# CURRICULUM AND SYLLABI FOR AUTONOMOUS STREAM

## B.TECH. (CIVIL ENGINEERING) COURSES

(For Students Admitted from Academic Year 2014-15 onwards)

### CURRICULUM

#### I SEMESTER

<table>
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<th>Subject Code</th>
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<th>Periods</th>
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**Total Credits** 32

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**Total Credits** 30

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# CA – Continuous Assessment, SE – Semester Examination, TM – Total Marks

* TA – Theory Category A, TB – Theory Category B, TC – Theory Category C,

LB – Laboratory, EGD – Engineering Graphics / Drawing

POD – Practice Oriented Design, TCP – Theory Combined with Practice, PR - Practice

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* Approved in 3rd Academic Council Meeting
### III SEMESTER

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**Total Credits** 26

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**Total Credits** 27

*TX® - Theory Course (Category TA/TB/TC/TCP)*
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**Total Credits** 26

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**Total Credits** 27

*TX® - Theory Course (Category TA/TB/TC/TCP)*
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**Total Credits** 26

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<td>Industrial Refrigeration and Air-Conditioning</td>
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<td>Object Oriented Programming using C++</td>
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<td>41</td>
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<td>PHG01</td>
<td>Introduction to Nanoscience and Nanotechnology</td>
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<td>Nanotechnology and Nanoelectronics</td>
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<td>Non Destructive Testing</td>
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<td>Smart Materials and Structures</td>
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<td>Soft skill and Personality Development</td>
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## CONSOLIDATED CREDIT DISTRIBUTION

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SYLLABUS (Core Subjects)
Department : Mathematics  
Programme : B.Tech.

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<td>MA101</td>
<td>Mathematics I</td>
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Prerequisite -

Objectives
- To introduce the ideas of differential and integral calculus
- To familiarize students with functions of several variables
- To introduce methods for solving differential equations

Outcome
- Understands Calculus
- Functions of several variables
- Able to solve differential equations

UNIT – I
Curvature, radius of curvature, evolutes and involutes. Beta and Gamma functions and their properties.

UNIT – II
Partial derivatives, Total derivative, Differentiation of implicit functions, Change of variables, Jacobians and their properties, Partial differentiation of implicit functions, Maxima and minima of functions of two variables, Lagrange’s method of undetermined multipliers.

UNIT – III
Multiple Integrals, change of order of integration in double integrals, Applications: Plane areas (double integration), Change of variables (Cartesian to polar), volumes by solids of revolution, double and triple integrations (Cartesian and polar) – Center of mass and Gravity (constant and variable densities).

UNIT – IV
Exact equations, First order linear equations, Bernoulli’s equation, orthogonal trajectories, growth, decay and geometrical applications. Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut’s type.

UNIT – V
Linear differential equations of higher order - with constant coefficients, the operator D, Euler’s linear equation of higher order with variable coefficients, simultaneous linear differential equations, solution by variation of parameters method.

Total contact Hours: 45  Total Tutorials: 15  Total Practical Classes:  
Total Hours: 60

Text Books:

Reference Books:
Semester : One
Category : TA

Subject Code  Subject             Hours / Week  Credit  Maximum Marks
PH101         Engineering Physics  4          -        -          40    60    100

Prerequisite
- To provide a bridge between basic Physics and Engineering courses.
- To introduce the concepts and applications of Ultrasonics, Optics, Lasers, Optical Fibers, and wave mechanics and fundamentals of crystal structure.

Outcome
- At the end of the course, Students would have adequate exposure to the concepts of the various topics of this Engineering Physics course and their real life applications.

UNIT – I Acoustics and Ultrasonics Hours: 12


UNIT – II Optics Hours: 12


UNIT – III Crystal Structure and Lattice Defects Hours: 12

Crystal structure: Space Lattice, Unit Cell, Lattice Parameters, Crystal Systems, Bravais Lattices- Atomic Radius, Co-ordination Number and Packing Factor of SC, BCC, FCC, HCP structures – Miller Indices- Powder X Ray Diffraction Method; Lattice Defects: Qualitative ideas of point, line, surface and volume defects and their influence on properties of solids

UNIT – IV Wave Mechanics Hours: 12

Matter Waves – de Broglie hypothesis – Uncertainty Principle – Schrodinger Wave Equations – Time Dependent – Time Independent – Application to Particle in a One Dimensional potential Box –Concept of Quantum Mechanical Tunneling (without derivation) – Applications of tunneling (qualitative) to Alpha Decay, Tunnel Diode, Scanning Tunneling Microscope.

UNIT – V Lasers and Fiber Optics Hours: 12


Reference Books:
<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject</th>
<th>Hours / Week</th>
<th>Credit</th>
<th>Maximum Marks</th>
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<td>Engineering Chemistry</td>
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<td>60</td>
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**Prerequisite**

- To know the importance of chemistry in engineering education
- To understand the chemistry of industrial processes
- To apply the knowledge of chemistry to solve engineering problems

**Objectives**

- Students will be able to understand and appreciate usefulness of chemistry concepts in the design, fabrication and maintenance of materials for engineering applications.
- Students will gain knowledge about the chemistry background of some of the important industrial processing techniques.
- With the knowledge gained in conceptual chemistry, engineering students will be able to approach confidently the design and development of futuristic materials to meet the requirement of industry and society.

**UNIT – I**

**Water Treatment**

*Hours: 12*


**UNIT – II**

**Industrial Polymers**

*Hours: 12*


**UNIT – III**

**Electrochemical Cells**

*Hours: 12*


**UNIT – IV**

**Corrosion and Control**

*Hours: 12*


**UNIT – V**

**Engineering Materials**

*Hours: 12*


**Text Books:**


**Reference Books:**

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject</th>
<th>Hours / Week</th>
<th>Credit</th>
<th>Maximum Marks</th>
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<tr>
<td>BE102</td>
<td>Basic Electrical and Electronics Engineering</td>
<td>3 1 -</td>
<td>4</td>
<td>40 60 100</td>
</tr>
</tbody>
</table>

**Prerequisite**
- To apply Kirchhoff’s law to simplify the given circuit.
- To understand the concept of AC circuit and to simplify the given RL, RC, RLC series and parallel circuits.
- To understand the principle of electromagnetic induction and the working principle of electrical machines.
- The students understand the working principle of transistor, FET, MOSFET, CMOS and their applications.
- To design adders, subtractors and to gain knowledge on sequential logic circuits.
- To understand the need for communication and acquire knowledge on different communication systems.
- To have an overview of different emerging technologies in day-to-day applications.

**Objectives**
- The students explored the basic terminology, laws and concepts of DC and AC circuits in electrical engineering.
- The students know the principle of operation of DC and AC electrical machines and different types of power plants.
- Will understand the importance of FET’s, MOSFET’s, CMOS and their applications.
- Will be able to design Combinational and Sequential circuits.
- Awareness towards different Communication Systems.
- Gain knowledge in the working principle of real time applications used in day today life like ATM, Microwave Oven, Bluetooth, WiFi and Computer Networks.

**Outcome**
- The students explored the basic terminology, laws and concepts of DC and AC circuits in electrical engineering.
- The students know the principle of operation of DC and AC electrical machines and different types of power plants.
- Will understand the importance of FET’s, MOSFET’s, CMOS and their applications.
- Will be able to design Combinational and Sequential circuits.
- Awareness towards different Communication Systems.
- Gain knowledge in the working principle of real time applications used in day today life like ATM, Microwave Oven, Bluetooth, WiFi and Computer Networks.

**UNIT – I**
**DC Circuits**

**UNIT – II**
**AC Circuits**
Concepts of AC circuits – rms value, average value, form and peak factors – Simple RL, RC and RLC series and parallel circuits – Concept of real and reactive power – Power factor – Series and parallel resonance - Introduction to three phase system - Power measurement by two wattmeter method.

**UNIT – III**
**Electrical Machines and Power Plants**
Law of Electromagnetic induction, Fleming’s Right & Left hand rule - Principle of DC rotating machine, Single phase transformer, single phase induction motor and synchronous motor (Qualitative approach only) - Layout of thermal, hydro and nuclear power generation (block diagram approach only). Components of AC transmission and distribution systems – One line diagram.

**UNIT – IV**
**Electronics**

**UNIT – V**
**Communication**

**UNIT – VI**
**Overview of Emerging Technologies**
## Microwave Ovens - RFID - Automated Teller Machines (ATM)

<table>
<thead>
<tr>
<th>Total contact Hours: 45</th>
<th>Total Tutorials: 15</th>
<th>Total Practical Classes: -</th>
<th>Total Hours: 60</th>
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</thead>
</table>

### Text Books:

**Electrical**

**Electronics and Communication**

### Reference Books:

**Electrical**

**Electronics and Communication**

### Web sites:

1. www.electronics-tutorials.ws
2. www.en.wikipedia.org/wiki/Telecommunication
3. www.nptel.ac.in/courses/IIT-MADRAS/Basic_Electronics.../LECTURE1.pdf
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<th>Credit</th>
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<td>Engineering Thermodynamics</td>
<td>3 L 1 T 1 P 4 C</td>
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<td>40 CA 60 SE 100 TM</td>
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**Prerequisite**
- To convey the basics of the thermodynamic principles
- To establish the relationship of these principles to thermal system behaviors
- To develop methodologies for predicting the system behavior
- To establish the importance of laws of thermodynamics applied to energy systems
- To explain the role of refrigeration and heat pump as energy systems
- To develop an intuitive understanding of underlying physical mechanism and a mastery of solving practical problems in real world.

**Objectives**
- Parallels are drawn between the subject and the student’s everyday experience so that this course may be related to what the students already know.
- Students are made to understand the principles of thermodynamics and adjudge the viability of operation of any thermal system in real time applications
- Students are encouraged to make engineering judgments, to conduct independent exploration of topic of thermodynamics and to communicate the findings in a professional manner.
- Students are made to develop natural curiosity to explore the various facets of thermodynamic laws.
- While emphasizing basic laws, students are provided with modern tools to use in real time engineering problems.

**Outcome**
- Parallels are drawn between the subject and the student’s everyday experience so that this course may be related to what the students already know.
- Students are made to understand the principles of thermodynamics and adjudge the viability of operation of any thermal system in real time applications
- Students are encouraged to make engineering judgments, to conduct independent exploration of topic of thermodynamics and to communicate the findings in a professional manner.
- Students are made to develop natural curiosity to explore the various facets of thermodynamic laws.
- While emphasizing basic laws, students are provided with modern tools to use in real time engineering problems.

**UNIT – I**


**UNIT – II**

The concept of energy, work and heat – reversible work- internal energy -Perfect gas – specific heats – Joules law - enthalpy- Conservation of Energy principle for closed and open systems - First law of thermodynamics – Application of first law to a process (flow and non-flow) – Steady flow energy equation and its engineering application - Calculation of work and heat for different processes.

**UNIT – III**


**UNIT – IV**


**UNIT – V**

Reverse Carnot cycle - COP - Vapor compression refrigeration cycle and systems (only theory) - Gas refrigeration cycle - Absorption refrigeration system – Liquefaction – Solidification (only theory).

**Text Books:**

<table>
<thead>
<tr>
<th><strong>Reference Books:</strong></th>
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<table>
<thead>
<tr>
<th><strong>Web sites:</strong></th>
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<tr>
<td>1. <a href="http://nptel.iitm.ac.in/courses/Webcourse-contents/">http://nptel.iitm.ac.in/courses/Webcourse-contents/</a></td>
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Department: Computer Science and Engineering/Information Technology

Programme: B.Tech.

Semester: One

Category: TA

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<td>Computer Programming</td>
<td>3 1 -</td>
<td>4</td>
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Prerequisite:
- To introduce the basics of computers and information technology.
- To educate problem solving techniques.
- To impart programming skills in C language.
- To practice structured programming to solve real life problems.

Objectives:
On successful completion of the course, students will be able to:
- Understand the basics of computers and its related components
- Have the ability to write a computer program to solve specified problems

Outcome:

UNIT – I
Hours: 09

UNIT – II
Hours: 09

UNIT – III
Hours: 09
Strings – String I/O functions, String Library functions – Storage classes.

UNIT – IV
Hours: 09
Structures – Arrays and Structures – Nested structures – Structure as Argument to functions– Union
Pointers – Declaration, Initialization and Accessing Pointer variable – Pointers and arrays – pointers as argument and return value – Pointers and strings - pointers and structures.

UNIT – V
Hours: 09
Dynamic Memory Allocation: MALLOC, CALLOC, FREE, REALLOC
Introduction to preprocessor – Macro substitution directives – File inclusion directives – Compiler Control directives – Miscellaneous directives.

Total contact Hours: 45  Total Tutorials: 15  Total Practical Classes: -  Total Hours: 60

Text Books:

Reference Books:
Department: Mechanical Engineering  
Programme: B.Tech  
Semester: One  
Category: EGD  

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<td>Engineering Graphics</td>
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Prerequisite: -

Objectives:
- To convey the basics of engineering drawing
- To explain the importance of an engineering drawing
- To teach different methods of making the drawing
- To establish the importance of projects and developments made in drawing that are used in real systems

Outcome:
- From what students have already learnt and know, relation has been brought about how to bring their vision into realities.
- Students are made to follow and understand the basic of mechanical drawing
- Students are encouraged to make engineering drawing of physical object representing engineering systems.
- Students are made to develop natural curiosity to explore the various facets of engineering drawings.

