determination of volume of earth work in cutting and embankments for level section, volume of borrow pits, capacity of reservoirs.

UNIT - III
Theodolite Surveying: Types of Theodolites, Fundamental Lines, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometrical levelling when base is accessible and inaccessible.
Traversing: Methods of traversing, traverse computations and adjustments, Omitted measurements.

UNIT - IV
Curves: Types of curves and their necessity, elements of simple, compound, reverse, transition and vertical curves.

UNIT - V
Photogrammetry Surveying:
Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; Stereoscopy, ground control extension for photographic mapping- aerial triangulation, radial triangulation, methods; photographic mapping- mapping using paper prints, mapping using stereoplotting instruments, mosaics, map substitutes.
Course Outcomes: Course will enable the student to:
- Apply the knowledge to calculate angles, distances and levels
- Identify data collection methods and prepare field notes
- Understand the working principles of survey instruments, measurement errors and corrective measures
- Interpret survey data and compute areas and volumes, levels by different type of equipment and relate the knowledge to the modern equipment and methodologies

TEXT BOOKS:

REFERENCES:
### STRENGTH OF MATERIALS – II

**II Year B.Tech. II-Sem**

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**Pre Requisites:** Strength of Materials -I

**Course Objectives:** The objective of this Course is

- To understand the nature of stresses developed in simple geometries shafts, springs, columns & cylindrical and spherical shells for various types of simple loads
- To calculate the stability and elastic deformation occurring in various simple geometries for different types of loading.
- To understand the unsymmetrical bending and shear center importance for equilibrium conditions in a structural members of having different axis of symmetry.

### UNIT – I

**TORSION OF CIRCULAR SHAFTS :**

**SPRINGS :** Introduction – Types of springs – deflection of close and open coiled helical springs under axial pull and axial couple – springs in series and parallel.

### UNIT – II

**COLUMNS AND STRUTS:**

**BEAM COLUMNS:** Laterally loaded struts – subjected to uniformly distributed and concentrated loads.

### UNIT - III

**DIRECT AND BENDING STRESSES:**
Stresses under the combined action of direct loading and bending moment, core of a section – determination of stresses in the case of retaining walls, chimneys and dams – conditions for stability-Overturning and sliding – stresses due to direct loading and bending moment about both axis.

### UNIT – IV

**THIN CYLINDERS :**

**THICK CYLINDERS :**
Introduction - Lame’s theory for thick cylinders – Derivation of Lame’s formulae – distribution of hoop and radial stresses across thickness – design of thick cylinders – compound cylinders – Necessary difference of radii for shrinkage.

### UNIT – V

**UNSYMETRICAL BENDING :**
Introduction – Centroidal principal axes of section –Moments of inertia referred to any set of rectangular axes – Stresses in beams subjected to unsymmetrical bending – Principal axes – Resolution of bending moment into two rectangular axes through the centroid – Location of neutral axis.

**SHEAR CENTRE:** Introduction - Shear centre for symmetrical and unsymmetrical (channel, I, T and L) sections
**Course Outcome:**
On completion of the course, the student will be able to:
- Describe the concepts and principles, understand the theory of elasticity, and perform calculations, relative to the strength of structures and mechanical components in particular to torsion and direct compression;
- to evaluate the strains and deformation that will result due to the elastic stresses developed within the materials for simple types of loading
- Analyze strength and stability of structural members subjected to Direct, and Direct and Bending stresses;
- Understand and evaluate the shear center and unsymmetrical bending.
- Frame an idea to design a system, component, or process

**Text Books:**

1) Strength of Materials by R.K Rajput, S.Chand & Company Ltd.
2) Mechanics of Materials by Dr.B.C.Punmia, Dr. Ashok Kumar Jain and Dr. Arun Kumar Jain

**References:**

1) Strength of Materials by R.Subramanian, Oxford University Press.
2) Mechanics of Materials by R.C.Hibbeler, Pearson Education
HYDRAULICS & HYDRAULIC MACHINERY

II Year B.Tech. II-Sem

Pre Requisites:

Course Objectives:

- To Define the fundamental principles of water conveyance in open channels.
- To Discuss and analyze the open channels in uniform and Non-uniform flow conditions.
- To Study the characteristics of hydroelectric power plant and its components.
- To analyze and design of hydraulic machinery and its modeling

UNIT-I
Open Channel Flow – I
Introduction to Open channel flow-Comparison between open channel flow and pipe flow, Classification of open channels, Classification of open channel flows, Velocity distribution. Uniform flow – Characteristics of uniform flow, Chezy’s, Manning’s and Bazin formulae for uniform flow – Factors affecting Manning’s Roughness Coefficient “n”. Most economical sections. Computation of Uniform flow, Normal depth.


UNIT-II
Open Channel Flow – II
Non uniform flow – Gradually Varied Flow - Dynamic equation for G.V.F; Classification of channel bottom slopes – Classification and characteristics of Surface profiles – Computation of water surface profiles by Numerical and Analytical approaches. Direct step method.

Rapidly varied flow: Elements and characteristics (Length and Height) of Hydraulic jump in rectangular channel– Types, applications and location of hydraulic jump, Energy dissipation and other uses – Positive and Negative Surges (Theory only).

UNIT-III
Dimensional Analysis and Hydraulic Similitude
Dimensional homogeneity – Rayleigh’s method and Buckingham’s pi methods – Dimensionless groups. Similitude, Model studies, Types of models. Application of dimensional analysis and model studies to fluid flow problems. Distorted models.

Basics of Turbo Machinery
Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, Jet striking centrally and at tip, Velocity triangles at inlet and outlet, expressions for work done and efficiency – Angular

UNIT-IV
Hydraulic Turbines – I
Elements of a typical Hydropower installation – Heads and efficiencies – Classification of turbines – Pelton wheel – Francis turbine – Kaplan turbine – working, working proportions, velocity diagram, work done and efficiency, hydraulic design. Draft tube – Classification, functions and efficiency.

Hydraulic Turbines – II
Governing of turbines – Surge tanks – Unit and specific turbines – Unit speed – Unit quantity – Unit power – Specific speed – Performance characteristics – Geometric similarity – Cavitation. Selection of turbines.
UNIT-V

Centrifugal Pumps
Pump installation details – classification – work done – Manometric head – minimum starting speed –
losses and efficiencies – specific speed. Multistage pumps – pumps in parallel – performance of
pumps – characteristic curves – NPSH – Cavitation.

Hydropower Engineering: Classification of Hydropower plants – Definition of terms – load factor,
utilization factor, capacity factor, estimation of hydropower potential.

Course Outcomes:
At the end of the course the student will able to
- Apply their knowledge of fluid mechanics in addressing problems in open channels and hydraulic
  machinery.
- Understand and solve problems in uniform, gradually and rapidly varied flows in open channel in
  steady state conditions.
- Apply dimensional analysis and to differentiate the model, prototype and similitude conditions
  for practical problems.
- Get the knowledge on different hydraulic machinery devices and its principles that will be
  utilized in hydropower development and for other practical usages.

Text Books
2. Fluid Mechanics and Hydraulic machines by Manish Kumar Goyal, PHI learning Private
   Limited, 2015.

REFERENCES
1. Fluid mechanics & Hydraulic Machines, Domkundwar & Domkundwar Dhanpat Rai & C
2. Fluid Mechanics by R.C. Hibber, Pearson India Education Services Pvt. Ltd.
3. Fluid Mechanic & Fluid Power Engineering by D.S. Kumar (Kataria & Sons Publications Pvt. Ltd.).
5. Introduction to Fluid Mechanics and Fluid Machines by SK Som, Gautam Biswas, Suman
   Chakraborty, Mc Graw Hill Education (India) Private Limited
6. Hydraulic Machines by Banga & Sharma (Khanna Publishers).
PRE REQUISITES: Strength of Materials – I

COURSE OBJECTIVES: The objective of the course is to
- Differentiate the statically determinate and indeterminate structures.
- To understand the nature of stresses developed in perfect frames and three hinged arches for various types of simple loads.
- Analyze the statically indeterminate members such as fixed bars, continuous beams and for various types of loading.
- Understand the energy methods used to derive the equations to solve engineering problems.
- Evaluate the influence on a beam for different static & moving loading positions.

UNIT – I
ANALYSIS OF PERFECT FRAMES: Types of frames- Perfect, Imperfect and Redundant pin jointed plane frames - Analysis of determinate pin jointed plane frames using method of joints, method of sections and tension coefficient method for vertical loads, horizontal loads and inclined loads.

UNIT – II
ENERGY THEOREMS: Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces - Castigliano’s theorem-Unit Load Method - Deflections of simple beams and pin- jointed plane frames - Deflections of statically determinate bent frames.

THREE HINGED ARCHES – Introduction – Types of Arches – Comparison between Three hinged and Two hinged Arches - Linear Arch - Eddy’s theorem - Analysis of Three hinged arches - Normal Thrust and radial shear - Geometrical properties of parabolic and circular arches - Three hinged parabolic circular arches having supports at different levels - Absolute maximum bending moment diagram for a three hinged arch.

UNIT-III
PROPPED CANTILEVER and FIXED BEAMS: Determination of static and kinematic indeterminacies for beams- Analysis of Propped cantilever and fixed beams, including the beams with different moments of inertia - subjected to uniformly distributed load - point loads - uniformly varying load, couple and combination of loads - Shear force, Bending moment diagrams and elastic curve for Propped Cantilever and Fixed Beams-Deflection of Propped cantilever and fixed beams - effect of sinking of support, effect of rotation of a support.

UNIT – IV
CONTINUOUS BEAMS: Introduction-Continuous beams - Clapeyron’s theorem of three moments- Analysis of continuous beams with constant and variable moments of inertia with one or both ends fixed-continuous beams with overhang - effect of sinking of supports.