UNIT – 0  
Introduction to Standards for Engineering Drawing practice, Lettering, Line work and Dimensioning.

UNIT – I  
Projection of Points and Projection of lines  
Hours: T-06; P-09

UNIT – II  
Projection of Planes and Projections of solids in simple positions  
Hours: T-06; P-09

UNIT – III  
Projection of solids in complicated positions  
Hours: T-06; P-09

UNIT – IV  
Sections of solids - Development of Surfaces  
Hours: T-06; P-09

UNIT – V  
Axonometric Projections: Isometric Projections (simple solids); Perspective Projections (planes and simple solids; Orthographic Projections  
Hours: T-06; P-09

Total contact Hours: 30  
Total Tutorials: -  
Total Practical Classes: 45  
Total Hours: 75

Text Books:
3. BIS, Engineering Drawing practices for Schools & College, SP 46 : 2003

Reference Books:
4. James D Bethune and et. al., Modern Drafting, Prentice Hall Int.,

Web sites:
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<td>• To study and understand the use of OS commands</td>
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<td>• To get familiarity on MS-Office packages like MS-Word, MS-Excel and MS-Powerpoint</td>
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<tr>
<td>• To gain a hands on experience of compilation and execution of ‘C’ programs</td>
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<tr>
<td>• To inculcate logical and practical thinking towards problem solving using C programming.</td>
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<table>
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<tr>
<td>On successful completion of the course, students will be able to:</td>
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<tr>
<td>• Have the ability to write a computer program to solve specified problems</td>
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<tr>
<td>• Problem solving ability will be gained by the students</td>
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<th>Fundamentals of Computing</th>
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<td>2. Use of mail merge in word processor</td>
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<td>3. Use of spreadsheet to create Charts (XY, Bar, Pie) with necessary formulae.</td>
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<td>2. Basic C Programs</td>
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<td>a. Arithmetic Operations</td>
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<td>b. Area and Circumference of a circle</td>
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<tr>
<td>c. Swapping with and without Temporary Variables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Programs using Branching statements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. To check the number as Odd or Even</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Greatest of Three Numbers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Counting Vowels</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Grading based on Student’s Mark</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Programs using Control Structures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Computing Factorial of a number</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Fibonacci Series generation</td>
<td></td>
<td></td>
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<tr>
<td>c. Prime Number Checking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Computing Sum of Digit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Programs using String Operations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Palindrome Checking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Searching and Sorting Names</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Programs using Arrays</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Sum of ‘n’ numbers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Sorting an Array</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Matrix Addition, Subtraction, Multiplication and Transpose</td>
<td></td>
<td></td>
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<tr>
<td>7. Programs using Functions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Computing nCr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Factorial using Recursion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Call by Value and Call by Reference</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Programs using Structure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Student Information System</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Employee Pay Slip Generation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Electricity Bill Generation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Programs using Pointers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Pointer and Array</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Pointer to function</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Pointer to Structure</td>
<td></td>
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</tbody>
</table>
10. Programs using File Operation
   a. Counting No. of Lines, Characters and Black Spaces
   b. Content copy from one file to another
   c. Reading and Writing Data in File

<table>
<thead>
<tr>
<th>Total contact Hours:</th>
<th>Total Tutorials:</th>
<th>Total Practical Classes: 45</th>
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</table>
Department: Electronics and Communication Engineering / Electrical and Electronics Engineering
Programme: B.Tech.

Semester: One
Category: LB

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject</th>
<th>Hours / Week</th>
<th>Credit</th>
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</tr>
</thead>
<tbody>
<tr>
<td>BE103</td>
<td>Basic Electrical and Electronics Engineering Laboratory</td>
<td>-</td>
<td>3</td>
<td>60 40 100</td>
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</tbody>
</table>

Prerequisite -

Objectives
- To understand the basic electrical tools and their applications.
- To get trained in using different types of wiring.
- To find faults in electrical lamp and ceiling fan.
- To understand and apply Kirchhoffs laws to analyze electrical circuits.
- To study the operation of CRO and principle of fiber optic communication.
- To design adder and substractors.
- To understand the frequency response of RC coupled amplifier.

Outcome
- The students get exposure on the basic electrical tools, applications and precautions.
- The students are trained for using different types of wiring for various purposes in domestic and industries.
- The students are taught to find faults in electrical lamp and ceiling fan.
- Will be able to learn and use equipments like Signal Generator, Power Supply and CRO.
- To apply Kirchhoff's law for simplification of circuits.
- To design combinational circuits.
- To obtain the frequency response of Amplifiers.

List of Experiments

**Electrical Lab**
1. Electrical Safety, Precautions, study of tools and accessories.
2. Practices of different joints.
3. Wiring and testing of series and parallel lamp circuits.
4. Staircase wiring.
5. Doctor’s room wiring.
7. Go down wiring.
8. Wiring and testing a ceiling fan and fluorescent lamp circuit.
9. Study of different types of fuses and A.C. and D.C. meters.

**Electronics and Communication Lab**
2. Study of Fiber Optic Communication.
4. Zener Diode as Voltage Regulator.
5. Design of Adder and Subtractor Circuits.

Total contact Hours: -
Total Tutorials: -
Total Practical Classes: 45
Total Hours: 45
<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject</th>
<th>Hours / Week</th>
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<tr>
<td>MA102</td>
<td>Mathematics II</td>
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<td>100</td>
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</tbody>
</table>

**Prerequisite:**
- To acquaint with theory of Matrices
- Hyperbolic functions and theory of equations
- Vector calculus and statistics

**Objectives:**
- Understand Matrix theory
- Solving techniques of equations
- Understands Vectors and statistics

**Outcome:**
- Understands Matrix theory
- Solving techniques of equations
- Understands Vectors and statistics

**UNIT – I**
**Matrix Theory**

Eigen values and Eigen vectors of a real matrix, Characteristic equation, Properties of Eigen values. Cayley-Hamilton Theorem, Diagonalisation of matrices. Reduction of a quadratic form to canonical form by orthogonal transformation and nature of quadratic forms.

**UNIT – II**
**Trigonometry and Theory of Equations**

Trigonometry: Hyperbolic and circular functions, logarithms of complex number, resolving real and imaginary parts of a complex quantity.

Theory of equations: Relation between roots and coefficients, reciprocal equations, transformation of equations and diminishing the roots.

**UNIT – III**
**Finite Differences**

Finite differences: Definitions and relation between operators ($\Delta, V, \delta, E, \mu, D$). Solution of difference Equations, Solving Boundary value problems for ordinary differential equations using finite difference method.

**UNIT – IV**
**Vector Analysis**

Gradient, divergence and curl, their properties and relations. Stoke’s theorem and Gauss divergence theorem (without proof). Simple applications involving cubes, sphere and rectangular parallelepipeds.

**UNIT – V**
**Statistics**

Moments, skewness and Kurtosis - Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions, Correlation and regression – Rank correlation.

**Text Books:**

**Reference Books:**
Department: Physics  
Programme: B.Tech.

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject</th>
<th>Hours / Week</th>
<th>Credit</th>
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<tbody>
<tr>
<td>PH102</td>
<td>Material Science</td>
<td>4 - - 4</td>
<td>40 60 100</td>
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</table>

Prerequisite: -

Objectives:
- To impart knowledge to the Engineering students about the significance of Materials Science and its contribution to Engineering and Technology.
- To introduce the Physical concepts and properties of Different category of materials and their modern applications in day-to-day life.

Outcome:
- Engineering Students would have gained fundamental knowledge about the various types of materials and their applications to Engineering and Technology.

UNIT – I  
Dielectric Materials  
Hours: 12


UNIT – II  
Magnetic Materials and Superconductors  
Hours: 12


Superconductors: Basic concepts – properties of superconductors – Meissner effect – Type I and II superconductors – BCS theory (qualitative) - High Temperature Superconductors– Qualitative ideas of Josephson effect, quantum interference and SQUID– their applications.

UNIT – III  
Semiconductors  
Hours: 12


UNIT – IV  
Nuclear Reactors and Materials  
Hours: 12


Nuclear fusion reactions for fusion reactors-D-D and D-T reactions, Basic principles of Nuclear Fusion reactors

UNIT – V  
Smart Materials and Nanomaterials  
Hours: 12

Smart Materials: Introduction –definitions. Shape Memory alloys (SMA): One way and two way Shape memory effect, pseudoelasticity, Properties and applications of SMA- features of Ni-Ti SMA alloy.

Liquid Crystals: Types – nematic, cholesteric, smectic- Application to Display Devices

Metallic Glasses: preparation by melt spinning. properties and applications

Nanomaterials: Introduction to Nano materials-Methods of synthesis (CVD, Laser Ablation, Solgel, Ball-milling Techniques), Properties and applications of nanomaterials.

C60 Buck Minister Fullence, carbon nanotubes– synthesis (Plasma arc, Pulsed Laser evaporation methods) Properties and applications.

Total contact Hours: 60  
Total Tutorials: -  
Total Practical Classes: -  
Total Hours: 60

Text Books:

Reference Books:
Department : Chemistry  
Programme : B.Tech.

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject</th>
<th>Hours / Week</th>
<th>Credit</th>
<th>Maximum Marks</th>
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<tbody>
<tr>
<td>CY102</td>
<td>Environmental Science</td>
<td>4</td>
<td>4</td>
<td>40 60 100</td>
</tr>
</tbody>
</table>

Prerequisite -

Objectives

- To widen the knowledge of environmental awareness and pollution
- To educate the importance of preserving the earth’s resources and ecosystem
- To highlight the modern techniques and regulations to monitor and control pollution

Outcome

- Students will be able to understand about the environment and natural resources we are blessed with.
- Students will become aware of environmental issues like pollution, dwindling natural resources and degrading ecosystem.
- Students will be inspired to act as environmentally friendly and work for sustainable development of the humanity.

UNIT – I  
Ecosystem and Biodiversity  
Hours: 12


UNIT – II  
Air Pollution  
Hours: 12


UNIT – III  
Water and Land Pollution  
Hours: 12


UNIT – IV  
Instrumental Pollution Monitoring  
Hours: 12


UNIT – V  
Energy and Environment  
Hours: 12


Text Books:

1. Anubha Kaushik and C.P. Kaushik, Environmental Science and Engineering, New Age International (P) Ltd, New Delhi, 2009. (Unit I)
2. S.S. Dara, A Text Book of Environmental Chemistry and Pollution Control, S. Chand and Company Ltd, New Delhi, 2008. (Unit II, III, & V)

Reference Books:
<table>
<thead>
<tr>
<th></th>
<th>Reference</th>
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</table>
**Department**: Civil Engineering / Mechanical Engineering  
**Programme**: B.Tech

<table>
<thead>
<tr>
<th>Semester</th>
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<th>Subject Code</th>
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<th>Subject</th>
<th>Prerequisite</th>
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<tbody>
<tr>
<td>BE101</td>
<td>BE101</td>
<td>Basic Civil and Mechanical Engineering</td>
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<table>
<thead>
<tr>
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<table>
<thead>
<tr>
<th>Objectives</th>
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</thead>
<tbody>
<tr>
<td>- To be able to differentiate the types of buildings according to national building code.</td>
</tr>
<tr>
<td>- To understand building components and their functions as well as different types of roads, bridges and dams</td>
</tr>
<tr>
<td>- To convey the basics of Mechanical Engineering</td>
</tr>
<tr>
<td>- To establish the necessity of basics of Mechanical Engineering to other engineering disciplines</td>
</tr>
<tr>
<td>- To explain the concepts of thermal plants used in power systems being a common issue</td>
</tr>
<tr>
<td>- To narrate the methods of harnessing renewable energies and their working principles</td>
</tr>
<tr>
<td>- To explain the role of basic manufacturing processes</td>
</tr>
<tr>
<td>- To develop an intuitive understanding of underlying working principles of mechanical machines and systems.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outcome</th>
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</thead>
<tbody>
<tr>
<td>- Parallels are drawn between the subject and the student’s everyday experience so that this course may be related to what the students already know.</td>
</tr>
<tr>
<td>- Students are made to understand the principles of Mechanical Engineering based on theories.</td>
</tr>
<tr>
<td>- Students are encouraged to make engineering judgments, to conduct independent exploration of topic of renewable energy systems and to communicate the findings in a professional manner.</td>
</tr>
<tr>
<td>- Students are made to develop natural curiosity to explore the various facets of mechanical equipment and machines.</td>
</tr>
<tr>
<td>- While emphasizing basic principles, students are provided with explanations used in real time engineering systems.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>UNIT – I</th>
<th>Buildings and Building Materials</th>
<th>Hours: 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buildings-Definition-NBC Classification - plinth area, floor area, carpet area, floor space index-construction materials-stone, brick, cement, cement-mortar, concrete, steel- their properties and uses. Impact of manufacture and use of building materials on the environment.</td>
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</tbody>
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<table>
<thead>
<tr>
<th>UNIT – II</th>
<th>Buildings and their Components</th>
<th>Hours: 10</th>
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<thead>
<tr>
<th>UNIT – III</th>
<th>Basic Infrastructure</th>
<th>Hours: 10</th>
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<table>
<thead>
<tr>
<th>UNIT – IV</th>
<th>IC Engines and Steam Generators</th>
<th>Hours: 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC engines – Classification – Working principles - Diesel and petrol engines: two stroke and four stroke engines – Merits and demerits. Steam generators (Boilers) – Classification – Constructional features (of only low pressure boilers) – Boiler mountings and accessories – Merits and demerits - Applications.</td>
<td></td>
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</tbody>
</table>

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<thead>
<tr>
<th>UNIT – V</th>
<th>Conventional and Non-conventional Power Generation</th>
<th>Hours: 10</th>
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<tbody>
<tr>
<td>UNIT – VI</td>
<td>Introduction to Manufacturing Technology</td>
<td>Hours: 10</td>
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<tr>
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</tr>
<tr>
<td>Machines: Lathe – Drilling machine – Grinding machine (Description only)</td>
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<td><strong>Web sites:</strong></td>
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<td></td>
</tr>
<tr>
<td>1. <a href="http://nptel.iitm.ac.in/courses/Webcourse-contents/">http://nptel.iitm.ac.in/courses/Webcourse-contents/</a></td>
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Department : Civil Engineering          Programme : B.Tech.
Semester : Two                          Category : TB

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<tr>
<td>CE101</td>
<td>Engineering Mechanics</td>
<td>3  1  -  4  40  60  100</td>
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</tbody>
</table>

Prerequisite -

Objectives
- To explain the importance of mechanics in the context of engineering.
- To understand the static equilibrium of particles and rigid bodies in two dimensions
- To introduce the techniques for analyzing the forces in the bodies.
- To study the motion of a body and to write the dynamic equilibrium equation.

Outcome
- On successful completion of the course, a student would be able to identify and analyze the problems by applying the principles of engineering mechanics, and to proceed to advanced study on mechanical systems.

UNIT – I  Fundamentals Of Mechanics  Hours: 09

UNIT – II  Application of Force System  Hours: 09
Types loads and supports – simply supported beams, cantilever beams and plane trusses – reactions (Introduction only).
Friction: Laws of friction, Static dry friction, simple contact friction problems, body on inclined planes, ladders, wedges, simple screw jack.

UNIT – III  Properties of Surfaces  Hours: 09
Properties of sections – centroids, center of gravity, area moment of inertia, product moment of inertia, polar moment of inertia, radius of gyration, mass moment of inertia.
Principle of virtual work – work done – application to simple structural arrangements.

UNIT – IV  Kinematics and Kinetics of Particles  Hours: 09

UNIT – V  Kinematics and Kinetics of Rigid Bodies  Hours: 09

Total contact Hours: 45  Total Tutorials: 15  Total Practical Classes: -  Total Hours: 60

Text Books:

Reference Books:
# Communicative English

**Department:** Humanities and Social Sciences  
**Programme:** B.Tech.

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject</th>
<th>Hours / Week</th>
<th>Credit</th>
<th>Maximum Marks</th>
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<tbody>
<tr>
<td>HS101</td>
<td>Communicative English</td>
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<td>4</td>
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**Prerequisite:**

- To improve the LSRW skills of I. B.Tech students
- To instill confidence and enable the students to communicate with ease
- To equip the students with the necessary skills and develop their language prowess

**Objectives:**

- On successful completion of the module students should be able to:
  - communicate effectively in English
  - get rid of their inhibitions
  - possess effective language skills
  - improve their career prospects

**Outcome:**

- To equip the students with the necessary skills and develop their language prowess

**UNIT – I**  
**Basic Concepts of Communicative English**  
**Hours:** 12


**UNIT – II**  
**Comprehension and Analysis**  
**Hours:** 12


**UNIT – III**  
**Writing**  
**Hours:** 12


**UNIT – IV**  
**Oral Communication**  
**Hours:** 12


**UNIT – V**  
**Vocabulary and Language Through Literature**  
**Hours:** 12

- Analysis of
  1. “English in India”, R.K. Narayan
  3. “Politics and the English Language”, George Orwell


**Total contact Hours:** 60  
**Total Tutorials:** -  
**Total Practical Classes:** -  
**Total Hours:** 60

**Text Books:**


**Reference Books:**

Department: Physics
Programme: B.Tech.

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject</th>
<th>Hours / Week</th>
<th>Credit</th>
<th>Maximum Marks</th>
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</thead>
<tbody>
<tr>
<td>PH103</td>
<td>Physics Laboratory</td>
<td>L 3 T 2 P 60 C 4 CA 10 SE 40 TM 100</td>
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</tbody>
</table>

Prerequisite: -

Objectives: To provide a practical understanding of some of the concepts learnt in the theory course on Physics and Materials Science.

Outcome: The Students would have gained practical experience about some of the Theoretical concepts learnt in the Physics and Materials Science courses.

List of Experiments:
(Any 10 experiments including a maximum of 2 Demonstration experiments are to be performed.)

Radius of curvature of a Lens - Newton’s rings
1. Thickness of a thin object by Air – wedge
2. Spectrometer – Resolving power of a Prism
3. Spectrometer – Resolving power of a Transmission grating
4. Determination of wavelength of a Laser source using transmission grating, reflection grating (vernier calipers) & particle size determination
5. Determination of numerical aperture & Acceptance angle of an optical fiber.
6. Laurent’s Half shade polarimeter – Determination of specific rotatory power*
7. Spectrometer - Hollow prism / Ordinary & Extraordinary rays by Calcite Prism*
8. Determination of optical absorption coefficient of materials using laser*
9. Coefficient of Thermal conductivity - Radial flow method
10. Coefficient of Thermal conductivity – Lee’s Disc method
11. Jolly’s Bulb Apparatus experiment – determination of α
12. Magnetism: I – H curve
13. Field along the axis of a coil carrying current
14. Vibration magnetometer – calculation of magnetic moment & pole strength
15. Electrical conductivity of semiconductor – two probe / four probe method*
16. Hall effect in a semiconductor*
17. Michelson’s Interferometer*

*Demonstration Experiments

Total contact Hours: -
Total Tutorials: -
Total Practical Classes: 45
Total Hours: 45

Reference Book:
1. Physics Practical Observation Manual Book issued by Dept. of Physics, Pondicherry Engineering College
**Department:** Chemistry  
**Programme:** B.Tech.  
**Semester:** Two  
**Category:** LB

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject</th>
<th>Hours / Week</th>
<th>Credit</th>
<th>Maximum Marks</th>
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<tbody>
<tr>
<td>CY103</td>
<td>Chemistry Laboratory</td>
<td>-</td>
<td>3</td>
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</table>

| Prerequisite | -                         |

**Objectives**
- To educate the principles involved in chemical analysis.
- To provide practical knowledge of handling chemicals and chemical analysis.
- To understand the importance of chemical analysis in various fields.

**Outcome**
- Students will be able to understand chemical analysis and its usefulness in engineering, industry and other fields.
- Students will gain laboratory skills and that will give confidence in analyzing samples in engineering, industry and other fields.
- Students will gain knowledge about the principles and methods of listed methods of quantitative analyses.

**List of experiments: (Any 10 experiments)**
1. Determination of total, permanent and temporary hardness of water by EDTA method.
2. Determination of magnesium in water by complexometry.
3. Determination of calcium in lime stone by complexometry.
4. Determination of alkalinity of water.
5. Determination of percentage of acetic acid in vinegar.
6. Determination of ferrous ion in Mohr’s salt.
7. Determination of lead dioxide by permanganometry.
8. Determination of ferrous and ferric ions in a solution by dichrometry.
10. Determination of dissolved oxygen in water.
11. Determination of COD of water sample.
12. Determination of available chlorine in bleaching powder.
13. Determination of chloride content in water by argentometry.
14. Determination of lead in polluted water by conductometry.
15. Preparation of potash alum from scrap aluminium.

| Total contact Hours: | - | Total Tutorials: | - | Total Practical Classes: | 45 | Total Hours: | 45 |

**Text Books:**

**Reference Books:**
**Department**: Mechanical Engineering  
**Programme**: B.Tech.  
**Semester**: Two  
**Category**: LB

<table>
<thead>
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<th>Credit</th>
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<tbody>
<tr>
<td>ME103</td>
<td>Workshop Practice</td>
<td>-</td>
<td>3</td>
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</table>

**Prerequisite**: -

**Objectives**
- To convey the basics of mechanical tools used in engineering
- To establish hands on experience on the working tools
- To develop basic joints and fittings using the hand tools
- To establish the importance of joints and fitting in engineering applications
- To explain the role of basic workshop in engineering
- To develop an intuitive understanding of underlying physical mechanism used in mechanical machines.

**Outcome**
- Parallels are drawn between the subject and the student’s everyday experience so that this course may be related to what the students already know.
- Students are introduced to basic hand tools used in various mechanical cutting operations.
- Students are encouraged to make simple joints and fittings.
- Students are made to develop natural curiosity to explore the various facets of basic cutting operations.
- While emphasizing basic operations, students are provided with modern hand tools to use in real time engineering jobs.
- Students are exposed to make objects like tray, welded joints.

**UNIT – I**  
**Fitting**  
Hours: 11

1. Study of tools and machineries
2. Symmetric fitting
3. Acute angle fitting
4. Obtuse angle fitting

**UNIT – II**  
**Welding**  
Hours: 11

1. Study of arc and gas welding equipment and tools
2. Simple lap welding (Arc)
3. Single V butt welding (Arc)
4. Corner joint (Arc)

**UNIT – III**  
**Sheet Metal**  
Hours: 11

1. Study of tools and machineries
2. Funnel
3. Waste collection tray
4. Rectangular Box

**UNIT – IV**  
**Carpentry**  
Hours: 12

1. Study of tools and machineries
2. Half lap joint
3. Corner mortise joint
4. Dovetail joint

**Total contact Hours**: -  
**Total Tutorials**: -  
**Total Practical Classes**: 45  
**Total Hours**: 45

**Text Books**:

**Web sites**:
## Subject Code Subject

| MA103 | Mathematics - III |

<table>
<thead>
<tr>
<th>Hours / Week</th>
<th>Credit</th>
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### Prerequisite
- To introduce the ideas of Laplace and Fourier Transforms
- To familiarize students with Complex Analysis
- To introduce Fourier series.

### Objectives
- Understands Transform Calculus
- Understand Complex Analysis
- Able to apply Fourier series

### Outcome
- UNDERSTANDS TRANSFORM CALCULUS
- UNDERSTAND COMPLEX ANALYSIS
- ABLE TO APPLY FOURIER SERIES

### UNIT – I Laplace Transform Hours: 09

### UNIT – II Complex Variable- Analytic Functions Hours: 09
Analytic functions – Necessary conditions Cauchy-Riemann equations (Cartesian and polar form) and sufficient conditions (excluding proof) – Harmonic and orthogonal properties of analytic function – Construction of analytic functions. Conformal mapping – Simple and standard transformations like \( w = z + c, cz, \sin z, 1/z \) Bilinear transformation. (excluding Schwarz-Christoffel transformation)

### UNIT – III Complex Integration Hours: 09
Complex integration, Cauchy’s Integral theorem, Cauchy’s integral formula and problems, Taylor’s and Laurent’s theorem (without proof) Classification of singularities. Residues and evaluation of residues – Cauchy’s Residue theorem – Contour integration: Application of residue theorem to real integrals – unit circle and semicircular contour (excluding poles on boundaries)

### UNIT – IV Fourier Series Hours: 09

### UNIT – V Fourier Transform Hours: 09
Fourier integral theorem (statement only), Fourier transform and its inverse, properties. Fourier sine and cosine transforms, their properties, convolution and Parseval’s identity.

### Total contact Hours: 45 Total Tutorials: 15 Total Practical Classes: - Total Hours: 60

### Text Books:

### Reference Books:
Course Title: Building Technology

**Objective:**
- To understand the building material characteristics and its application.
- To familiarize on building finishing materials and techniques.
- To learn about improvements in different building components.
- To acquire knowledge on few aspects like temporary structures, maintenance, acoustics.
- To understand modern techniques on energy, cost effective techniques, seismic resistance etc.

**Outcome:**
- Should able to define material property and its application.
- Should have attained knowledge on special finishing material and techniques.
- Should have acquired knowledge on latest developments in building components.
- Acquired knowledge on certain issues in buildings.
- Enriched knowledge on modern techniques and its implications.

**UNIT – I**
**Building Materials**

Lime, Timber and its Products, Floor and Wall Tiles, Pozzolanas, Ferrous metals, Thermal Insulation Material.