SLOPE DEFLECTION METHOD: Derivation of slope-deflection equation, application to continuous beams with and without sinking of supports -Determination of static and kinematic indeterminacies for frames - Analysis of Single Bay, Single storey Portal Frames by Slope Deflection Method including Side Sway - Shear force and bending moment diagrams and Elastic curve.
UNIT – V
MOVING LOADS and INFLUENCE LINES: Introduction maximum SF and BM at a given section and absolute maximum shear force and bending moment due to single concentrated load, uniformly distributed load longer than the span, uniformly distributed load shorter than the span, two point loads with fixed distance between them and several point loads- Equivalent uniformly distributed load-Focal length - Definition of influence line for shear force and bending moment - load position for maximum shear force and maximum bending Moment at a section - Point loads, uniformly distributed load longer than the span, uniformly distributed load shorter than the span-Influence lines for forces in members of Pratt and Warren trusses - Equivalent uniformly distributed load - Focal length.

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

- An ability to apply knowledge of mathematics, science, and engineering
- Analyse the statically indeterminate bars and continuous beams
- Draw strength behaviour of members for static and dynamic loading.
- Calculate the stiffness parameters in beams and pin jointed trusses.
- Understand the indeterminacy aspects to consider for a total structural system.
- Identify, formulate, and solve engineering problems with real time loading

Text Books:

References:
1) Structural analysis T.S Thandavamoorthy, Oxford university Press
2) Structural Analysis by R.C.Hibbeler, Pearson Education
6) Fundamentals of Structural Analysis by M.L.Gamhir, PHI Learning Pvt. Ltd
SURVEYING LAB

II Year B.Tech. II-Sem

Pre Requisites: Surveying Theory

Course Objectives:

- To impart the practical knowledge in the field- measuring distances, directions, angles,
- To determining R.L.’s areas and volumes
- To set out Curves
- To stake out points
- To traverse the area
- To draw Plans and Maps

List of Experiments

1. Surveying of an area by chain, and compass survey (closed traverse) & plotting.
2. Determine of distance between two inaccessible points with compass
3. Radiation method, intersection methods by plane table survey.
4. Levelling – Longitudinal and cross-section and plotting
5. Measurement of Horizontal and vertical angle by theodolite
6. Trigonometric leveling using theodolite
7. Height and distances using principles of tachometric surveying
8. Determination of height, remote elevation, distance between inaccessible points using total station
9. Determination of Area using total station and drawing map
10. Traversing using total station for drawing contour map
11. Stake out using total station
12. Setting out Curve using total station

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

- Apply the principle of surveying for civil Engineering Applications
- Calculation of areas, Drawing plans and contour maps using different measuring equipment at field level
- Write a technical laboratory report
BASIC ELECTRICAL & ELECTRONICS LAB

II Year B.Tech. II-Sem

Basic Electrical Engineering Laboratory-I

List of Experiments:

1. Characteristics of Fluorescent lamps
2. Characteristics of Tungsten and Carbon filament lamps
3. (a) Verification of Thevenin’s theorem.
   (b) Verification of Norton’s theorems.
4. Verification of Maximum power theorem.
5. Verification of Superposition theorem
6. Study of R-L-C Series circuit
7. Study of R-L-C parallel circuit

Basic Electronics Engineering Laboratory-I

• There will be a couple of familiarization lectures before the practical classes are undertaken where basic concept of the instruments handled Eg: CRO, Multimeters etc will be given. Lectures on measurement techniques and error calculation will also have to be organized.
• 3 hours per week must be kept, initially for practical lectures, and later for tutorials.

List of Experiments:

1. Familiarisation with passive and active electronic components such as Resistors, Inductors, Capacitors, Diodes, Transistors (BJT) and electronic equipment like DC power supplies, multimeters etc.
2. Familiarisation with measuring and testing equipment like CRO, Signal generators etc.
3. Study of I-V characteristics of Junction diodes.
4. Study of I-V characteristics of Zener diodes.
5. Study of Half and Full wave rectifiers with Regulation and Ripple factors.
6. Study of I-V characteristics of BJTs.
FLUID MECHANICS & HYDRAULIC MACHINERY LAB

II Year B.Tech. II-Sem

Pre Requisites: FM & HHM Theory

Course Objectives

- To identify the behavior of analytical models introduced in lecture to the actual behavior of real fluid flows.
- To explain the standard measurement techniques of fluid mechanics and their applications.
- To illustrate the students with the components and working principles of the Hydraulic machines- different types of Turbines, Pumps, and other miscellaneous hydraulics machines.
- To analyze the laboratory measurements and to document the results in an appropriate format.

List of Experiments

1. Verification of Bernoulli’s equation
2. Determination of Coefficient of discharge for a small orifice by a constant head method
3. Calibration of Venturimeter / Orifice Meter
4. Calibration of Triangular / Rectangular/Trapezoidal Notch
5. Determination of Minor losses in pipe flow
6. Determination of Friction factor of a pipe line
7. Determination of Energy loss in Hydraulic jump
8. Determination of Manning’s and Chezy’s constants for Open Channel Flow
9. Impact of jet on vanes
10. Performance Characteristics of Pelton wheel turbine
11. Performance Characteristics of Francis turbine
12. Performance Characteristics of Keplan Turbine
13. Performance Characteristics of a single stage / multi stage Centrifugal Pump

Course Outcomes

Students who successfully complete this course will have demonstrated ability to:

- Describe the basic measurement techniques of fluid mechanics and its appropriate application.
- Interpret the results obtained in the laboratory for various experiments.
- Discover the practical working of Hydraulic machines- different types of Turbines, Pumps, and other miscellaneous hydraulics machines.
- Compare the results of analytical models introduced in lecture to the actual behavior of real fluid flows and draw correct and sustainable conclusions.
- Write a technical laboratory report
STRUCTURAL ANALYSIS – II

III Year B.Tech. I-Sem

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Pre Requisites: SA- I

Course Objectives:
The objectives of the course are to
- Identify the various actions in arches.
- Understand classical methods of analysis for statically indeterminate structures.
- Differentiate the approximate and numerical methods of analysis for indeterminate structures.
- Find the degree of static and kinematic indeterminacies of the structures.
- Plot the variation of S.F and B.M when a moving load passes on indeterminate structure

UNIT – I
TWO HINGED ARCHES: Introduction – Classification of Two hinged Arches – Analysis of two hinged parabolic arches – Secondary stresses in two hinged arches due to temperature and elastic shortening of rib.

MOMENT DISTRIBUTION METHOD - Analysis of continuous beams with and without settlement of supports using -Analysis of Single Bay Single Storey Portal Frames including side Sway - Analysis of inclined frames -Shear force and Bending moment diagrams, Elastic curve.

UNIT – II
KANI’S METHOD: Analysis of continuous beams including settlement of supports - Analysis of single bay single storey and single bay two Storey Frames including Side Sway using Kani’s Method - Shear force and bending moment diagrams, Elastic curve.

INDETERMINATE TRUSSES: Determination of static and kinematic indeterminacies – Analysis of trusses having single and two degrees of internal and external indeterminacies – Castigliano’s second theorem.

UNIT – III

UNIT – IV
MATRIX METHODS OF ANALYSIS: Introduction to Flexibility and Stiffness matrix methods of analyses using ‘system approach’ upto three degree of indeterminacy – Analysis of continuous beams including settlement of supports using flexibility and stiffness methods - Analysis of pin-jointed determinate plane frames using flexibility and stiffness methods - Analysis of single bay single storey portal frames using stiffness method - Shear force and bending moment diagrams - Elastic curve.

UNIT – V
INFLUENCE LINES FOR INDETERMINATE BEAMS: Introduction – influence line diagram for shear force and bending moment for two span continuous beam with constant and different moments of inertia - influence line diagram for shear force and bending moment for propped cantilever beams.
Course Outcomes
After the completion of the course student should be able to
- Analyze the two hinged arches.
- Solve statically indeterminate beams and portal frames using classical methods
- Sketch the shear force and bending moment diagrams for indeterminate structures.
- Formulate the stiffness matrix and analyze the beams by matrix methods

Text Books:

References:
6. Structural Analysis by R. C. Hibbeler, Pearson Education
GEOTECHNICAL ENGINEERING

III Year B.Tech.I-Sem

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Pre-Requisites: Engineering Geology, Applied Mechanics, Fluid Mechanics

Course Objectives: The objectives of the course are to

- understand the formation of soil and classification of the soils
- determine the Index & Engineering Properties of Soils
- determine the flow characteristics & stresses due to externally applied loads
- estimate the consolidation properties of soils
- estimate the shear strength and seepage loss

UNIT – I


INDEX PROPERTIES OF SOILS: Grain size analysis – consistency limits and indices – I.S. Classification of soils.

UNIT – II


UNIT – III

STRESS DISTRIBUTION IN SOILS: Boussinesq’s and Westergaard’s theories for point load, uniformly loaded circular and rectangular areas, pressure bulb, variation of vertical stress under point load along the vertical and horizontal plane, and Newmark’s influence chart for irregular areas.


UNIT – IV

CONSOLIDATION: Types of compressibility – Immediate Settlement, primary consolidation and secondary consolidation - stress history of clay; e-p and e-log(p) curves – normally consolidated soil, over consolidated soil and under consolidated soil - preconsolidation pressure and its determination - Terzaghi’s 1-D consolidation theory – coefficient of consolidation: square root time and logarithm of time fitting methods - computation of total settlement and time rate of settlement.

UNIT – V

SHEAR STRENGTH OF SOILS: Importance of shear strength – Mohr’s- Coulomb Failure theories – Types of laboratory tests for strength parameters – strength tests based on drainage conditions – strength envelops – Shear strength of sands - dilatancy – critical void ratio, Introduction to stress path method.

Course Outcomes:

At the end of the course the student will able to

- Characterize and classify the soils
- Able to estimate seepage, stresses under various loading conditions and compaction characteristics
- Able to analyse the compressibility of the soils
- Able to understand the strength of soils under various drainage conditions
Text books:
1. Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New age International Pvt Ltd,

References:
1. Foundation Engineering by P.C. Varghese, PHI
STRUCTURAL ENGINEERING – I (RCC)

III Year B.Tech. I-Sem

Pre-Requisites: Structural Analysis I & II

Course Objectives
The objectives of the course are to
- Identify the basic components of any structural system and the standard loading for the RC structure
- Identify and tell the various codal provisions given in IS. 456
- Describe the salient feature of limit state method, compare with other methods and the concepts of limit state of collapse and limit state of serviceability
- Evaluate the behaviour of RC member under flexure, shear and compression, torsion and bond.