**UNIT – II**
**Finishing and Perfective materials**


**UNIT – III**
**Components of building and Treatment**

Partition wall and Cavity wall, Composite Masonry, Doors, Windows, Ventilators, Stairs, Lift, Ramps, Escalators, Anti Termite Treatment

**UNIT – IV**
**Plumbing and Temp, Structures**


**UNIT – V**
**Modern Techniques**


**Total contact Hours:** 60  **Total Tutorials:** 60  **Total Practical Classes:** 60  **Total Hours:** 60

**Text Books:**

**Reference Books:**
CE103 Mechanics of Solids - I

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<th>Subject Code</th>
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<tr>
<td>CE103</td>
<td>Mechanics of Solids - I</td>
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Prerequisite

- To develop an understanding of the relationship between external loads applied to a deformable body and the internal stress, strain induced in the body.
- To know about shear force and bending moment and bending stress distribution in various types of beams
- To learn about shear stress, stresses in springs, principal stresses and planes
- To understand the theory of torsion and stresses in thin cylinders & shells
- To analyse the columns with different end conditions and to learn about combined direct and bending stress

Objectives

On successful completion of the course, students will be able to:

- Calculate and understand the concepts of stress and strain;
- Determine shear force, bending moment and bending stresses in beams
- Solve shear stress, principal stress problems and stresses in springs
- Analyse thin cylinders, shells and members subjected to torsion
- Understand stability and buckling phenomena for a slender member under an axial load and check the stability of dams and retaining walls

Outcome

UNIT – I  
Stresses & strains  
Hours: 09

UNIT – II  
Bending stress  
Hours: 09
Shear force and bending moment diagrams for beams and frames- Theory of simple bending –Bending stress distribution at sections. Beams of uniform strength.

UNIT – III  
Shear stress  
Hours: 09
Shear stress distribution due to bending – Shear Centre. Springs – Stiffness – open & closed coil springs- problems in parallel, series springs-Complex stresses – Principal planes and stresses-Mohr’s circle.

UNIT – IV  
Torsion  
Hours: 09

UNIT – V  
Columns  
Hours: 09
Columns – Euler’s theory – Rankine – Jordon formula – Columns with initial curvature and eccentric loads–Long columns- Laterally loaded columns, Combined direct and bending stresses. Application to masonry dams and retaining walls

Total contact Hours: 45  
Total Tutorials: 15  
Total Practical Classes: -  
Total Hours: 60

Text Books:


Reference Books:

### Subject Code: CE104
### Subject: Surveying

<table>
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<tr>
<th>Subject Code</th>
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<th>Hours / Week</th>
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### Prerequisite
- To understand the basic concepts of surveying and able to solve problems associated with linear and angular measurements.
- To understand the importance of surveying in the field of civil engineering.
- To study the basics of linear/angular measurement methods like chain surveying, compass surveying.
- To know the basics of levelling and theodolite survey in elevation and angular measurements.
- To understand tacheometric surveying in distance and height measurements.

### Objectives

**On successful completion of the course, students will be able to:**
- Understand the basics of Surveying and its related field application.
- Utilize their knowledge to solve field associated problems.
- Carry out preliminary surveying in the field of civil engineering applications such as structural, highway engineering and geotechnical engineering.
- Plan a survey, taking accurate measurements, field booking, plotting and adjustment of traverse use various conventional instruments involved in surveying with respect to utility and precision plan a survey for applications such as road alignment and height of the building undertake measurement and plotting in civil engineering.

### Outcome

**UNIT – I**

**Compass Surveying and Setting out Curves**  
Hours: 9

**Basic Principles**
- Equipment and accessories for Ranging and Chaining - methods of ranging – errors in linear measurement and their correction – obstacles.
- Compass surveying – Basic terms and definitions – Bearing and angles - compass – types – Magnetic declination – Dip-Traversing - Local attraction.

**UNIT – II**

**Methods of Leveling**  
Hours: 9

**Basic terms and definitions**
- Methods of leveling – levels and staves- temporary and permanent adjustments –

**UNIT – III**

**Horizontal and Vertical Measurements**  
Hours: 9

**Theodolite**
- Setting out curves: – simple circular curve – Compound curve – Reverse curve - vertical curve.

**UNIT – IV**

**Stadia Surveying**  
Hours: 9

**Tacheometric systems**
- Tangential, stadia and subtense methods - Stadia systems - Horizontal and inclined sights - Vertical and normal staffing - Fixed and movable hairs - Stadia constants - Anallactic lens - Subtense bar.

**UNIT – V**

**Area and Volume Calculations**  
Hours: 9

**Areas and Volumes**
- Reconnaissance – preliminary and location surveys for engineering projects – Lay out – Setting out works – Route Surveys for highways – Railways and waterways.

### Total contact Hours: 45  
### Total Tutorials: 15  
### Total Practical Classes: -  
### Total Hours: 60

### Text Books:


### Reference Books:

Department : Civil Engineering
Programme : B.Tech. (CE)
Semester       : Three
Category      : TA

Subject Code | Subject            | Hours / Week | Credit | Maximum Marks |
--------------|--------------------|--------------|--------|---------------|
              |                    | L  T  P  C   | CA    | SE  TM         |
CE105        | Mechanics of Fluids| 3  1  -     | 4      | 40  60 100     |

Prerequisite

Objectives
- To make the student to understand the basic properties of fluids, fluid pressure under static condition, and the principle of buoyancy and its applications.
- To know about the types of fluid flow, various functions to define the flow, Euler’s equation, Bernoulli’s equation and its applications.
- To know about the Turbulent and Laminar flow through pipes and energy losses.
- To know about the discharge through the channels and pipes.
- To know about the model analysis in fluid flow problems.

Outcome
- The students have knowledge on the basic properties of fluids to solve the problems, computation of hydrostatic pressures on the hydraulic structures, and checking the stability of the floating bodies.
- To identify the type of flow and its kinematics and identifying the Bernoulli’s equation.
- To identify type of flow in flow through pipes and computing the energy losses in pipe flow problems.
- To compute the discharge through pipes and channels.
- To do dimensional analysis in fluid flow problems and its model analysis.

UNIT – I Fluid properties
Density, Specific Weight, Specific gravity, Compressibility, Viscosity, surface tension, capillarity, vapour pressure. Fluid Statics: Pressure in a fluid, pressure head, Measurement of pressure. Hydrostatic forces on submerged plane and curved surfaces, Buoyancy, Metacentre, Stability of floating and submerged bodies.

UNIT – II Fluid Kinematics & Fluid Dynamics
Stream line, streak line, path line and stream tube. Types of flow, steady, unsteady, uniform, non-uniform, laminar, turbulent, rotational and irrotational flows. Equation of continuity for one, two, three dimensional flows, stream function and velocity potential function, flow net analysis.
Dynamics of flow: Euler’s equation of motion, Bernoulli’s equation, simple applications of Bernoulli’s equation. Momentum equation. Kinetic energy and Momentum correction factors.

UNIT – III Boundary Layer Theory & Flow Through Pipes
Boundary layer thickness, Displacement thickness, Momentum thickness, Energy thickness, Boundary layer growth and separation. Laminar flow: Laminar flow through pipes, Hagen-Poiseuille flow, energy loss. Turbulent flow: Turbulent flow through pipes, Darcy’s equation, Minor losses, Energy and Hydraulic gradients, pipes in series and parallel.

UNIT – IV Flow measurement
Pitot tube, Venturimeter, Orificemeter, Flow nozzle, and mouthpieces, Flow over notches and weirs, Venturiflume and standing wave flume, Velocity measurement in open channel.

UNIT – V Dimensional Analysis and Similitude
Dimensional analysis- Rayleigh’s method, Buckingham’s π theorem, Dimensionless numbers, Laws of similitude, Model Analysis, Distorted models, Principles of analogy.

Total contact Hours: 45  Total Tutorials: 15  Total Practical Classes: -  Total Hours: 60

Text Books:

Reference Books:
<table>
<thead>
<tr>
<th>Subject Code</th>
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<tr>
<td>CE106</td>
<td>Materials Testing Laboratory - I</td>
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**Objectives**
- To understand the preparation of a specimen for the desired strength of materials.
- To find the Modulus of elasticity, modulus of rigidity, torsional strength, hardness shear strength, fatigue strength, ultimate tensile strength and yield strength of given.
- To find impact strength of mild steel specimen.
- To find stiffness of open coiled and closed coiled springs.
- To find the bending, shear compressive and tensile strength of wood materials.

**Outcome**
- The course will enable the students to evaluate the mechanical properties of materials subjected to the loads and report and verify the same as per Indian standards available and
- Able know where the mechanical property is used in the engineering design.
- The mechanical properties are
- Material constants namely modulus of elasticity and modulus of rigidity
- Ultimate tensile, shear, impact and torsional strength.
- Hardness
- Stiffness of helical springs
- Strength of wood parallel and perpendicular to the grains.

1. Tension Test on Mild steel and Tor Steel rod specimens
2. Direct Shear Test on Steel Rod Specimens
3. Bend and Re-bend Test on Steel Rod Specimens
4. Brinell Hardness Test on Metal Specimens
5. Rockwell Hardness Test on Metal Specimens
6. Vickers Hardness Test on Metal Specimens
7. Impact Test on Metal Specimens using Izod arrangement
8. Impact Test on Metal Specimens using Charpy arrangement
9. Ductility Test on Sheet metals using Erichsen Cupping
10. Torsion Test on Metal Specimens-
11. Fatigue Test on Metal Specimens- Demonstration only
12. Spring Test- Open coil and Closed coil both in tension and compression
13. Compression Test on wood Specimens- Parallel and Perpendicular to the Grains-
14. Direct Shear Test on Wood Specimens
15. Direct Tension Test on Wood Specimens
16. Static Bend Test on Wood Specimens with central and non-central loading

**Total contact Hours:** -  **Total Tutorials:** -  **Total Practical Classes:** 45  **Total Hours:** 45
<table>
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<tr>
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<tr>
<td>CE107</td>
<td>Surveying Laboratory</td>
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| Prerequisite | -                        |

<table>
<thead>
<tr>
<th>Objectives</th>
<th>To train and handling instruments used for surveying.</th>
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<tr>
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<td>To equip in understanding various problems in linear and angular measurement associated with field application</td>
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<table>
<thead>
<tr>
<th>Outcome</th>
<th>On successful completion of the course, students will be able to:</th>
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<tbody>
<tr>
<td></td>
<td>• Understand the basics of field oriented problems in surveying</td>
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<td>• Familiarize the instruments and utilize in the appropriate field oriented task</td>
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1. Basic in Surveying
2. Study of Dumpy Levelling & taking levels of various points and booking the same in a level field book
3. Differential or Fly levelling, Reducing levels by height of collimation and Rise and Fall method
4. Taking levels of longitudinal section and cross sections of a road plotting
5. Plotting of perpendicular and Oblique offsets
6. Plotting of contours from Radial methods and block levelling
7. Study of Theodolite, Measurement of horizontal angle (Repetition and reiteration)
9. Theodolite closed traverse, plotting and adjustment.
10. Heights and Distances (Base of the object accessible & inaccessible)
11. Heights and Distances - Instrument station in the same vertical plane
12. Heights and Distances (Base of the object in accessible - Instrument station not in the same vertical plane)
13. Determination of tachometric constant
14. Setting out Curves

Total contact Hours: - | Total Tutorials: - | Total Practical Classes: 45 | Total Hours: 45
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<tr>
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<tr>
<td>CE108</td>
<td>Functional Planning and Building Drawing Laboratory</td>
<td>-   -   3   2</td>
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**Prerequisite**
- To understand the Functional Planning and architectural design of buildings and introduction to building physics.
- To develop skills in manual and AutoCAD drafting of building plans, elevation and sections.
- To draw plan, elevation and section of load bearing and framed structures.
- To draw plan, elevation and section of public and industrial structures.
- To prepare detailed working drawing for doors, windows, etc.

**Objectives**
- Ability to develop a concept drawing based on the requirements
- Ability to draw Building Drawing as per planning authority requirement in AutoCAD.

**Theory**
2. Building Physics: Sun's movement and building: Sun control devices – Exposed walls and Openings
3. Lighting and acoustics
4. Introduction to AutoCAD – Draw and modify tools- Dimensioning-Layers- Blocks-Printing- Two dimensional drawing 3D commands.

**Plates to be submitted in AUTOCAD**
1. Door, Windows, Ventilators.
2. Foundation, Staircase
3. Residential buildings – Plan, Section, Elevations (Using Mini Drafter and AutoCad)
4. Public buildings like office, dispensary, post office, bank etc.
5. Industrial buildings

**Total contact Hours:** -  
**Total Tutorials:** -  
**Total Practical Classes:** 45  
**Total Hours:** 45
Subject Code: MA104  
Subject: Numerical Methods

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Prerequisite: -

Objectives:
- To introduce methods for solving nonlinear, system of linear algebraic equations and Eigen value problems
- To understand interpolation, differentiation and integration
- To solve problems in ordinary and partial differential equations

Outcome:
- Will be able to solve nonlinear and system of linear algebraic equations
- Does interpolation problems, numerical differentiation and integration
- Will be able to solve ordinary and partial differential equations numerically

UNIT – I  
Solution of Algebraic and transcendental Equations  
Hours: 9

Solution of algebraic and transcendental equation by the method of bisection, the method of false position, Newton-Raphson method and Horner’s method. Eigen value problem by power method and Jacobi method.

UNIT – II  
System of Equations and Matrix Inversion  
Hours: 9


UNIT – III  
Interpolation, Differentiation and Integration  
Hours: 9

Finite Differences, Relation between operators – Interpolation - Newton’s forward, backward and divided difference methods and Lagrange’s method for unequal intervals. Numerical differentiation in one variable. Numerical integration by Trapezoidal and Simpson’s rules

UNIT – IV  
Solution of Ordinary Differential Equation  
Hours: 9


UNIT – V  
Solution of Partial Differential Equations  
Hours: 9


Total contact Hours: 45  
Total Tutorials: 15  
Total Practical Classes: -  
Total Hours: 60

Text Books:

Reference Books:
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<td>CE109</td>
<td>Mechanics of Solids-II</td>
<td>3 1 - 4</td>
<td>40 60 100</td>
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**Prerequisite:** Mechanics of Solids - I

**Objectives:**
- Calculate & understand the concept of determination of deflection of beams & trusses
- Calculate the stresses due to unsymmetrical loading
- The student is to realize the three-dimensional nature of stress and strain and the relationships between strain and displacement.
- To understand the concept of various theories of failure

**Outcome:**
- Relate loading and deformation states to the proper components of stress and Strain
- Determine the deflection of beams & trusses
- Relate complex stress & strain
- Apply knowledge of theories of failure for design.

**UNIT – I**
Complex strain & Theories of failure

**Hours:** 9


**UNIT – II**
Deflection of beams

**Hours:** 9

Deflection of beams – Double Integration method - Macaulay’s method, moment area method – conjugate beam method

**UNIT – III**
Energy methods

**Hours:** 9

Strain energy due to axial, bending, shear and torsional forces – Impact loads. Principle of virtual displacement – principle of minimum potential energy – Castigliano’s Theorems – Maxwell – Betti’s theorem. Deflection of beams by unit load methods.

**UNIT – IV**
Deflection of Trusses and Frames

**Hours:** 9

Deflection of trusses and frames – strain energy and dummy/unit load methods.

**UNIT – V**
Unsymmetrical bending and curved beams

**Hours:** 9

Unsymmetrical bending – principal moments of inertia – stresses due to unsymmetrical bending, shear centre, beams curved in plan

**Total contact Hours:** 45  **Total Tutorials:** 15  **Total Practical Classes:** -  **Total Hours:** 60

**Text Books:**

**Reference Books:**
<table>
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<tr>
<th>Subject Code</th>
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<tbody>
<tr>
<td>CE110</td>
<td>Concrete Technology</td>
<td>4</td>
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**Prerequisite**
- 

**Objectives**
- Understand the properties of ingredients of concrete
- Understand the fresh and hardened properties of concrete
- Learn the durability properties of concrete
- Design the concrete mixes of various grades used in the construction
- Understand the need for special concrete.

**Outcome**
On successful completion of the course, students will be able to:
- Test the ingredients of concrete as per BIS
- understand the behavior of concrete in fresh and hardened state
- know about the deterioration of concrete
- design the concrete mixes of various grades used in the construction
- gain knowledge about special concrete

**UNIT – I  Materials for Concrete**

**UNIT – II  Fresh and Hardened Concrete**

**UNIT – III  Durability**
Durability of concrete- significant causes of concrete deterioration- alkali-aggregate reaction- deterioration by chemical actions

**UNIT – IV  Mix Design**

**UNIT – V  Special Concrete**

**Total contact Hours: 60**  **Total Tutorials: -**  **Total Practical Classes: -**  **Total Hours: 60**

**Text Books:**
1. Shetty, M.S, Concrete Technology; Theory & Practice, S.Chand & Group, New Delhi, 2014.

**Reference Books:**
### Subject Code: CE111
#### Subject: Hydraulics and Hydraulic Machinery

<table>
<thead>
<tr>
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**Prerequisite:** CE105 Mechanics of Fluids

**Objectives:**
- To classify the types of flows in open channel and also to design open channel sections in a most economical fashion with minimum wetted perimeter and learn about critical flows.
- To study about non uniform flows in open channel and longitudinal slopes in open channel and also to learn about the characteristics of hydraulic jump.
- To study the hydrodynamic forces and application to radial flow turbines.
- To learn about the fundamentals of turbines.
- To understand the basic principles in the working and application of typical pumps.

**Outcome:**
- At the end of the course, the student should be able to compute the various parameters of channels like uniform flow, critical flow and use it for typical practical situations.
- Further the student should be able to select the type of pumps, turbines for given practical situations, apart from understanding their typical characteristics.

**UNIT – I**

**Uniform flow**  
Hours: 9

Open Channel flow: Types of channel, Velocity distribution, Chezy, Manning and Basin formulae, for uniform flow, Most economical section, critical flow, specific energy, specific force. Computation of uniform flow and critical flow.

**UNIT – II**

**Non-Uniform flow**  
Hours: 9

Open channel flow: Non-uniform flow, Dynamic equation for Gradually Varied flow, computation for length of backwater curve, Rapidly varied flow- hydraulic jump, types, uses. Weirs and spill ways, Surges in open channels.

**UNIT – III**

**Basics of Turbo machinery**  
Hours: 9

Impulse momentum equation, Hydrodynamics forces of jets on vanes, Velocity Triangles, Angular momentum principle, application to radial flow turbines.

**UNIT – IV**

**Turbines**  
Hours: 9

Classification, impulse and reaction turbines, characteristic curves, draft tubes, governing of turbines, specific speed, unit quantities concept, similarity, cavitation.

**UNIT – V**

**Pumps**  
Hours: 9

Centrifugal pumps- classification, work done, minimum starting speed, losses and efficiencies, specific speed, multistage pumps, specific speed, characteristic curves, NPSH, cavitation in pumps.

Reciprocating pumps- types, effects of acceleration and frictional resistance, separation, Air Vessels, work saved by fitting air vessels.

**Text Books:**


**Reference Books:**

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>CE112</td>
<td>Fluid Mechanics and Machines Laboratory</td>
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<td>3</td>
<td>60</td>
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Prerequisite: -

Objectives:
- To determine the various parameters used in Fluid mechanics and Fluid Machinery
- Students are able to measure the discharge through the channels and pipes, check fly stability of the floating bodies.
- To design the various pumps and Turbines used in the power stations.

Outcome:
- To determine the various parameters used in Fluid mechanics and Fluid Machinery
- Students are able to measure the discharge through the channels and pipes, check fly stability of the floating bodies.
- To design the various pumps and Turbines used in the power stations.

A. Fluid Flow Laboratory
1. Calibration of rectangular and triangular notches
2. Determination of coefficient of discharge for orifices and mouthpieces
3. Calibration of venture meters and orifice meters
4. Verification of Bernoullis theorem
5. Determination of pipe friction
6. Determination of minor losses in pipe due to bends, elbows, sudden contraction, expansion etc.,
7. Determination of Metacentric height of various ship models
8. Determination of force due to Impact of jet on vanes

B. Fluid Machinery Laboratory
1. Study of performance characteristics of centrifugal pump (constant speed)
2. Study of performance characteristics of Reciprocating pump
3. Study of performance characteristics of Submersible pump
4. Study of performance characteristics of Gear pump
5. Tests on Turbine

Total contact Hours: - | Total Tutorials: - | Total Practical Classes: 45 | Total Hours: 45
**Department**: Civil Engineering  
**Programme**: B.Tech. (CE)  
**Semester**: Four  
**Category**: POD

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<td>Engineering Geology</td>
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**Prerequisite**

- To familiarize the various types of minerals and rocks, their geological characteristics to understand their behavior/performance.
- To impart hands on training in determination of properties of rocks.
- To provide the knowledge on interpretation of data to arrive the solution.

**Objectives**

- Student should able to identify minerals/rocks, their characteristics and their bearing on the construction. Also, the student will be familiar with attitude of geological formations and preparation of geological sections to address the problems during site investigation process.

**Outcome**

- Physical properties of minerals, classification and studying of minerals such silicate minerals/rock forming minerals, oxides, sulphides, sulphates, carbonates and halites etc.

**UNIT – I  Minerology**  
Hours: 7

Mode of origin of rocks, texture, structure and mineralogical characteristics of Igneous, sedimentary and metamorphic rocks, physical and mechanical properties of rocks and their relationship with geological characteristics, significance of rocks in the rocks in the field of construction.

**UNIT – II  Petrology**  
Hours: 8

Structural features such as folds faults and joints and their significance in civil engineering, principles of geophysical methods, electrical resistivity method and seismic refraction methods.

**UNIT – III  Structural Geology and geophysical exploration Techniques**  
Hours: 8

Geotechnical classification of rock masses, scope of geo-science in site investigation, geological considerations in dam and tunnel site selection, landslides and groundwater.

**Practices**

1. Megascopic study of important rock forming/silicate minerals.
2. Megascopic study of important non-silicate minerals.
3. Megascopic study of important igneous rocks.
4. Megascopic study of important sedimentary rocks
5. Megascopic study of important metamorphic rocks
6. Elementary problems of true dip, apparent dip and strike of geological formations.
7. Establishing thickness, depth and structure of geological formations
8. Construction of topographic profile, geological sections and their interpretation
9. Electrical resistivity method (not recommended for examination).
10. Determination of soundness of rocks (not recommended for examination)
11. Determination of weathering of rock
12. Determination of durability of rock

**Total contact Hours**: 30  
**Total Tutorials**: -  
**Total Practical Classes**: 45  
**Total Hours**: 75
### Department: Civil Engineering  
Programme: B.Tech (CE)

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#### Prerequisite
- 

#### Objectives
- To create an awareness of ethical concerns and conflicts and to Enhance familiarity with codes of conduct
- To Increase the ability to recognize and resolve ethical dilemmas

#### Out come
- The students will be exposed to the ethical practices in Civil Engineering.
- The student will be aware to duties and responsibilities as a citizen
- Educated in identifying ethical problems and Ethical solutions.

- **Indian Constitution**  

- **Ethics - Ethical Behaviour**  

- **Professional Ethics as applied to Engineering**  
  Professional Ethics as applied to Engineering – Characteristics of Professional and Professional Ethics – Engineering Ethics. Professional Code of Ethics – IEI&NSPE.

- **Engineering Ethics**  

- **Responsibility towards Environment**  
  Responsibility towards Environment. International Engineering Professionalism

#### Total Contact Hours: 45  
Total Tutorials: 45  
Total Practical Class: 45  
Total Hours: 45

#### Reference Books
**Department**: Civil Engineering  
**Programme**: B.Tech. (CE)  
**Semester**: Five  
**Category**: TA

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<td>CE115</td>
<td>Environmental Engineering- I</td>
<td>3 L 1 T -</td>
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<td>40 CA 60 SE 100 TM</td>
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**Prerequisite**: -

**Objectives**
- To study the water supply demand and distribution
- To understand the quality of water from various sources
- To carry out functional design of water treatment units.

**Outcome**
- An ability to apply knowledge of Environmental Science and Engineering to solve problems related to water supply and sanitation.

**UNIT – I Introduction**
Water supply Scheme - objectives and requirements - Domestic, industrial, commercial and public requirements - Various methods of estimating population - Variations in rate of demand and its effects on design.

**UNIT – II Sources of Water and intakes**:  
Surface and groundwater sources - Computation of storage capacity of reservoirs by analytical and graphical methods - Forms of underground sources like wells, Infiltration wells and galleries, Intake structures, tube wells - Sanitary protection of wells-transportation of water- Pipe flow formulae – pipe materials- laying of pipes-testing of pipes-

**UNIT – III Quality of Water**:  
Indian and W.H.O. Standards for drinking water - impurities in water - Physical, chemical and bacteriological analysis of water - quality of water for trade purpose and swimming pools

**UNIT – IV Water Treatment system**:  
Unit process of water treatment - Principles, functions and design of flocculators, sedimentation tanks, sand filters, principles of disinfection, water softening, aeration, Iron and manganese removal.

**UNIT – V Distribution System**  
Service reservoir location, determination of capacity – Method of distribution - Layout of distribution systems-Design of distribution system, analysis of pipe networks by different methods, pipe appurtenance for distribution system – Plumbing works and layout of water supply system for buildings, waste detection and prevention, Effects of corrosion and its prevention.

**Total contact Hours**: 45  
**Total Tutorials**: 15  
**Total Practical Classes**: -  
**Total Hours**: 60

**Text Books**:

**Reference Books**:
### Course Information

**Department:** Civil Engineering  
**Programme:** B.Tech. (CE)  
**Semester:** Five  
**Category:** TB

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<td>3 1 - 4 40 60 100</td>
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**Prerequisite:** -

**Objectives**
- To study the stress strain behavior of steel and concrete
- To understand the concept of working stress and limit state methods
- To gain the knowledge of limit state design for flexure, shear, torsion, bond and anchorage
- To understand the behavior of columns subjected to eccentric load and use of interaction diagrams
- To study the design of various foundation

**Outcome**
- On completion of the course, the students will be able to:
  - apply the fundamental concepts of working stress method and limit state method
  - use IS code of practice for the design of concrete elements
  - design the beams, slab, stairs, column and footing
  - draw various RCC structural elements
  - design foundation

**UNIT – I Basics of structural design**  
**Hours:** 9

Basic design concepts – working stress design, ultimate strength design, probabilistic analysis and design, Limit state design-code recommendations. Behaviour of RCC elements under flexure-modular ratio and cracking moment – Analysis at service loads and at ultimate load level.