UNIT -I
Limit state Analysis and design of sections in Flexure – Behaviour of RC section under flexure - Rectangular, T and L-sections, singly reinforced and doubly reinforced Beams – Detailing of reinforcement

UNIT – II
Design for Shear, Bond and Torsion - Mechanism of shear and bond failure - Design of shear using limit state concept – Design for Bond –Anchorage and Development length of bars - Design of sections for torsion - Detailing of reinforcement

UNIT - III
Design of Two-way slabs with different end conditions, one way slab, and continuous slab Using I S Coefficients
Limit state design for serviceability for deflection, cracking and codal provisions.

UNIT – IV

UNIT – V
Design of foundation - Different types of footings – Design of wall footing – Design of flat isolated square, rectangular, circular footings and combined footings for two columns.

Course Outcomes
After the completion of the course student should be able to
- Compare and Design the singly reinforced, doubly reinforced and flanged sections.
- Design the axially loaded, uniaxial and biaxial bending columns.
- Classify the footings and Design the isolated square, rectangular and circular footings
- Distinguish and Design the one-way and two-way slabs.
TEXT BOOKS:

REFERENCES:
3. Fundamentals of Reinforced concrete design by M.L. Gambhir,Printice Hall of India Pvt.Ltd.,
4. Design of Reinforced Concrete Structures by N.Subramanian, Oxford University Press

NOTE:
Alternate weeks two periods of theory can be converted into drawing classes. The end examination paper should consist of Part – A and Part – B. Part – A should consist of two questions in design and drawing out of which one question to be answered. Part –B should consist of five questions in design out of which three to be answered. Weightage for Part – A is 40 % and Part – B is 60 %.
TRANSPORTATION ENGINEERING - I

III Year B.Tech.I-Sem

Pre-Requisites: NIL

Course Objectives:

- Introduction to highway development in India an understanding factors to be considered while aligning of highways
- To understand the necessity of highway geometric design.
- To introduce traffic characteristic, road safety and parking issues.

UNIT I
HIGHWAY DEVELOPMENT AND PLANNING:
Highway Development in India – Necessity for Highway Planning- Different Road Development Plans; Classification of Roads - Road Network Patterns – Highway Alignment- Factors affecting Alignment- Engineering Surveys – Drawings and Reports – Highway Project.

UNIT – II

UNIT – III
TRAFFIC ENGINEERING &REGULATIONS:

UNIT – IV
INTERSECTION DESIGN:
Types of Intersections – Conflicts at Intersections – Requirements of At-Grade Intersections - Types of At-Grade Intersections: Channelized and Unchannelized Intersections – Traffic Islands - Types of Grade Separated Intersections - Rotary Intersection – Concept of Rotary – Design Factors of Rotary – Advantages and Limitations of Rotary Intersections.

UNIT – V
Parking Analysis and Traffic Safety: Types of parking facilities – On-street parking and Off-street Parking facilities; Parking studies and analysis- Parking Inventory Study, Parking Usage Study By Patrolling, Questionnaire Survey, Cordon Surveys; Evaluation of
parking parameters; Parking accumulation, Parking Load, Parking Turnover, Parking Index, Parking Volume

Course Outcomes:

- Understand the longitudinal and cross sectional elements of a highway.
- Design the horizontal and vertical alignment of roads.
- Understanding the concept of intersections, interchanges.
- Understanding the various parking parameters.

Text books:

References:
BUSINESS ECONOMICS AND FINANCIAL ANALYSIS

III Year B.Tech. I Sem

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Course Objective
1. To prepare engineering students to analyze cost/ revenue/ financial data and to make economic and financial analysis in decision making process and to examine the performance of companies engaged in engineering.

Course Outcome
1. To perform and evaluate present and future worth of the alternate projects and to appraise projects by using traditional and DCF Methods. To carry out cost benefit analysis of projects and to calculate BEP of different alternative projects.

UNIT I
Introduction to Engineering Economics-

UNIT II
Macro Economic Concepts:

UNIT III
Production, Cost, Market Structures & Pricing:

UNIT IV
Capital Budgeting Techniques:
Significance of Capital Budgeting - cash flows-Time Value of Money- Choosing between alternative investment proposals- Methods of Appraisal Techniques- Pay Back Period - Average Rate of Return – Net Present Value- Internal Rate of Return – Profitability Index.

UNIT V
Introduction to Accounting:

Suggested Readings
HIGHWAY ENGINEERING AND CONCRETE TECHNOLOGY LAB

III Year B.Tech. I-Sem

Pre-Requisites: Building Materials, Concrete Technology, Highway Materials

Course Objectives: The objectives of the course

- To learn laboratory tests and their procedures cement, fine aggregate, coarse aggregates and bitumen
- To Evaluate fresh concrete properties
- To Understand the test procedures for characterization of Concrete and bituminous mixes

Student shall be able to

Categorize the test on materials used Civil Engineering Building & Pavement constructions

To perform the tests on concrete for its characterization.

To Design Concrete Mix Proportioning by Using Indian Standard Method.

Examine the tests performed for Bitumen mixes.

To prepare a laboratory report

List of Experiments

I. Test on Cement & sand
   1. Normal Consistency and fineness of cement.
   2. Initial setting time and final setting time of cement.
   3. Specific gravity of cement
   4. Soundness of cement
   5. Compressive strength of cement
   6. Bulking of sand, Bulk and compact densities of fine and coarse aggregates

II Test on Fresh Concrete

Workability test on concrete
   1. Slump test
   2. CF (compact factor test)
   3. Vee-bee Test
   4. Flow Table Test

III Test on hardened concrete

5. Compression test on cubes & Cylinders
   6. Flexure test
   7. Split Tension Test
   8. Modulus of Elasticity

IV Test on Aggregates (Coarse and Fine)

9. Specific gravity (Pycnometer and wire basket), water absorption
   10. Shape (Flakiness and elongation indices)
   11. Impact and abrasion value tests
   12. Crushing test

V Tests on Bitumen and Bituminous concrete

1. Penetration, softening point
   2. Ductility and viscosity

VI. Traffic surveys

1. Volume
2. Speed
3. Parking
Course Outcomes
1. Testing the various materials as per IS code specification used in construction.
2. Judging the suitability of various materials for construction purposes.
4. Collection of traffic data by different surveys.

TEXT BOOKS:
2. Highway Material Testing manual, Khanna ,Justo and Veeraraghavan, Nemchand Brothers

IS CODES:
1. IS 10262 :2009 “Concrete Mix Proportioning – Guidelines”
2. IS 516:2006 “Methods of Tests on Strength of Concrete”
3. IS 383 :1993 “Specification For Coarse And Fine Aggregates From Natural Sources For Concrete”
GEO TECHNICAL ENGINEERING LAB

III Year B.Tech. I-Sem

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Pre-Requisites: Soil Mechanics (Co-requisite)

Course Objectives: To obtain index and engineering properties of locally available soils, and to understand the behavior of these soil under various loads.

LIST OF EXPERIMENTS

1. Atterberg Limits (Liquid Limit, Plastic Limit, and shrinkage limit)
2. a) Field density by core cutter method and
   b) Field density by sand replacement method
3. Determination of Specific gravity of soil Grain size distribution by sieve analysis
4. Permeability of soil by constant and variable head test methods
5. Standard Proctor’s Compaction Test
6. Determination of Coefficient of consolidation (square root time fitting method)
7. Unconfined compression test
8. Direct shear test
9. Vane shear test
10. Differential free swell index (DFSI) test

Course Outcomes: At the end of the course, the student will be able to classify and evaluate the behavior of the soils subjected to various loads.

REFERENCE:

ADVANCED COMMUNICATION LAB

III Year B.Tech.I-Sem

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Pre-Requisites: English

**Course Objectives:** The purpose of this course is to develop the students’ competence in communication at an advanced level. Assuming that the students are fairly proficient in the basic communication skills of listening, speaking, reading and writing in English, this course aims to train them in communicating efficiently in the workplace and professional contexts.

1. **Introduction**
The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

The proposed course should be a laboratory course to enable students to use ‘good’ English and perform the following:

- Gathering ideas and information to organise ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Writing formal letters.
- Transferring information from non-verbal to verbal texts and vice-versa.
- Taking part in social and professional communication.

2. **Objectives:**
This Lab focuses on using multi-media instruction for language development to meet the following targets:

- To improve the students’ fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.
- To prepare all the students for their placements.

**Learning Outcomes**
- Accomplishment of sound vocabulary and its proper use contextually.
- Flair in Writing and felicity in written expression.
- Enhanced job prospects.
- Effective Speaking Abilities

3. **Syllabus:**
The following course content to conduct the activities is prescribed for the Advanced Communication Skills (ACS) Lab:

1. **Activities on Fundamentals of Inter-personal Communication and Building Vocabulary** - Starting a conversation – responding appropriately and relevantly – using the right body language – Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.
2. **Activities on Reading Comprehension** – General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading & effective googling.


4. **Activities on Presentation Skills** – Oral presentations (individual and group) through JAM sessions/seminars/PPTs and written presentations through posters/projects/reports/ e-mails/assignments etc.

5. **Activities on Group Discussion and Interview Skills** – Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation – Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conference and Mock Interviews.

4. **Minimum Requirement:**

   The Advanced Communication Skills (ACS) Laboratory shall have the following infra-structural facilities to accommodate at least 35 students in the lab:

   - Spacious room with appropriate acoustics
   - Round Tables with movable chairs
   - Audio-visual aids
   - LCD Projector
   - Public Address system
   - T. V, a digital stereo & Camcorder
   - Headphones of High quality


6. **Suggested Software:**

   The software consisting of the prescribed topics elaborated above should be procured and used.