**UNIT – II Design of Beams**  
**Hours:** 9


**UNIT – III Design of Slabs**  
**Hours:** 9

Design of one-way and two-way slabs. Design of continuous (one-way only) slabs. Design of staircases.

**UNIT – IV Design of Columns**  
**Hours:** 9

Design of column – short and long column. Design of column using interaction diagrams. Design of circular and rectangular columns subjected axial load and uniaxial bending, axial load and bi axial bending, Axial tension and uniaxial bending.

**UNIT – V Design of footings**  
**Hours:** 9

Design of isolated footings subjected to axial load and moments, design of rectangular and trapezoidal combined footings.

**Total contact Hours:** 45  
**Total Tutorials:** 15  
**Total Practical Classes:** -  
**Total Hours:** 60

**Text Books:**

**Reference Books:**
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<td>CE117</td>
<td>Structural Analysis</td>
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**Prerequisite**
- Mechanics of Solids II

**Objectives**
- To understand the concept of analysis of indeterminate structures by various classical methods
- To study the use of ILD for determinate structure
- To learn the concepts of moving loads and its effect on structures
- To study behaviour of arches and their methods of analysis and to know the concept and analysis of cable stayed bridge
- To introduce the concept of plastic analysis

On completion of the course, the students will be able to:
- use various classical methods for analysis of indeterminate structures
- apply the concepts of ILD and moving loads on determinate structures
- demonstrate the concepts of qualitative influence line diagram for continuous beams and frames
- demonstrate the analysis and behavior of arches and cable stayed suspension bridges
- calculate shape factor and plastic moment capacity of beams and frames

**UNIT – I**  
*Force Method of Analysis*  
Hours: 9

Statically indeterminate structures - Degree of static indeterminacy - Analysis of continuous beams by theorem of three moments – Analysis pinned and rigid frames (with two degrees of indeterminacy) - Unit load method - Trusses with lack of fit - Thermal stresses

**UNIT – II**  
*Displacement Method of Analysis*  
Hours: 9

Kinematic indeterminacy - Slope deflection method applied for Continuous beams and rigid frames - Support displacements.

Moment distribution Method - Stiffness and carry over factors – Distribution and carry-over of moments - Analysis of continuous Beams - Plane rigid frames with and without sway

Kani’s method - Analysis of continuous Beams

**UNIT – III**  
*Influence lines and Moving Loads*  
Hours: 9

ILD for shear, moment and reactions for cantilever and simply supported beams. Moving loads on simply supported beams - single and several points loads – maximum bending moment and maximum shear force – equivalent UDL. Absolute maximum bending moment. Muller Breslau Theorem and its application to continuous beams.

**UNIT – IV**  
*Arches and Cables*  
Hours: 9

Theory of arches - Analysis of three hinged, two hinged and tied arches - influence lines, rib shortening, settlement, and temperature effects. Analysis of forces in cables - Suspension bridges.

**UNIT – V**  
*Plastic Analysis*  
Hours: 9


**Total contact Hours**: 45  
**Total Tutorials**: 15  
**Total Practical Classes**: -  
**Total Hours**: 60

**Text Books**:

**Reference Books**:
### Department: Civil Engineering  
### Programme: B.Tech. (CE)

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<td>CE118</td>
<td>Structural Mechanics Laboratory</td>
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#### Prerequisite
- 

#### Objectives
- To gain basic knowledge in theory of structures.
- Student will able to understand theory of structures

#### Practices
1. **Buckling load of columns of various end conditions**  
   To determine crippling load of columns with different end conditions and compare the theoretical values.
2. **Verification of Maxwell’s theorem**  
   To verify the principle of Maxwell’s theorem.
3. **Verification of horizontal thrust in three hinged arch**  
   To evaluate experimentally horizontal thrust in three hinged arch and draw influence line diagram for the horizontal thrust.
4. **Verification of shear centre**  
   To evaluate the shear centre of the unsymmetrical sections.
5. **Verification of deflection (elastic deflection of beams)**  
   To determine the deflection of simply supported, fixed, propped, cantilever and continuous beams.
6. **Verification of horizontal thrust in two hinged arch**  
   To evaluate experimentally horizontal thrust in two hinged arch and draw influence line diagrams for the horizontal thrust.
7. **Verification of deflections in curved members**  
   To evaluate experimentally and analytically the elastic displacement of curved members.
8. **Verification of a redundant joint**  
   To analyse a redundant joint.
9. **Verification of deflection of trusses**  
   To evaluate experimentally and analytically the elastic deflection of trusses.
10. **Verification of bar-beam combinations**  
    Experimental and analytical study of deformation in bar-beam combination.

**Total contact Hours:** -  
**Total Tutorials:** -  
**Total Practical Classes:** 45  
**Total Hours:** 45
Department: Civil Engineering  
Programme: B.Tech. (CE)

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<td>Environmental Engineering Laboratory</td>
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Prerequisite: 
- To learn and practice on the various testing methods for water quality, waste water quality and other environmental parameters.
- To correlate theoretical and practical and measures for visual understanding and practice.

Objectives: 
- Students should capable of learning and conducting experiments on water, waste water and other environmental pollution and their by accessing them self on the process decision making with the help of suitable national and international coddle provision.

Outcome:
1. Determination of Turbidity, pH, and Conductivity.
2. Determination of Alkalinity.
3. Determination of Chlorides.
4. Determination of Hardness.
5. Determination of Iron.
6. Determination of Manganese.
7. Determination of Fluorides.
11. Jar test for the determination of optimum coagulant Dose.
12. Determination of loss of head in sand filters.
13. Determination of B.O.D.
14. Determination of C.O.D.
15. Estimation of E-Coli and Fecal coli form test.
16. Plate count (for bacterial analysis of water).
17. Determination of Residual Chlorine.

Total contact Hours: -  
Total Tutorials: -  
Total Practical Classes: 45  
Total Hours: 45
Subject Code: CE120
Subject: Material Testing Laboratory-II
Hours / Week: L - T - P 3 T 2
Credit: 60
Maximum Marks: 100

Prerequisite: -

Objectives:
- This course provides an understanding of the basic properties of construction materials, and presents laboratory standards and testing requirements for these materials.
- To familiarize the students to do the experiments as per the guidelines of BIS.
- To provide the knowledge on mix proportioning of concrete as per the guidelines of BIS.
- To obtain practical knowledge on fresh and hardened properties of concrete.
- To develop an understanding of the highway materials and to obtain knowledge on properties of these materials.

Outcome:
- Student should be able to conduct suitable experiments on construction materials to test their properties as per BIS/IRC and to conduct proper test to evaluate the properties of fresh and hardened concrete, and highway materials.

I. Tests on cement
1. Determination of specific gravity of cement.
2. Determination of standard consistency of cement.
3. Determination of initial and final setting times of cement.

II. Tests on aggregates
1. Determination of specific gravity and water absorption of fine & coarse aggregates.
2. Determination of fineness modulus of fine aggregate & coarse aggregate.

III. Tests on fresh and hardened concretes
1. Determination of degree of workability: Slump cone test, Demo test.

IV. Tests on Highway materials- Sub-grade material and Aggregates
1. CBR test on the soil/granular material.
2. Crushing value test, impact value test, and angularity test on aggregates.

V. Tests on Bitumen
1. Penetration test and softening point test.
2. Flash point test and viscosity test.

Total contact Hours: -
Total Tutorials: -
Total Practical Classes: 45
Total Hours: 45
## Environmental Engineering - II

### Subject Code: CE121

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### Prerequisite
- Environmental Engineering - I

### Objectives
- To learn the basics of sewage composition and its characteristics
- To depict the information about various sewage treatment processes
- To provide the adequate information on various disposal standards for industrial effluents
- To study the information about air pollution and its effects
- To understand the knowledge about solid waste generation and disposal methods

### Outcome
- On completion of the course, the students will be able to:
  - determine the sewage characteristics and design various sewage treatment plants
  - analyze the status of surface water and ground water quality and the remediation technologies carry out municipal water and wastewater treatment system design and operation manage hazardous wastes, risk assessment and treatment technologies apply environmental treatment technologies and design processes

### UNIT I - Introduction

- Definitions - General considerations- Interdependence of water supply and waste water disposal – source and nature of waste water - Combined and separate system – surface drainage - storm water flow – Investigation and design of sewerage schemes – Data collection - Design flow for separate, storm and combined systems.

### UNIT II - Microbiology of Sewage


### UNIT III - Collection and Transport of Sewage


### UNIT IV - Treatment methods


### UNIT V - Disposal of sewage

- Wastewater Disposal and Reuse - Disposal of sewage - Land disposal - Discharge in to rivers. lakes, estuaries and ocean – River pollution - Oxygen sag curve - recycle and reuse of waste effluents. – Disinfection –Chlorination and odour prevention. Introduction to Low cost treatment methods -Special nature of problem of industrial water - Process modifications and by product recovery. – Introduction to air pollution and solid waste management.

### Text Books:

### Reference Books:
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<td>CE122</td>
<td>Transportation Engineering</td>
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**Prerequisite**
- To understand the importance of transportation and characteristics of road transport
- To know about the history of highway development, surveys and classification of roads
- To study about the geometric design of highways
- To study about traffic characteristics and design of intersections
- To know about the pavement materials and design

**Objectives**
- On completion of the course, the students will be able to:
  - carry out surveys involved in planning and highway alignment
  - design cross section elements, sight distance, horizontal and vertical alignment
  - implement traffic studies, traffic regulations and control, and intersection design
  - determine the characteristics of pavement materials
  - design flexible and rigid pavements as per IRC

**Outcome**
- Importance: Road transportation, Highway alignment – Requirement, Engineering surveys for highway location.
- Maps & drawings to be prepared. Geometric design – Cross section element, width, camber, design – speed, sight distances, requirements and design of horizontal and vertical alignments.

**UNIT – I**
Highway Geometry

**UNIT – II**
Highway Materials

**UNIT – III**
Traffic Management and Control

**UNIT – IV**
Pavement Design

**UNIT – V**
Construction and Maintenance

**Text Books:**

**Reference Books:**
### Geotechnical Engineering – I

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#### Prerequisite
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#### Objectives
- Provide the description of soil and to characterize soil as per IS Code.
- To develop an understanding of the soil hydraulics
- To understand principles of stress distribution due to self-weight and applied loading conditions and its application to compressibility of soil.
- Familiarize the students an understanding of strength of soils.

#### Outcome
- On successful completion of the course, students will be able to:
  - Understand the basics of soil mechanics and its related problems.
  - They are able to solve specified problems.
  - The student should be able to classify the soil and evaluate the geotechnical properties of soil used in the design of geotechnical structure.

#### UNIT – I
**Index Properties**

- Soil formation – soil minerals – soil structure - three phase system – definitions- inter- relationships (derivations and problems) – Index properties determinations - IS soil classification – soil deposits in India.

#### UNIT – II
**Soil Hydraulics**


#### UNIT – III
**Stress Analysis**

- Stress due to concentrated load, due to uniformly loaded area, line load strip load- pressure distribution diagrams - contact stress - Westergarrd’s analysis.(Derivations and problems)

#### UNIT – IV
**Soil Compressibility**


#### UNIT – V
**Shear Strength**

- Shear strength- Mohr – coulomb theory – shear strength parameter – laboratory and field tests – pore pressure parameters - stress path - insitu shear strength - factors affecting shear strength - shearing characteristics of sand and clay (problems)

**Total contact Hours: 45 | Total Tutorials: 15 | Total Practical Classes: | Total Hours: 60**

**Text Books:**

**Reference Books:**
### Subject Code: CE124
#### Subject: Geotechnical Engineering Laboratory

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#### Prerequisite
- To provide the hands on training in determination of Index and Engineering and index properties of soils.
- To familiarize the students to do the experiments as per the guidelines of BIS.
- To provide the knowledge on interpretation experimental results to solve foundation problems

#### Objectives
- On successful completion of the course, students will be able to:
  - Evaluate the index properties to classify the soil
  - Evaluate other geotechnical properties of soil used in design of geotechnical structures.

#### Outcome
1. Specific Gravity of CG and FG Soils
2. In-situ unit weight Determination – Core Cutter Method & Water content Determination
3. Grain Size Analysis – Mechanical Method - Dry Sieve Analysis / Wet Sieve Analysis
5. Atterberg Limits: Liquid Limit Test and Plastic Limit Test
6. Atterberg Limit: Shrinkage Limit Test & Free Swell Test
7. Laboratory Permeability Test: Constant and Variable Head
8. Standard Proctor Compaction Test
9. Direct Shear Test
10. Unconfined Compression Test
11. Triaxial Shear test – UU Test
12. Visual Soil Identification as per IS Code
13. Consolidation Test (Demo)

#### Total contact Hours: -
#### Total Tutorials: -
#### Total Practical Classes: 45
#### Total Hours: 45
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**Prerequisite**
- To gain basic knowledge in modelling of structures.
- To gain knowledge on the analysis of continuous beams with secondary stresses
- To gain knowledge on the analysis of rigid jointed frames with and without side sway.
- To gain knowledge on the analysis of pin jointed frames with and without temperature stress and lack of fit.
- To verify the results, such as max shear force, bending moment, inflection points etc with free body diagram concept.