   - Oxford Advanced Learner’s Compass, 8th Edition
   - DELTA’s key to the Next Generation TOEFL Test: Advanced Skill Practice.
   - Lingua TOEFL CBT Insider, by Dreamtech
   - TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
   - The following software from ‘train2success.com’
     - Preparing for being Interviewed
     - Positive Thinking
     - Interviewing Skills
     - Telephone Skills
     - Time Management

   **Course Outcomes:** Communicate efficiently in the work place up professional context

7. **Books Recommended:**


**DISTRIBUTION AND WEIGHTAGE OF MARKS:**

**Advanced Communication Skills Lab Practicals:**

1. The practical examinations for the ACS Laboratory practice shall be conducted as per the University norms prescribed for the core engineering practical sessions.

2. For the English Language lab sessions, there shall be continuous evaluation during the year for 25 sessional marks and 50 End Examination marks. Of the 25 marks, 15 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The End Examination shall be conducted by the teacher concerned, by inviting the External Examiner from outside. In case of the non-availability of the External Examiner, other teacher of the same department can act as the External Examiner.

**Mini Project: As a part of Internal Evaluation**

1. **Seminar/Professional Presentation**
2. A Report on the same has to be prepared and presented.

* Teachers may use their discretion to choose topics relevant and suitable to the needs of students.

* Not more than two students to work on each mini project.

* Students may be assessed by their performance both in oral presentation and written report.
ENVIRONMENTAL ENGINEERING - I

III Year B.Tech.II-Sem

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Pre Requisites: Fluid Mechanics

Course Objectives: This subject provides the knowledge of water sources, water treatment, design of distribution system waste water treatment, and safe disposal methods. The topics of characteristics of waste water, sludge digestion are also included.

UNIT – I

UNIT – II

UNIT - III

UNIT – IV

UNIT – V

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

- Assess characteristics of water and wastewater and their impacts
- Estimate quantities of water and waste water and plan conveyance components
- Design components of water and waste water treatment plants
- Be conversant with issues of air pollution and control
TEXT BOOKS:

REFERENCES:
3. Environmental Pollution and Control Engineering CS Rao, Wiley Publications
4. Water and Waste Water Technology by Steel, Wiley
8. Introduction to Environmental Engineering and Science by Gilbert Masters, Prentice
9. Hall, New Jersey.
10. Introduction to Environmental Engineering by P. Aarne Vesilind, Susan M. Morgan,
FOUNDATION ENGINEERING

III Year B.Tech. II-Sem

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Pre-Requisites: Soil Mechanics

Course Objectives:
To Plan Soil exploration programme for civil Engineering Projects
To check the stability of slopes
To determine the lateral earth pressures and design retaining walls
To determine the Bearing capacity of Soil
To design pile group foundation

UNIT – I

UNIT – II

UNIT – III
EARTH PRESSURE THEORIES: Active, Passive and at rest soil pressures Rankine’s theory of earth pressure – earth pressures in layered soils – Coulomb’s earth pressure theory.

RETAINING WALLS: Types of retaining walls – stability of gravity and cantilever retaining walls against overturning, sliding and, bearing capacity, filter material for drainage.

UNIT – IV
SHALLOW FOUNDATIONS- Types - choice of foundation – location and depth - safe bearing capacity – shear criteria – Terzaghi’s, and IS code methods - settlement criteria – allowable bearing pressure based on SPT N value and plate load test – allowable settlements of structures.

UNIT - V
PILE FOUNDATION: Types of piles – load carrying capacity of piles based on static pile formulae – dynamic pile formulae – Pile Capacity through SPT results - pile load tests - load carrying capacity of pile groups in sands and clays – Settlement of pile groups – negative skin friction

Course Outcomes:
At the end of the course the student will able to
- Understand the principles and methods of Geotechnical Exploration
- Decide the suitability of soils and check the stability of slopes
- Calculate lateral earth pressures and check the stability of retaining walls
- Analyse and design the shallow and deep foundations

Text books:
References:

STRUCTURAL ENGINEERING – II (Steel)

III Year B.Tech. II-Sem

Pre-Requisites: Structural Analysis I & II

Course Objectives
The objectives of the course is to

- Explain the mechanical properties of structural steel, plasticity, yield.
- Describe the salient features of Limit State Method of design of Steel structures.
- Identify and explain the codal provisions given in IS. 800.
- Analyze the Behaviour of steel structures under tension, compression and flexure.
- Design the tension, compression, flexural members and plate girder.
- Design the connection in steel structure, build-up member and (bolted and welded).

UNIT – I


UNIT – II


UNIT – III
Plastic Analysis; Plastic moment – Plastic section modulus - Plastic analysis of continuous beams
Design of Flexural Members – Laterally supported and unsupported Beams – Design of laterally supported beams - Bending and shear strength/buckling – Built-up sections - Beam splice

UNIT – IV

UNIT – V
Design of Industrial Structures; Types of roof trusses - loads on trusses – wind loads - Purlin design – truss design.

Note: Design of structural members include detailed sketches.
Course Outcomes:

After the completion of the course student should be able to

- Analyze the tension members, compression members.
- Design the tension members, compression members and column bases and joints and connections
- Analyze and Design the beams including built-up sections and beam and connections.
- Identify and Design the various components of welded plate girder including stiffeners

Text Books:


Reference Books:

2. Design of steel structures by Edwin H. Gayrold and Charles Gayrold, Tata Macgrawhill publishers, 1972

NOTE:
Alternate weeks two periods of theory can be converted into drawing classes. The end examination paper should consist of Part – A and Part – B. Part – A should consist of two questions in design and drawing out of which one question to be answered. Part – B should consist of five questions in design out of which three to be answered. Weightage for Part – A is 40 % and Part – B is 60 %.
HYDROLOGY & WATER RESOURCES ENGINEERING

III Year B.Tech. II-Sem

Pre-Requisites: Fluid Mechanics & HHM

Course Objectives:

This course provides the description of hydrological cycle and derive various formulas used in estimation of different basic components of surface and Ground water cycle. And its components. Further it will explain the water requirement for irrigation and connectivity of hydrology to the field requirement.

Unit - I
Introduction: Concepts of Hydrologic cycle, Global Water Budget, Applications in Engineering.
Sources of data.
Precipitation
Forms of precipitation, characteristics of precipitation in India, measurement of precipitation: Recording and non-recording types, rain gauge network: mean precipitation over an area: Arithmetic, Theissen’s and Isohyetal methods, Missing Rainfall Data – Estimation, Consistency of Rainfall records, depth area-duration relationships, maximum intensity/depth-duration-frequency relationship, Probable Maximum Precipitation (PMP), rainfall data in India.

Unit - II
Abstractions from precipitation
Evaporation process, evaporimeters, analytical methods of evaporation estimation, reservoir evaporation and methods for its reduction, evapotranspiration, measurement of evapotranspiration, evapotranspiration equations: Penman and Blaney & Criddle Methods, potential evapotranspiration over India, actual evapotranspiration, interception, depression storage, infiltration, infiltration capacity, measurement of infiltration, modelling infiltration capacity, classification of infiltration capacities, infiltration indices.

Runoff

Unit - III
Hydrographs
Hydrograph – Distribution of Runoff – Hydrograph Analysis Flood Hydrograph – Effective Rainfall – Base Flow – Base Flow Separation - Direct Runoff Hydrograph Unit pulse and Unit step function - Unit Hydrograph, definition, limitations and applications of Unit hydrograph, derivation of Unit Hydrograph from Direct Runoff Hydrograph and vice versa - S-hydrograph, Synthetic Unit Hydrograph.

Unit - IV
Groundwater Hydrology
Occurrence, movement and distribution of groundwater, aquifers – types, Specific Yield, Permeability, Storage coefficient, Transmissibility, Darcy’s Law. Well Hydraulics - Steady radial flow into well for confined and unconfined aquifers, Recuperation tests. Well constants.

Crop Water Requirements – Water requirement of crops-Crops and cropseasons in India, cropping pattern, duty and delta; Quality of irrigation water; Soil-water relationships, rootzone-water, infiltration, consumptive use, irrigation requirement, frequency of irrigation, Method of applying water to the fields: surface, sub-surface, sprinkler and trickle/drip irrigation.
Unit - V


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

- Understand the different concepts and terms used in engineering hydrology
- To identify and explain various formulae used in estimation of surface and Ground water hydrology components
- Demonstrate their knowledge to connect hydrology to the field requirement

Text Books
2. Irrigation Engineering and Hydraulic structures by Santhosh kumar Garg Khanna publishers

Reference Books
1. Elements of Engineering Hydrology by V.P. Singh (Tata McGraw-Hill)
2. Engineering Hydrology by Jaya Rami Reddy (Laxmi Publications)
4. Elements of Water Resources Engineering by K.N.Duggal and J.P.Soni (New Age International)
5. G L Asawa, Irrigation Engineering, Wiley Eastern
ENVIRONMENTAL ENGINEERING LAB

III Year B.Tech. II-Sem

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Pre-Requisites:

Course Objectives: the objectives of the course are to

- Perform the experiments to determine water and waste water quality
- Understand the water & waste water sampling, their quality standards
- Estimate quality of water, waste water, Industrial water

Practical Work: List of Experiments

1. Determination of pH
2. Determination of Electrical Conductivity
3. Determination of Total Solids (Organic and inorganic)
4. Determination of Acidity
5. Determination of Alkalinity
6. Determination of Hardness (Total, Calcium and Magnesium Hardness)
7. Determination of Chlorides
8. Determination of optimum coagulant Dosage
9. Determination of Dissolved Oxygen (Winkler Method)
10. Determination of COD
11. Determination of BOD/DO
12. Determination of Residual Chlorine
13. Total count No.
14. Noise level measurement

Course outcomes

After the completion of the course student should be able to

- Understand about the equipment used to conduct the test procedures
- Perform the experiments in the lab
- Examine and Estimate water, waste water, air and soil Quality
- Compare the water, air quality standards with prescribed standards set by the local governments
- Develop a report on the quality aspect of the environment

Text/Reference Books:

1. Introduction to Environmental Engineering and Science by Gilbert Masters, Prentice Hall, New Jersey.
COMPUTER AIDED DESIGN LAB

III Year B.Tech. II-Sem

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Pre-Requisites: Computer Aided Civil Engineering Drawing or AUTO CAD Principles –Excel-Structural Engineering -1 & 2

Course Objectives: The objectives of the course are to
- Learn the usage of any fundamental software for design
- Create geometries using pre-processor
- Analyse and Interpret the results using post processor
- Design the structural elements

LIST OF EXPERIMENTS

1. Analysis & Design determinate structures using a software
2. Analysis & Design of fixed & continuous beams using a software
3. Analysis & Design of Plane Frames
4. Analysis & Design of space frames subjected to DL & LL
5. Analysis & Design of residential building subjected to all loads (DL, LL, WL, EQL)
6. Analysis & Design of Roof Trusses
7. Design and detailing of built up steel beam
8. Developing a design programme for foundation using EXCEL Spread Sheet
9. Detailing of RCC beam and RCC slab
10. Detailing of Steel built up compression member

Course Outcomes

After the completion of the course student should be able to
- Model the geometry of real world structure Represent the physical model of structural element/structure
- Perform analysis
- Interpret from the Post processing results
- Design the structural elements and system as per IS Codes

Note: Drafting of all the exercises is to be carried out using commercially available designing software’s.
Course Objectives:

Students will be able to:
1. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
2. To address the growth of Indian opinion regarding modern Indian intellectuals’ constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
3. To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Syllabus

UNIT 1:
**History of Making of the Indian Constitution**: History Drafting Committee, (Composition & Working)

UNIT 2:
**Philosophy of the Indian Constitution**: Preamble, Salient Features

UNIT 3:
**Contours of Constitutional Rights & Duties**:
- Fundamental Rights
- Right to Equality
- Right to Freedom
- Right against Exploitation
- Right to Freedom of Religion
- Cultural and Educational Rights
- Right to Constitutional Remedies
- Directive Principles of State Policy
- Fundamental Duties.

UNIT 4:
**Organs of Governance**:
- Parliament
- Composition
- Qualifications and Disqualifications
- Powers and Functions
- Executive
- President
- Governor
- Council of Ministers
- Judiciary, Appointment and Transfer of Judges, Qualifications
- Powers and Functions

UNIT 5:
**Local Administration**:
- District’s Administration head: Role and Importance,
- Municipalities: Introduction, Mayor and role of Elected Representative,
CEO of Municipal Corporation.
Elected officials and their roles, CEO ZilaPachayat: Position and role.
Block level: Organizational Hierarchy (Different departments),
Village level: Role of Elected and Appointed officials,
Importance of grass root democracy

UNIT 6:
Election Commission:
Election Commission: Role and Functioning.
Chief Election Commissioner and Election Commissioners.
State Election Commission: Role and Functioning.
Institute and Bodies for the welfare of SC/ST/OBC and women.

Suggested reading
1. The Constitution of India, 1950 (Bare Act), Government Publication.

Course Outcomes:
Students will be able to:
1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
ESTIMATION, COSTING AND PROJECT MANAGEMENT

IV Year B.Tech. I-Sem

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Pre-Requisites: NIL

Course Objectives: The subject provide process of estimations required for various work in construction. To have knowledge of using SOR & SSR for analysis of rates on various works and basics of planning tools for a construction projects.

UNIT – I

UNIT – II
Reinforcement bar bending and bar requirement schedules Earthwork for roads and canals.

UNIT – III
Rate Analysis – Working out data for various items of work over head and contingent charges.

UNIT-IV

UNIT-V
Construction project planning- Stages of project planning: pre-tender planning, pre-construction planning, detailed construction planning, role of client and contractor, level of detail. Process of development of plans and schedules, work break-down structure, activity lists, assessment of work content, concept of productivities, estimating durations, sequence of activities, activity utility data; Techniques of planning- Bar charts, Gantt Charts. Networks: basic terminology, types of precedence relationships, preparation of CPM networks: activity on link and activity on node representation, computation of float values, critical and semi critical paths, calendaring networks. PERT- Assumptions underlying PERT analysis, determining three time estimates, analysis, slack computations, calculation of probability of completion

NOTE : NUMBER OF EXERCISES PROPOSED :
1. Three in flat Roof & one in Sloped Roof
2. Exercises on Data – three Nos.

Course Outcomes:
- Understand the technical specifications for various works to be performed for a project and how they impact the cost of a structure.
- Quantify the worth of a structure by evaluating quantities of constituents, derive their cost rates and build up the overall cost of the structure.
- Understand how competitive bidding works and how to submit a competitive bid proposal.
- An idea of how to optimize construction projects based on costs.
- An idea how construction projects are administered with respect to contract structures and issues.
- An ability to put forward ideas and understandings to others with effective communication processes.
Text Books
2. Punmia, B.C., Khandelwal, K.K., Project Planning with PERT and CPM, LaxmiPublications, 2016

Reference books:
1. Estimating and Costing by G.S. Birdie
5. Estimation, Costing and Specifications by M. Chakraborthi; Laxmi publications.

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## PROFESSIONAL ELECTIVE -III

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MANAGEMENT FUNDAMENTALS FOR ENGINEERS

IV Year B.Tech. I Sem

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Course Objective
To understand the Management Concepts, applications of Concepts in Practical aspects of business and development of Managerial Skills for Engineers.

Course Outcome
The students understand the significance of Management in their Profession. The various Management Functions like Planning, Organizing, Staffing, Leading, Motivation and Control aspects are learnt in this course. The students can explore the Management Practices in their domain area.

UNIT I
Introduction to Management
Evolution of Management, Nature & Scope-Functions of Management-Role of Manager-levels of Management-Managerial Skills - Challenges-Planning-Planning Process-Types of Plans-MBO.

UNIT II
Organization Structure & HRM
Organization Design-Organizational Structure-Departmentation-Delegation-Centralization-Decentralization-Recentralization-Organizational Culture- Organizational climate- Organizational change.

UNIT III
Operation Management

UNIT IV
Marketing Management

UNIT V
Project Management
Suggested Readings

MINI PROJECT / INTERNSHIP

IV Year B.Tech. I-Sem

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0042

A) There shall be an Industrial oriented Mini Project in Collaboration with an Industry of the relevant specialization to be registered immediately after III Year II Semester Examinations and taken up during the summer vacation for about eight weeks duration.

B) The industry oriented Mini-Project shall be submitted in a report form, and a presentation of the same shall be made before a Committee, which evaluates it for 100 marks. The committee shall consist of Head of the Department, the supervisor of Mini-Project, and a Senior Faculty Member of the Department. There shall be no internal marks for Industry oriented Mini-Project. The Mini-Project shall be evaluated in the IV year I Semester.
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Each Student shall start the project work during the IVth Year –I Semester as per the instructions of the of the Project Guide/Project Supervisor assigned by the HEAD Of The DEPARTMEN. Out of a total 200 marks allotted for the Project Work, 60 marks shall be for CIE( Continuous Project Evaluation ) and 140 marks for SEE(End Semester Viva –Voce Examination.)
There shall be a Seminar Presentation in IV Year II Semester.

For the seminar, the student shall collect the information on a specialized topic, prepare a Technical Report and Submit to the Department at the time of Seminar Presentation. The Seminar Presentation (along with the Technical Report) shall be evaluated by two faculty members assigned by the Head of the Department, for 100 marks. There shall be SEE or external Examination for Seminar.
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The Project Viva Voce shall be conducted by a committee comprising of an External Examiner, Head of the Department and Project Supervisor. Out of 60 marks allocated for CIE, 30 marks shall be awarded by the Project Supervisor (based on the Continuous Evaluation of Student’s Performance throughout the Project work period) and the other 30 marks shall be awarded by a Departmental Committee Consisting of Head of the Department and Project Supervisor, based on the work carried out the presentation made by the Student at the time of Viva Voce Examination.
PROFESSIONAL ELECTIVE - I
CONCRETE TECHNOLOGY

III Year B.Tech. I-Sem

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Pre Requisites: Building Materials

Course Objectives: The objectives of the course are to

- **Know** different types of cement as per their properties for different field applications.
- **Understand Design** economic concrete mix proportion for different exposure conditions and intended purposes.
- **Know** field and laboratory tests on concrete in plastic and hardened stage.

UNIT I

UNIT - II

UNIT – III

UNIT - IV

TESTING OF HARDENED CONCRETE:Compression tests– Tension tests – Factors affecting strength – Flexure tests – Splitting tests – Pull-out test, Non-destructive testing methods – codal provisions for NDT.


UNIT – V

Course Outcomes:

After the completion of the course student should be able to

- **Determine** the properties of concrete ingredients i.e. cement, sand, coarse aggregate by conducting different tests. Recognize the effects of the rheology and early age properties of concrete on its long-term behavior.
- **Apply** the use of various chemical admixtures and mineral additives to design cement based materials with tailor-made properties
- **Use** advanced laboratory techniques to characterize cement-based materials.
- **Perform** mix design and engineering properties of special concretes such as high-performance concrete, self-compacting concrete, and fibre reinforced concrete.

Text books:
1. Concrete Technology by M.S. Shetty. – S.Chand & Co.; 2004

References:

IS Codes:

IS 383
IS 516
IS 10262 - 2009
PROFESSIONAL ELECTIVE - I  
ELEMENTS EARTHQUAKE ENGINEERING

III Year B.Tech. I-Sem

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Pre-Requisites: Structural Engineering –II & RC Design

Course Objectives

The objectives of the course are to
- **Understand** Engineering Seismology
- **Explain** and discuss single degree of freedom systems subjected to free and forced vibrations
- **Acquire** the knowledge of the conceptual design and principles of earthquake resistant designs as per IS codes
- **understand** importance of ductile detailing of RC structures

UNIT - I


Introduction-Functional planning-Continuous load path-Overall form-simplicity and symmetry-elongated shapes-stiffness and strength - Seismic design requirements-regular and irregular configurations-basic assumptions.