**Objectives**

**Outcome**
On successful completion of the course, students will be able to:
- Model pin and rigid jointed structures
- Analyse continuous beams with secondary stresses and check the results
- Analyse rigid jointed frames with and without side sway and check the results
- Analyse pin jointed frames with and without temperature stress and lack of fit and check the results.

**Practices**
1. Introduction to STAAD Pro V 8i – Preprocessor, creating geometry, editing tools, load and support definition and structuring of output file.
2. Types of analysis, use of post processor and report generation.
3. Analysis of rigid and pinned frames using Staad Pro tool.
4. Drawing shear force and bending moment diagram for various structures under different boundary and loading conditions- construction of free body diagram.
5. Analysis of arches using Staad Pro.
6. Influence lines diagram and moment envelope using Staad Pro.

**Total contact Hours:** -  **Total Tutorials:** -  **Total Practical Classes:** 45  **Total Hours:** 45
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**Prerequisite**
Structural Concrete Design

**Objectives**
- To prepare working drawings for concrete structures.
- Preparation of layout of the structure with detailed design details.
- Preparation of working drawings with all dimensions required for execution / fabrication of structures.

**Outcome**
- An ability to design, draft and detail various concrete and steel structures / members.

Detailed Design and Drawing of the following RCC elements/Structures:
1. Continuous beams and slab systems.
2. Rectangular Combined footings.
3. Cantilever retaining walls
4. Elevated – circular and rectangular water tanks (excluding staging)
5. Staircases.

| Total contact Hours: - | Total Tutorials: - | Total Practical Classes: 45 | Total Hours: 45 |
**Department:** Humanities and Social Sciences  
**Programme:** B. Tech. (CE)  
**Semester:** Six  
**Category:** PR

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<td>HS102</td>
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**Prerequisite:**

- To enhance the students’ communication and language skills and make them industry-ready.
- To encourage brainstorming discussions and team work.
- To train students to master soft skills through various activities.

**Objectives**

On successful completion of the module students will be able to:

- Communicate in English effectively and confidently.
- Imbibe the requisite soft skills.
- Improve critical thinking and analytical skills.

**Outcomes**


**Total contact Hours:** 45  
**Total Tutorials:** 45  
**Total Practical Classes:** 45  
**Total Hours:** 45

**Reference Books:**


**Websites:**

1. www.cambridgeenglish.org
<table>
<thead>
<tr>
<th>Subject Code</th>
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<th>Credit</th>
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**Objective**

- To understand the principles of design of Joints
- To gain knowledge in design of Tension Members
- To understand plastic behavior of steel structural members
- To study the design of flexural members
- To understand the provisions in Codes and learn follow Codal practices

**Outcome**

At the end of the course the students would develop confidence and adequate capability

- in design of joints, beams, flexural members
- Use IS code for design of steel structures.

---

**UNIT – I**  
Design of Joints  
Total Hours : 9

Design of eccentric joints by bolting and welding – design of stiffened and unstiffened seated connections.

**UNIT – II**  
Design of Tension Members  
Total Hours : 9

Design of tension members – single and compound sections – tension splices – design of lug angles. Failures in bolted and welded joints – design of joints with bolts and welding.

**UNIT – III**  
Plastic behavior and compression member  
Total Hours : 9


**UNIT – IV**  
Design of Flexural Members  
Total Hours : 9

Plastic analysis of beams and simple frames. Laterally supported and unsupported members. Design of purlins.

**UNIT – V**  
Design of built-up Beams  
Total Hours : 9

Design of gantry girders and plate girders – Design of trusses.

**Text Books**


**Reference Books**

Department: Civil Engineering  
Programme: B.Tech (CE)  
Semester: Seven  
Category: TA  

<table>
<thead>
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<td>Geotechnical Engineering - II</td>
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</table>

Prerequisite: Geotechnical Engineering - I

Objectives
- Provide the students with a basic understanding of the essential steps involved in a geotechnical site investigation.
- Introduce to the students, the principal types of foundations and the factors governing the choice of the most suitable type of foundation for a given solution. procedures used for: a) bearing capacity estimation, b) Pile carrying capacity.
- To familiarize the concepts of earth pressure, design Earth Retaining structures and to determine stability of slopes.

Outcome
- To develop an understanding of the behavior of foundations for engineering structures and to gain knowledge of the design methods that can be applied to practical problems.

UNIT – I  
Soil Exploration  

UNIT – II  
Lateral earth pressure  
Active, passive and earth pressure at rest, Rankine and Coulomb’s theory – Rebhann’s Method. Earth pressure due to inclined back fill, line load and earth quake load - Cantilever sheet pile wall in granular and clay soil. (problems). Design of braced excavation (concept only).

UNIT – III  
Shallow foundation  
Types and selection criteria – Shear failures - Bearing capacity Determination using Terzaghi and IS code formula (problems) – SBC form field tests - proportioning of foundation – BC of foundation subjected to moments and earthquake loading – Elastic and Consolidation settlement. Methods to increase BC (Concept only). Raft Foundation (theory only).

UNIT – IV  
Pile foundations  

UNIT – V  
Stability of slopes  

Total Contact Hours: 45  
Total Tutorials: 15  
Total Practical Class:  
Total Hours: 60

Text Books

Reference Books
**Department**: Civil Engineering  
**Programme**: B.Tech (CE)  
**Semester**: Seven  
**Category**: TA

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<td>CE129</td>
<td>Construction Management</td>
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**Prerequisite**: -

**Objectives**
- To understand the nature of construction management and its importance.
- To know organizational set up and its role.
- To know the scientific methods of project controlling technique.
- To acquire knowledge on contracting and its feasibility.
- To acquire knowledge about awareness needed on safety, accidents and its regulations.

**Outcome**
- One can able to define the concept of construction management.
- Can able to distinguish levels of organization and their role.
- Should be able to control the project by network technique.
- Should be able to finalize tender and its relevant documents.
- Should be aware on public issues in projects.

**Unit – I: Project Management**
*Hours: 12*
Construction Project- Project Categories, Management objectives, functions – Project Development Process-Project Life Cycle- Project Team-Role of Project Manager-Management failure.

**Unit-II: Organization and Planning**
*Hours: 12*

**Unit-III: Scheduling and Network Analysis**
*Hours: 12*
Scheduling: Definition, objectives, Scheduling and Controlling of Projects.Network Techniques in Construction Management- Bar Chart, Gaint Chart, PERT, CPM, Time& cost optimization

**Unit-IV: Contracts**
*Hours: 12*

**Unit-V: Labour Legislations and Construction**
*Hours: 12*
Labour Legislations-Safety in Construction: Objectives, Steps in Safety Programme, Safety Costs, Safety Codes, Occupational Safety and Hazards, Accidents- Causes of Accident,

**Total Contact Hours**: 60  
**Total Tutorials**:  
**Total Practical Class**:  
**Total Hours**: 60

**Text Books**
2. Ps Gahlot, BmDhir, Construction Planning & Management, New Age International (P) Ltd., 2014

**Reference Books**
<table>
<thead>
<tr>
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<td>CE130</td>
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**Prerequisite**
Design of Steel Structures

**Objective (s)**
- To prepare working drawings for steel and concrete structures.
- Preparation of layout of the structure with detailed design details.
- Preparation of working drawings with all dimensions required for execution / fabrication of structures.

**Outcome**
- An ability to design, draft and detail various concrete and steel structures / members.

**Detailed Design and Drawing of the following Steel elements/Structures:**
1. Roof trusses and joints including purlins.
2. Stiffened welded seat connections – moment resisting welded connections for beams.
3. Welded plate girder.
5. Self-supporting chimney.

**Total Contact Hours** : **Total Tutorials** : **Total Practical Class** : **Total Hours** : 45
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Prerequisite  

- To study the types of estimation  
- To study the analysis of rates and types of specification  
- To study the method of valuation  

Outcome  

- Based on PWD PSR & CPWD plinth area rates the student should be able to prepare the detailed estimate and valuation of given building.

**EXERCISE - I**  
**Introduction**  

Hours: 9  

Estimates – types of estimates – Advantages – Method of measurements – Unit of measurement for various item of work – Method of measurement as per IS 1200, method of estimation; Centre line method of estimation – Examples using above methods.

**EXERCISE – II**  
**Estimation of buildings**  

Hours: 9  

Load bearing and framed structures – Calculation of quantities of brick work, RCC, PCC, Plastering, white washing, Color washing and painting for shops, single room & double room building and simple residential buildings with flat roof.

**EXERCISE – III**  
**Estimation of other structures**  

Hours: 9  


**EXERCISE - IV**  
**Specification and rate analysis**  

Hours: 9  

Specification: purpose and basic principles of general and detailed specification of various item of work – Earthwork excavation – Cement concrete – Damp proof course – Form work – Brick and stone masonry – Flooring- Painting of wood work.

Analysis of rate – Purpose – Quantity of materials per unit rate of work – Requirement of labour and materials for different works – Obtaining the rate for different works using local schedule of rates – Cement mortar – Cement concrete – RCC- Brick masonry – Plastering – Flooring – Painting.

**EXERCISE - V**  
**Valuation**  

Hours: 9  

Valuation – Purpose, definition of common terms used in valuation such as free and lease hold property – Gross income, net income, outgoings, sinking fund, scrap value, salvage value, market value, book value, capital cost and depreciation methods – Valuation of building using different methods with examples – Fixation of rent for a building - Valuation of land.

**Text Books:**  

2. Puducherry Schedule of Rates (PSR), Pondicherry Region, PWD, Government of Puducherry, 2014

**Reference Book:**  

### Subject Code: CE132

#### Subject
Project Work (Phase – I)

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### Prerequisite

- 

### Objectives

- The students are encouraged to get hands on experience to work in various area of civil engineering.

### Outcome

- The students will be able to perceive the problems and to find suitable solutions.

The objective of the design project is to enable the students to work in groups of not more than four members in each group on a project involving analytical, experimental, design or combination of these in the area of Civil Engineering. Each project shall have a guide. The student is required to do literature survey, formulate the problem and form a methodology of arriving at the solution of the problem.

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Prerequisite: -

Objectives:
- To verify the overall knowledge that the student has gained during the course

Outcome:
- The students will be able to attend the various Competitive examinations such as GATE, IES examination etc.

The student will be tested for his understanding of basic principles of the core Civil Engineering subjects through objective type tests and viva voce.

<table>
<thead>
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**Prerequisite**  
-  

**Objectives**  
- The students will be encouraged to handle the field problem independently  

**Outcome**  
- Students by the end of the course would have confidence to tackle any problems in the field and will become employable.

Project work phase II will be an extension of the project work Phase-I started in the seventh semester. On completion of the work, a project report should be prepared and submitted to the department.

**Total Contact Hours :** 135  
**Total Tutorials:**  
**Total Practical Class :** 135  
**Total Hours :** 135
SYLLABUS (Elective Subjects)
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**Prerequisite**

- To learn about construction accidents and safety laws
- To study and understand the various safety concepts and requirements applied to construction projects.
- To study relation between safety & construction team and cost of accidents
- To study safety procedures to be followed for various construction activities
- To learn about the safety precautions to be followed in operating various machineries

**Objectives**

- On successful completion of the course, students will be able to:
  - Know about the causes of accidents and various laws related to safety
  - Know various construction safety concepts and its elements
  - Understand the relation between safety and construction team
  - Learn about safety audit and to identify hazards in construction activities
  - Know the safety guidelines to be followed for operating various construction equipments

**Outcome**


**UNIT – I**

**Accidents and related laws**

**Hours: 12**

Elements of an Effective Safety Programmes - Job-site assessment - Safety Meetings - Safety Incentives. Contractual Obligations - Substance Abuse - Safety Record Keeping - Safe Workers

**UNIT – II**

**Safety Procedures**

**Hours: 12**

Safety and First Line Supervisors - Safety and Middle Managers - Top Management Practices, Company Activities and Safety - Project Coordination and Safety Procedures - Workers Compensation - Accident prevention-cost of accidents-accident reporting investigation

**UNIT – III**

**Safety Professionals and Management**

**Hours: 12**

total loss control and damage control-Safety sampling- safety audit - safety equipment-planning and site preparation-safety system of storing construction materials-Excavation - blasting-timbering-scaffolding-safe use of ladders

**UNIT – IV**

**Safety Audit and Methods**

**Hours: 12**


**Text Books:**


**Reference Books:**

1. Tamilnadu Factory Act, Department of Inspectorate of factories, Tamil Nadu. Health
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<thead>
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**Prerequisite**: -

**Objectives**
- To introduce various construction equipments, selection and apply scientific principles for effectively utilizing them
- To make aware of the various techniques and practices on construction of various civil engineering structures.
- To study and understand the latest construction techniques applied to engineering Construction

**Outcome**
- To develop an understanding of the methods adopted in construction of high rise buildings with basement floors and to optimize the construction by using right equipments.