UNIT II


Introduction to earthquake resistant design: Seismic design requirements-regular and irregular configurations-basic assumptions-design earthquake loads-basic load combinations-permissible stresses-seismic methods of analysis-factors in seismic analysis-equivalent lateral force method.

UNIT III

UNIT IV

UNIT V

Course Outcomes

After the completion of the course student should be able to

- Explain and derive fundamental equations in structural dynamics
- Discuss and explain causes and Theories on earthquake, seismic waves, measurement of earthquakes
- Evaluate base shear using IS methods
- Design and Detail the reinforcement for earthquake forces

TEXT BOOKS:
2. Earthquake Resistant Design of structures – Pankaj Agarwal and Manish Shrikhande, Prentice Hall of India Pvt. Ltd.

REFERENCES:
2. Earthquake Resistant Design of Buidling structures by Vinod Hosur, Wiley India Pvt. Ltd.
4. Masory and Timber structures including earthquake Resistant Design –Anand S.Arya, Nem chand & Bros
5. Earthquake Tips – Learning Earthquake Design and Construction
   a. C.V.R. Murthy
7. Design of Reinforced Concrete Structures by N.Subramaniam- Oxford University.
8. Reinforced Concrete Design by Unnikrishna Pillai and Devdas Menon, Tata Mc Graw Hill
PROFESSIONAL ELECTIVE - I
INTRODUCTION TO OFFSHORE STRUCTURES

III Year B.Tech. I-Sem

Pre Requisites: FM & Hydraulics, Structural Analysis, RC Design

Course Objectives: The subject provide a knowledge on offshore structures, analysis and design of offshore structures.

UNIT I
Types of offshore structures .selection .function - Physical, environmental and geotechnical aspects of marine and offshore construction. Loads and responses of offshore structures. Foundations for offshore structures. Introduction to design and installation of offshore piled platforms, concrete offshore platforms, Moored floating structures and Submarine pipelines

UNIT II
WAVE THEORIES
Wave generation process, small and finite amplitude wave theories.

UNIT III
FORCES OF OFFSHORE STRUCTURES
Wind forces, wave forces on vertical, inclined cylinders, structures - current forces and use of Morison equation.

UNIT IV
OFFSHORE SOIL AND STRUCTURE MODELING
Different types of offshore structures, foundation modeling and structural modeling.

UNIT V
ANALYSIS AND DESIGN OF OFFSHORE STRUCTURES
Static method of analysis, foundation analysis and dynamics of offshore structures. Design of platforms, helipads, Jacket tower and mooring cables and pipe lines.

Course Outcomes: Able to understand & design offshore structures

Text Books

References
7. Codes of Practices (latest versions) such as API RP-2A, Bureau Veritas etc.
8. Proceedings of Offshore Technology Conference (O.T.C.), Behaviour of Offshore Structures (BOSS) and other Conferences on Offshore Engineering.
PROFESSIONAL ELECTIVE - II
PRESTRESSED CONCRETE

III Year B.Tech. II-Sem

Pre-Requisites: Reinforced Concrete Design

Course Objectives
The objectives of the course are to

- Understand the principles and necessity of prestressed concrete structures.
- Know different techniques of prestressing.
- Get the knowledge on various losses of prestress.
- Understand Analysis and design of prestressed concrete members.

UNIT I:
Introduction & Methods and Systems of Prestressing:
Historic development - General principles of prestressing, Pretensioning and Posttensioning - Advantages and limitations of Prestressed concrete - General principles of PSC - Classification and types of prestressing - Materials - high strength concrete and high tensile steel and their characteristics - Prestressing and Posttensioning methods and systems of prestressing like Hoyer system, Magnel Blaton system, Freyssinet system and Gifford- Udall System - Lee McCall system

Flexure: Analysis of sections for flexure - beams prestressed with straight, concentric, eccentric, bent and parabolic tendons, Line of Thrust – Pressure Line, Load Balancing Concept.

UNIT II:
Losses of Prestress: Loss of prestress in pretensioned and posttensioned members due to various causes like elastic shortening of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, slip in anchorage, frictional losses.


UNIT III
Deflections: Importance of control of deflections - Factors influencing deflections – Short term deflections of uncracked beams - prediction of long time deflections - IS code requirements.

Composite Beams: Different Types - Propped and Unpropped - Stress distribution - Differential shrinkage - Analysis of composite beams - Deflection of determinate composite beam.

UNIT IV:

UNIT V:
Ultimate Shear Strength of PSC Beams: Introduction, Shear Strength of Beams without Shear Reinforcement, Modes of Shear Failure in PSC Beams, Truss Analogy – The Variable Truss Inclination method for Sections which require Shear Reinforcement, IS 1343 -2012 Codal Provisions –Bending, Shear and Torsion,

Course Outcomes
After the completion of the course student should be able to
- Acquire the knowledge of evolution of process of prestressing.
- Acquire the knowledge of various prestressing techniques.
- Develop skills in analysis design of prestressed structural elements as per the IS codal provisions

Text Books :-
1. Prestressed Concrete by N.Krishna Raju, Tata Mc Graw Hill Book co.

References :
4. IS 1343:2012
PROFESSIONAL ELECTIVE - II
OPTIMIZATION TECHNIQUES IN STRUCTURAL ENGINEERING

III Year B.Tech. II-Sem

Pre- requisites:-Mathematics I&II

Course Objectives: To understand the theory of optimization methods and algorithms developed for solving various types of optimization problems.

UNIT I

UNIT II

UNIT III
Dynamic Programming: Introduction - Multistage decision processes - concept of sub-optimization and the principle of optimality - computational procedure in dynamic programming - example illustrating the Calculus method of solution - example illustrating the Tabular of solution - conversion of a final value problem into an initial value problem - continuous dynamic programming - Additional applications.

UNIT IV

UNIT V
Application of Optimization techniques to trusses, Beams and Frames.

Course Outcomes: The student will be able to understand the basic principles of optimization, and in a position to formulate optimization models for a wide range of civil engineering problems and able to solve them.
Text Books:


References

PROFESSIONAL ELECTIVE - II
INTRODUCTION TO COMPOSITE MATERIALS

III Year B.Tech. II-Sem

Pre- Requisites: -Structural Engineering –I (RCC)

Course Objectives:-
- To Study the properties of Composite Laminae and its macro mechanical analysis
- To study the behavior of glass fibre reinforced laminates.
- To design GRP box beams and stressed skinned roof structures.

UNIT - I

UNIT - II

UNIT - III

UNIT - IV

UNIT - V
Design of GRP Box Beams: Introduction, loading, span and cross-sectional shape, Selection of material, Beam manufacture, Beam stresses, Experimental Behaviour, Effect on Beam performance-Modulus of Elasticity, Compressive Strength, I value, prevention of compression buckling failure, Behaviour under long term loading.
Design of Stressed skinned roof structure: Introduction, loading and material properties, preliminary design, and computer analysis.

Course Outcomes:-
After the completion of the course the student will be able to
- Acquire the knowledge about the composite laminae, glass fibre reinforced laminae and their strength characteristics
- Develop skills in design of GRP box beams&Stressed skinned roof structure.

Text book
1. GRP in Structural Engineering M.Holmes and D.J.Just.
PROFESSIONAL ELECTIVE – III
IRRIGATION AND HYDRAULIC STRUCTURES

IV Year B.Tech. I-Sem

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Pre-Requisites: Hydraulics& Hydraulic machinery, Hydrology &Water Resources Engineering

Course Objectives: To study various types of storage works and diversion headwork, their components and design principles for their construction.

UNIT - I
Storage Works-Reservoirs - Types of reservoirs, selection of site for reservoir, zones of storage of a reservoir, reservoir yield, estimation of capacity of reservoir using mass curve- Reservoir Sedimentation – Life of Reservoir.. Types of dams, factors affecting selection of type of dam, factors governing selection of site for a dam.

UNIT - II
Gravity dams: Forces acting on a gravity dam, causes of failure of a gravity dam, elementary profile, and practical profile of a gravity dam, limiting height of a low gravity dam, Factors of Safety - Stability Analysis, Foundation for a Gravity Dam, drainage and inspection galleries.

UNIT- III
Earth dams: types of Earth dams, causes of failure of earth dam, criteria for safe design of earth dam, seepage through earth dam-graphical method, measures for control of seepage. Spillways: types of spillways, Design principles of Ogee spillways - Spillway gates. Energy Dissipaters and Stillig Basins Significance of Jump Height Curve and Tail Water Rating Curve - USBR and Indian types of Stillig Basins.

UNIT- IV
Diversion Head works: Types of Diversion head works- weirs and barrages, layout of diversion head work - components. Causes and failure of Weirs and Barrages on permeable foundations,-Silt Ejectors and Silt Excluders
Weirs on Permeable Foundations – Creep Theories - Bligh’s, Lane’s and Khosla’s theories, Determination of uplift pressure- Various Correction Factors – Design principles of weirs on permeable foundations using Creep theories - exit gradient, U/s and D/s Sheet Piles - Launching Apron.

UNIT- V
Canal Falls - types of falls and their location, Design principles of Notch Fall and Sarada type Fall.Canal regulation works, principles of design of cross and distributary head regulators, types of Canal escapes - types of canal modules, proportionality, sensitivity,setting and flexibility. Cross Drainage works: types, selection of suitable type, various types, design considerations for cross drainage works

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

- Know types of water retaining structures for multiple purposes and its key parameters considered for planning and designing
- Understand details in any Irrigation System and its requirements
- Know, Analyze and Design of a irrigation system components

TEXT BOOKS:
1. Irrigation Engineering and Hydraulic structures by Santhosh kumar Garg, Khanna Publishers.
3. Irrigation and water power engineering by Punmia & Lal, Laxmi publications Pvt. Ltd., New Delhi
REFERENCES:
1. Theory and Design of Hydraulic structures by Varshney, Gupta & Gupta
PROFESSIONAL ELECTIVE - III
GEO ENVIRONMENTAL ENGINEERING

IV Year B.Tech. I-Sem

Pre Requisites: Soil Mechanics & Environmental Engineering-I

Course Objectives:
1. To study the sources of contamination and characterization of contaminated ground.
2. To study and model the contaminable Transport.
3. To identify appropriate remediation technique for the contaminated.