**UNIT – I Excavation**

**UNIT – II Sub-structures**
Methods and equipments for: Pile foundation, well foundation, and cofferdam. Shoring and under pinning – RCC Diaphragm walls.

**UNIT – III Super Structures**
Methods and equipments for: Scaffolding, Form work, Hoisting and Rigging (cranes), plastering and flooring. Concrete: RMC plants, pumping, finishing, - shotcreting – Building Demolition Techniques.

**UNIT – IV Bridges**
Methods and equipments for precast and cast – in – situ RCC Box girder bridge construction: Balanced cantilever method, Span by Span Method, Incremental lunching methods. – Cable Stayed Bridges – suspension bridges.

**UNIT – V Roads and Tunnels**
Methods and equipments for construction Flexible and rigid pavements, Tunnels in soft ground- Cut and cover method, TBM, Tunnel Lining.

**Total Contact Hours : 60**

**Total Tutorials :**

**Total Practical Class :**

**Total Hours : 60**

**Text Books**

**Reference Books**
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**Prerequisite:** -

**Objectives:**
- To provide an exposure to disasters, their significance and types.
- To ensure and understand the relationship between vulnerability, disasters, disaster prevention and risk reduction.
- To gain a preliminary understanding of approaches of Disaster Risk Reduction.
- To enhance awareness of institutional processes in the country.

**Outcome:**
On successful completion of the course, students will be able to:
- Realize the increasing vulnerability of the planet in general and India in particular to disasters.
- Create a basis to work towards preparedness and also helps to develop a culture of safety and prevention.

**UNIT – I Introduction to Disaster Management**
Definition- nature, characteristics and types of Disasters- Causes and effects, Disaster: A Global View- Disaster Profile of India- Disaster Management cycle.

**UNIT – II Natural Disaster**

**UNIT – III Manmade disaster**
Understanding Man-Made Disasters- Fires and Forest Fires- Nuclear- Biological and Chemical disaster- Road Accidents.

**UNIT – IV Capacity Development in Disaster Management**
Capacity building-Concept- Structural and nonstructural measures- Capacity assessment; strengthening capacity for reducing risk - Counter disaster resources and their utility in disaster management- Legislative support at the state and national levels-Coping strategies- Industrial safety plan.

**UNIT – V Strategies in Disaster Management**
Strategies for disaster management planning- Steps for formulating a disaster risk reduction plan- Disaster management Act and Policy in India- Organisational structure for disaster management in India- Preparation of state and district disaster management plans.

**Text Books:**

**Reference Books:**
<table>
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**Prerequisite**
- To introduce the various components in Harbour and offshore structures.
- Introduce to the students, planning and design principles of various components in Docks and harbours.
- To develop an idea about types off offshore structures forces on offshore structures design concepts and foundation for offshore structures.

**Objectives**

- To introduce the various components in Harbour and offshore structures.
- Introduce to the students, planning and design principles of various components in Docks and harbours.
- To develop an idea about types off offshore structures forces on offshore structures design concepts and foundation for offshore structures.

**Outcome**
- Student will be familiarized with the terminology and fundamental concepts of planning designing coastal and offshore structures.

**UNIT – I**

**Growth of Ports**

Hours: 12

History of Port – Classification of Harbours - Factors affecting the growth of Port. Requirement of a Harbour -
General Planning - Site investigation. Description of selected Indian ports.

**UNIT – II**

**Harbor Planning (Technical)**

Hours: 12


**UNIT – III**

**Harbor Structures**

Hours: 12


**UNIT – VI**

**Docks and Maintenance**

Hours: 12


**UNIT – V**

**Offshore Structures**

Hours: 12


**Total Contact Hours:** 60  **Total Tutorials:**  **Total Practical Class:**  **Total Hours:** 60

**Text Books**


**Reference Books**

Department: Civil Engineering
Programme: B.Tech (CE)

<table>
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Prerequisite:

Objectives:
- Create an awareness of the value of an entrepreneurial educational experience
- Create an awareness of the relationship between entrepreneurship and engineering
- Create an awareness of the career paths available to the entrepreneur
- Introduce the relationship between technological innovation, research and entrepreneurial activity

Outcome:
- Student will be familiarized with the terminology and fundamental concepts of planning designing coastal and offshore structures.

UNIT – I
Entrepreneurship

Entrepreneurship- Concept, Functions, Need and Importance, Myths about Entrepreneurship, Pros and Cons of Entrepreneurship, Process of Entrepreneurship.

An Entrepreneur: Types of Entrepreneurs, Competencies and Characteristics; Ethical Entrepreneurship, Entrepreneurial Value: Values, Attitudes and Motivation, Mindset of an Employee and an Entrepreneur-Difference, Intrapreneur: Importance in Any Organization.

UNIT – II
Entrepreneurship as Innovation and Problem Solving

Entrepreneurs- as problem solvers, Innovations and Entrepreneurial Ventures, Social Entrepreneurship-Concept and Importance, Risk taking-Concept. The role of technology/ social media in creating new forms of firms, organizations, networks and cooperative clusters, Barriers to Entrepreneurship, Support structure for promoting entrepreneurship (various government schemes). Sensing Entrepreneurial Opportunities,

UNIT – III
Entrepreneurship Journey, Enterprise Planning

Self-Assessment of Qualities, Skills, Resources and Dreams, Generation of Ideas, Feasibility Study, Opportunity Assessment, Business Plan Preparation, Execution of Business Plan, Role of Society and Family in the growth of an entrepreneur - Forms of Business Entitites

UNIT – VI
Understanding the Market, Enterprise Marketing


Goals of Business; Goal Setting. SMART Goals, Marketing and Sales strategy, Branding – Business name, logo, tag line, Promotion strategy, Negotiations – Importance and methods, Customer Relations, Employee and Vendor Management, Quality, Timeliness and Customer Satisfaction, Business Failure

UNIT – V
Business Arithmetic, Resource Mobilization

Simplified Cash Register and Record Keeping, Unit of Sale, Unit Price and Unit Cost – for single product or service ,Types of Costs – Start up, Variable and Fixed Income Statement, Cash flow Projections, Break Even Analysis – for single product or service Taxes

Types of Resources – Human, Capital and other Resources, Selection and utilization of human resources and professionals. Role and Importance of a Mentor, Estimating Financial Resources required, Methods of meeting the financial requirements, Size and capital based classification of business enterprises. Angel Investor, Venture Capital Funds, Stock Market – raising funds , Institutions Specialized Financial

Test Books:
1. Entrepreneurship - Class XI- C.B.S.E, Delhi Entrepreneurship - Class XII - C.B.S.E., Delhi
2. Udyamita (in Hindi) by Dr. MMP. Akhouri and S.P Mishra, pub. By National Institute for Entrepreneurship and Small Business Development (NIESBUD), NSIC-PATC Campus, Okhla
3. Entrepreneurial Development by C.B Gupta and N.PSrinivasan, Publisher Chand & Sons, 1992
4. Everyday Entrepreneurs - The harbingers of Prosperity and creators of Jobs - Dr. ArunaBhargava.
### Magazines

2. *Science Tec. Entrepreneur* (A Bi Monthly Publication), centre for Enterpreneurship Development, M.P (CEDMAP), 60 Jail Road, Jhangerbad, Bhopal - 462008
3. *LaghuUdhyogSamachar*
4. *Project Profile by DCSSI*
Department : Civil Engineering
Programme : B.Tech. (CE)

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Prerequisite: Surveying

Objectives:
- Solve sight specific problems of extensive surveying such as triangulation.
- Deduce error in linear and angular measurements by means of error correction
- Impart knowledge on Aerial surveying
- Study the basics of Remote sensing and its application
- To give an introductory knowledge of the Geographical information system in various field application.

Outcome:
On successful completion of the course, students will be able to:
- possess knowledge about Control surveying, Survey adjustments, Aerial survey, Remote sensing and GIS.

UNIT – I Control Surveying
Triangulation figures or systems-systems of framework-classification-station marks signals and towers – reconnaissance – base line measurement – rigid and flexible bars- tape corrections- radar ranging- satellite Station and reduction to centre- Flare and Floating triangulation

UNIT – II Surveying Adjustments
Definitions – Laws of weights – Laws of Accidental Errors – Principal of Least squares – Distribution of Errors to the field measurements- Normal equations – Methods of Correlates – Triangulation Adjustment – Angle , Station & Figure Adjustment – Adjustment of Triangle-Spherical Excess-Geodetic Quadrilateral – Method of Equal shifts

UNIT – III Fundamentals of Total Station Surveying
Methods of measuring distance- Basic Principles of Total Station- Historical Development- Classifications-applications and Comparison with conventional surveying.
Infrared and Laser Total station instruments. Microwave system systems : measuring principle- working principle-sources of errors – microwave total station instruments. Care and maintenance of Total station instruments.

UNIT – IV GPS Surveying
Introduction to GPS, GPS systems (viz. Glonoss, Galileo etc...) and their features-Segments of GPS (Space, Control and User)- their importance and role in GPS- Absolute Position and Differential Position GPS-Role of Differential Position GPS in establishing controls- Factors governing accuracy in GPS positioning-Different types of errors in GPS positioning.

UNIT – V Basics of Geographical Information System

Total contact Hours: 45 Total Tutorials: 15 Total Practical Classes: - Total Hours: 60

Text Books:

Reference Books:
3. N. Madhu, R. Sathikumar, Satheesh Gopi Publisher: Pearson Education India., Total station Remote sensing and GIS
<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject</th>
<th>Hours / Week</th>
<th>Credit</th>
<th>Maximum Marks</th>
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<td>L  T  P  C</td>
<td>CA</td>
<td>SE  TM</td>
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<tr>
<td>CEP07</td>
<td>Remote Sensing and GIS</td>
<td>4  0  0  4</td>
<td>40</td>
<td>60  100</td>
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</table>

**Prerequisite**
- 

**Objectives**
- To introduce the students to the basic concepts and principles of various components of remote sensing.
- To provide an exposure to GIS and its practical applications in civil engineering.

**Outcome**
- The students will be familiarized with basic concepts of remote sensing and GIS and their applications in Civil Engineering.

**UNIT – I**  
**EMR and Its Interaction with Atmosphere & Earth Material**  
Definition of remote sensing and its components – Electromagnetic spectrum – wavelength regions, important to remote sensing – Wave theory, Particle theory, Stefan-Boltzman and Wein’s Displacement Law – Atmospheric scattering, absorption – Atmospheric windows – spectral signature concepts – typical spectral reflective characteristics of water, vegetation and soil.

**UNIT – II**  
**Platforms and Sensors**  
Types of sensor systems-Types of remote sensing platforms – remote sensing satellite orbit types, Sun-synchronous and Geosynchronous – Passive and Active sensors – resolution concept – Pay load description of important Earth Resources and Meteorological satellites – Airborne and space-borne TIR and microwave sensors.

**UNIT – III**  
**Image Interpretation and Analysis**  

**UNIT – IV**  
**Geographic Information Systems**  

**UNIT – V**  
**Data Entry, Storage and Analysis**  

**Total Contact Hours**: 60  
**Total Tutorials**:  
**Total Practical Class**:  
**Total Hours**: 60

**Text Books**

**Reference Books**
<table>
<thead>
<tr>
<th>Subject Code</th>
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<tbody>
<tr>
<td>CEP08</td>
<td>Hydrology and Water Resources Engineering</td>
<td>4 0 0 4</td>
<td>40 60 100</td>
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</table>

**Prerequisite**
- 

**Objectives**
- To understand the various physical processes in the hydrologic cycle and the methods of estimation thereof.

**Outcome**
- At the end of the course the student should be able to estimate the effective rainfall, flood magnitude etc and relate it to the field situations.

**UNIT – I Precipitation**
- Hydrologic cycle, precipitation, stream flow, evaporation, transpiration and infiltration, types and measurement of precipitation, gauge networks, hyetographs, average depth of precipitation over the basin, mass rainfall curves, intensity duration curves – estimates of missing data and adjustment of records.

**UNIT – II Evapo-Transpiration and Infiltration**

**UNIT – III Groundwater**
- Occurrence and movement of ground water, Darcy’s law, aquifers – types and specific yield of aquifers and basin, steady & unsteady flow in wells in confined and unconfined aquifers, well loss and specific capacity of a well.

**UNIT – IV Runoff**

**UNIT – V Floods**

**Text Books**

**Reference Books**
**Department:** Civil Engineering  
**Programme:** B.Tech (CE)  
**Semester:**  
**Category:** TA  

<table>
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<tr>
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<tbody>
<tr>
<td>CEP09</td>
<td>Groundwater Hydrology</td>
<td>4 L 0 T 0 P 4 C</td>
<td>40 60 100</td>
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</table>

**Prerequisite:** -

**Objectives**
- Provide the basic understanding about the rock/soil properties affecting storage and transmission of groundwater and the fundamental principles governing the groundwater flow.
- Introduce various methods to carry out pumping tests to assess aquifer characteristics.
- To familiarize the concepts of well design, construction, development, completion and groundwater exploration and recharge techniques.

**Outcome**
- The student should be able to carry out pumping test and interpret the result to find out the aquifer characteristics, recharge and barrier boundaries. Also, the student should be able to carry out groundwater exploration, design, construction, development and completion of wells.