Unit. I
Sources and Site Characterization: Scope of Geoenvironmental Engineering, Various Sources of Contaminations, Need for contaminated site characterization; and Characterisation methods.

Unit. II
Solid and Hazardous Waste Management: Classification of waste, Characterisation solid wastes, Environmental Concerns with waste, waste management strategies.

Unit. III

Unit. IV
Remediation Techniques: Objectives of site remediation, various active and passive methods, remediation NAPL sites, Emerging Remediation Technologies.

Unit. V
Landfills: Types of landfills, Site Selection, Waste Containment Liners, Leachate collection system, Cover system, Gas collection system.

Course Outcomes:
Able to identify appropriate remediation techniques for contamination & provide models

Text Books
1. Bedient, Refai & Newell - Ground Water Contamination
2. Sharma, H. D. and Reddy, K. R. - Geoenvironmental Engineering

References:
1. Rowe, R. K. - Geotechnical & Geoenvironmental Engineering Handbook
2. Reddi, L. N. and Inyang, H. I. - Geoenvironmental Engineering
3. LaGrega, M. D., Buckingham, P. L. and Evans, J. C. - Hazardous Waste Management
IV Year B.Tech. I-Sem

Course Objectives:

The objectives of the course are to

- Know the concepts of Remote Sensing, its interpreting Techniques and concepts of Digital images
- Know the concept of Geographical Information System (GIS), coordinate system GIS Data and its types
- Understand the students managing the spatial Data Using GIS.
- Understand Implementation of GIS interface for practical usage.

UNIT – I


UNIT- II:

Introduction to GIS: Introduction, History of GIS, GIS Components, GIS Applications in Real life, The Nature of geographic data, Maps, Types of maps, Map scale, Types of scale, Map and Globe, Coordinate systems, Map projections, Map transformation, Geo-referencing.

Spatial Database Management System: Introduction: Spatial DBMS, Data storage, Database structure models, database management system, entity-relationship model, normalization

Data models and data structures: Introduction, GIS Data model, vector data structure, raster data structure, attribute data, geo-database and metadata,

UNIT- III:

Spatial Data input and Editing: Data input methods – keyboard entry, digitization, scanning, conversion of existing data, remotely sensed data, errors in data input, Data accuracy, Micro and Macro components of accuracy, sources of error in GIS.

Spatial Analysis: Introduction, topology, spatial analysis, vector data analysis, Network analysis, raster data analysis, Spatial data interpolation techniques

UNIT- IV:

Implementing a GIS and Applications

Implementing a GIS: Awareness, developing system requirements, evaluation of alternative systems, decision making using GIS

Applications of GIS

GIS based road network planning, Mineral mapping using GIS, Shortest path detection using GIS, Hazard Zonation using remote sensing and GIS, GIS for solving multi criteria problems, GIS for business applications.
Course Outcomes
After the completion of the course student should be able to

- **Describe** different concepts and terms used in Remote Sensing and its data
- Understand the Data conversion and Process in different coordinate systems of GIS interface
- **Evaluate** the accuracy of Data and implementing a GIS
- Understand the applicability of RS and GIS for various applications.

**TEXT BOOKS**


**REFERENCES**

4. Textbook of Remote Sensing and Geographical Information systems by M. Anji Reddy,
PROFESSIONAL ELECTIVE - IV
DESIGN AND DRAWING OF IRRIGATION STRUCTURES

IV Year B.Tech. I-Sem

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Pre Requisites: WRE – I & II

Course Objectives: Learn designing and drawing of hydraulic structure like surplus weir, siphon well drop, trapezoidal notch fall, tank sluice with tower head.

Design and drawing of the following hydraulic structures

Group A
1. Surplus weir.
2. Syphon Well Drop
3. Trapezoidal notch fall.
4. Tank sluice with tower head

Group B
1. Sloping glacis weir.
2. Canal regulator
4. Type III Syphon aqueduct

Final Examination pattern:

The Question paper is divided into two parts with two questions in each part. The student has to answer ONE question from each part. Part I should cover the designs and drawings from Group A for 45 marks and Part II should cover only designs from group B carrying 30 marks.

The duration of examination will be FOUR hours.

However, the students are supposed to practice the drawings for Group B structures also for internal evaluation.

Course Outcomes: Able to provide design & drawing of irrigation structures

TEXT BOOKS:
PROFESSIONAL ELECTIVE – IV
ADVANCED FOUNDATION ENGINEERING

IV Year B.Tech. II-Sem  
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Pre- Requisites:- Soil Mechanics & Foundation Engineering

Course Objectives:
- To study Soil exploration & Preparation of soil reports.
- To study the concepts of foundations on collapsible and expansive soils
- In depth study of Shallow & Deep foundations
- To study the settlements of Pile groups.

UNIT- I
Soil Exploration: Exploration Methods; Planning the Exploration Program; Boring and Sampling; In Situ Tests: Standard & Cone Penetration Tests, Field Vane & Borehole shear tests, Dilatometer, Pressuremeter; Rock Sampling, Core Recovery, RQD; Geophysical Exploration; Preparation of Soil Report.

UNIT- II
Shallow Foundations: Bearing Capacity: - General Formulae; Effect of Water Table; Footings with eccentric or Inclined Loads, Foundations on Layered Soils, on finite layer with a Rigid Base at Shallow Depth, effect of compressibility of soil.

UNIT- III
Settlement: Components – Immediate, Consolidation & Creep, Stresses and Displacements in Homogeneous, Layered and Anisotropic Soils; Consolidation Settlement; One, Two & Three Dimensional Consolidation; Secondary Compression Settlement; Bearing Pressure using SPT, CPT, Dilatometer and Pressuremeter; Settlement of foundations on Sands-Schmertmann and Burland & Busbridge methods; Structure Tolerance to Settlement and Differential Settlements, Rotation of Tall Structures.

UNIT- IV
Deep Foundations: Single Pile: Vertically loaded piles, Static capacity α, β and λ Methods, Dynamic formulae; Point Bearing Resistance with SPT and CPT Results; Bearing Resistance of Piles on Rock; Settlement; Pile Load Test; Uplift Resistance; Laterally Loaded Piles -Ultimate Lateral Resistance; Negative Skin Friction; Batter Piles; Under Reamed Piles; Ultimate Capacity of Pile Groups in Compression, Pullout & Lateral Load; Efficiency; Settlements of Pile Groups; Interaction of Axially & Laterally Loaded Pile Groups.

UNIT- V
Special Topics of Foundation Engineering
Foundations on Expansive Soils: The nature, origin and occurrence, Identifying, testing and evaluating expansive soils, typical structural distress patterns and Preventive design & construction measures.
Introduction to Reliability-Based Design: Methods, LRFD for structural strength requirements, LRFD for geotechnical strength requirements, Serviceability requirements.
Course Outcomes:

- Able to plan and select the soil exploration methods
- Determine the Bearing capacity of Soil and elements for the design of shallow foundations
- To design the deep foundations under different loading conditions
- To design the foundations on problematic soils and reliability based design for shallow and deep foundations

REFERENCE:

PROFESSIONAL ELECTIVE - V  
ENVIRONMENTAL ENGINEERING -II

IV Year B.Tech. I-Sem

Pre –Requisites : Environmental Engineering-I

Course Objectives: The objectives of the course are to

- Understand the Air pollution Concepts
- Define the terms and Understands the necessity of solid waste management
- Understanding the concepts of industrial waste treatment and hazardous waste

UNIT – I
Air Pollution – sources of pollution – Classification – effects on human beings – Global effects of Air pollution.

UNIT – II

UNIT –III

UNIT – IV

UNIT – V

Course Outcomes:-
- Identify Air pollution control Methods
- Gain Knowledge about environmental protection Act’s

TEXT BOOKS:
1. Environmental Science and Engineering by J.G.Henry and G.W.Heinke – Person Education.

REFERENCES:
1. Physico – Chemical process for waster quality control by Weber
2. Air Pollution and Control by MN Rao & H.N.Rao
PROFESSIONAL ELECTIVE - V
THEORY AND APPLICATIONS OF CEMENT COMPOSITES

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

- Formulate constitutive behaviour of composite materials – Ferrocement, SIFCON and Fibre Reinforced Concrete - by understanding their strain-stress behaviour.
- Classify the materials as per orthotropic and anisotropic behaviour.
- Estimate strain constants using theories applicable to composite materials.
- Analyze and design structural elements made of cement composites.

UNIT – I

UNIT – II

UNIT – III

UNIT – IV
Mechanical Properties of Cement Composites: Behavior of Ferrocement, Fiber Reinforced Concrete in Tension, Compression, Flexure, Shear, Fatigue and Impact, Durability and Corrosion.

UNIT – V
Analysis and Design of Cement Composite Structural Elements - Ferro cement, SIFCON and Fiber Reinforced Concrete.

Reference Books:

PROFESSIONAL ELECTIVE - V  
PAVEMENT DESIGN

IV Year B.Tech. II-Sem  

L  T  P  C  
3  0  0  3

Pre Requisites: Transportation Engineering

Course Objectives: The study factors affecting pavement design, material characteristics, design of flexible, rigid pavements and low volume roads.

UNIT – I

UNIT – II

UNIT – III

UNIT - IV
Design Of Flexible Pavements: Flexible Pavement Design Concepts, Asphalt Institute’s Methods with HMA and other Base Combinations, AASHTO, IRC Methods

UNIT – V

Course Outcomes: The student will be able to design pavements
**Text Books:**
2. Pavement Analysis & Design, Yang H. Huang, Prentice Hall Inc

**References:**
4. IRC Codes 37, 58, 62, 81 for Flexible and Rigid Pavements design, low volume roads and over lays.
PROFESSIONAL ELECTIVE - VI
GROUND IMPROVEMENT TECHNQUES

IV Year B.Tech. II-Sem

Prerequisites: Geo-Technical Engineering, Foundation Engineering

Course Objectives: The objectives of the course are

- To know the need of ground improvement
- To acquire the knowledge on the various ground improvement techniques available and their applications for different types of soils
- To understand suitable ground improvement technique for given soil conditions.

UNIT I:
Introduction to Engineering Ground Modification: Need and objectives, Identification of soil types, In situ and laboratory tests to characterize problematic soils; Mechanical, Hydraulic, Physico-chemical, Electrical, Thermal methods, and their applications.

UNIT II:

UNIT III:

UNIT IV:
Physical and Chemical Modification – Modification by admixtures, Modification Grouting, Introduction to Thermal Modification including freezing.

UNIT V:
Modification by Inclusions and Confinement - Soil reinforcement, reinforcement with strip, and grid reinforced soil. In-situ ground reinforcement, ground anchors, rock bolting and soil nailing.

Course Outcomes: At the end of the course the student able to

- Know the necessity of ground improvement
- Understand the various ground improvement techniques available
- Select & design suitable ground improvement technique for existing soil conditions in the field

Text Books

References:
PROFESSIONAL ELECTIVE - VI
PIPELINE ENGINEERING

IV Year B.Tech. I-Sem

L  T  P  C
3  0  0  3

Pre Requisites: Fluid Mechanics, Hydraulics and Hydraulic Machinery

Course Objectives:
- To familiarize the students with the various elements and stages involved in transportation of water.
- To understand standards and practices in piping design.
- To know various equipment and their operation in pipelinetransportation.
- To understand technology in transportation of fluids.

UNIT - I


UNIT – II
Frictional Head loss in Pipes: Major and Minor losses, Artificially roughened pipes, moody Diagram. Friction coefficient relationships, Empirical formulae, Simple pipe flow problems Equivalent pipes; pipes in series, parallel, series-parallel; problems. Water Hammer and energy transmission through pipes: gradual and Instantaneous closure

UNIT – III


UNIT – IV


UNIT - V

Pipelineconstruction: Construction–Commissioning.

Course Outcome: At the end of the course the student will able to get an understanding of the key steps in a pipeline’s lifecycle: design, construction, installation, asset management and maintenance.

Text Books:
1. Analysis of Water Distribution Networks, P.R. Bhave and R. Gupta, Narosa Publishing House Pvt. Ltd.

Reference Books:
PROFESSIONAL ELECTIVE - VI
URBAN TRANSPORTATION ENGINEERING

IV Year B.Tech. II-Sem

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Course Objectives:
- The course introduces students to the fundamentals of Urban transportation engineering
- It familiarizes students with contemporary transportation planning issues and methods of analysis.

Unit I:
**Introduction:** Fundamentals of Transportation, Principles of planning, evaluation, selection, adoption, financing, and implementation of alternative urban transportation systems

Unit II:
**Data Collection And Inventories:** Collection of data – Organization of surveys and Analysis, Study Area, Zoning, Types and Sources of Data, Road Side Interviews, Home Interview Surveys, Commercial Vehicle Surveys, Sampling Techniques, Expansion Factors, Accuracy Checks, Use of Secondary Sources, Economic data – Income – Population – Employment – Vehicle Ownership.

Unit III:
**Travel Demand issues:** Travel Attributes, Assumptions in Demand Estimation, Detailed approach on 4 step travel demand estimation; Sequential, and Simultaneous Approaches, Aggregate and Disaggregate Techniques.

Unit IV:
**Demand and supply planning** Plan Preparation and Evaluation: Travel Forecasts to Evaluate Alternative Improvements, Impacts of New Development on Transportation Facilities. Master plans, Selection of Corridor, Corridor Identification, Corridor deficiency Analysis

Unit V:
**Metropolitan cities:** Issues in urban mobility, integrating land use and transport planning; Overview of urbanization process, city structure and urban activity and infrastructure systems, Economic and social significance of urban infrastructure systems; Transport’s Role in tackling Social Inclusion

Course Outcomes:
At the end of the course, the student will be able to:
- Identify urban transportation problems.
- Estimate urban travel demand.
- Plan urban transport networks.
- Identify urban transport corridors.
- Prepare urban transportation plans

Text books
1. Introduction to Transportation Planning – M.J.Bruton; Hutchinson of London Ltd.
2. Introduction to Urban System Planning - B.G.Hutchinson; Mc Graw Hill.

References:
1. Traffic Engineering and Transport Planning - Kadiyali L.R., Khanna Publishers
2. Lecture notes on UTP - Prof. S. Raghavachari , R.E.C.Warangal.
OPEN ELECTIVE - I
DISASTER PREPAREDNESS & PLANNING MANAGEMENT

III Year B.Tech. II-Sem

Course Objectives:
The objectives of the course are

- To Understand basic concepts in Disaster Management
- To Understand Definitions and Terminologies used in Disaster Management
- To Understand Types and Categories of Disasters
- To Understand the Challenges posed by Disasters
- To understand Impacts of Disasters

UNIT I:
Introduction - Concepts and definitions: disaster, hazard, vulnerability, resilience, risks severity, frequency and details, capacity, impact, prevention, mitigation.

UNIT II
Disasters - Disasters classification; natural disasters (floods, draught, cyclones, volcanoes, earthquakes, tsunami, landslides, coastal erosion, soil erosion, forest fires etc.); manmade disasters (industrial pollution, artificial flooding in urban areas, nuclear radiation, chemical spills, transportation accidents, terrorist strikes, etc.); hazard and vulnerability profile of India, mountain and coastal areas, ecological fragility.

UNIT III
Disaster Impacts - Disaster impacts (environmental, physical, social, ecological, economic, political, etc.); health, psycho-social issues; demographic aspects (gender, age, special needs); hazard locations; global and national disaster trends; climate change and urban disasters.

UNIT IV
Disaster Risk Reduction (DRR) - Disaster management cycle – its phases; prevention, mitigation, preparedness, relief and recovery; structural and non-structural measures; risk analysis, vulnerability and capacity assessment; early warning systems, Post disaster environmental response (water, sanitation, food safety, waste management, disease control, security, communications); Roles and responsibilities of government, community, local institutions, NGOs and other stakeholders; Policies and legislation for disaster risk reduction, DRR programmes in India and the activities of National Disaster Management Authority.

UNIT V
Disasters, Environment and Development - Factors affecting vulnerability such as impact of developmental projects and environmental modifications (including of dams, landuse changes, urbanization etc.), sustainable and environmental friendly recovery; reconstruction and development methods.

Course Outcomes:
The student will develop competencies in

- the application of Disaster Concepts to Management
- Analyzing Relationship between Development and Disasters.
- Ability to understand Categories of Disasters and
- realization of the responsibilities to society

Text Books:
Reference Books:
1. http://ndma.gov.in/ (Home page of National Disaster Management Authority)
OPEN ELECTIVE - II
REMOTE SENSING & GIS

IV Year B.Tech. I-Sem

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Course Objectives:
The objectives of the course are to

- Know the concepts of Remote Sensing, its interpreting Techniques and concepts of Digital images
- Know the concept of Geographical Information System (GIS), coordinate system GIS Data and its types
- Understand the students managing the spatial Data Using GIS.
- Understand Implementation of GIS interface for practical usage.

UNIT – I

UNIT- II:
Introduction to GIS: Introduction, History of GIS, GIS Components, GIS Applications in Real life, The Nature of geographic data, Maps, Types of maps, Map scale, Types of scale, Map and Globe, Coordinate systems, Map projections, Map transformation, Geo-referencing,
Spatial Database Management System: Introduction: Spatial DBMS, Data storage, Database structure models, database management system, entity-relationship model, normalization
Data models and data structures: Introduction, GIS Data model, vector data structure, raster data structure, attribute data, geo-database and metadata,

UNIT- III:
Spatial Data input and Editing: Data input methods – keyboard entry, digitization, scanning, conversion of existing data, remotely sensed data, errors in data input, Data accuracy, Micro and Macro components of accuracy, sources of error in GIS.
Spatial Analysis: Introduction, topology, spatial analysis, vector data analysis, Network analysis, raster data analysis, Spatial data interpolation techniques

UNIT- IV: Implementing a GIS and Applications
Implementing a GIS: Awareness, developing system requirements, evaluation of alternative systems, decision making using GIS
Applications of GIS
GIS based road network planning, Mineral mapping using GIS, Shortest path detection using GIS, Hazard Zonation using remote sensing and GIS, GIS for solving multi criteria problems, GIS for business applications.
Course Outcomes
After the completion of the course student should be able to

- **Describe** different concepts and terms used in Remote Sensing and its data
- Understand the Data conversion and Process in different coordinate systems of GIS interface
- **Evaluate** the accuracy of Data and implementing a GIS
- Understand the applicability of RS and GIS for various applications.

TEXT BOOKS


REFERENCES

8. Textbook of Remote Sensing and Geographical Information systems by M. Anji Reddy,
OPEN ELECTIVE - III
ENVIRONMENTAL IMPACT ASSESSMENT

IV Year B.Tech. II-Sem

Course Objectives: The objectives of the course are to

- Define and Classify Environmental Impacts and the terminology
- Understands the environmental Impact assessment procedure
- Explain the EIA methodology
- List and describe environmental audits

UNIT-I

UNIT-II
EIA Methodologies: Environmental attributes-Criteria for the selection of EIA methodology, impact identification, impact measurement, impact interpretation & Evaluation, impact communication, Methods-Adhoc methods, Checklists methods, Matrices methods, Networks methods, Overlays methods. EIA review- Baseline Conditions -Construction Stage Impacts, post project impacts.

UNIT-III
Environmental Management Plan: EMP preparation, Monitoring Environmental Management Plan, Identification of Significant or Unacceptable Impacts Requiring Mitigation, Mitigation Plans and Relief & Rehabilitation, Stipulating the Conditions, Monitoring Methods, Pre- Appraisal and Appraisal.

UNIT-IV

UNIT-V

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

- Identify the environmental attributes to be considered for the EIA study
- Formulate objectives of the EIA studies
- Identify the methodology to prepare rapid EIA
- Prepare EIA reports and environmental management plans
Text Books:

References: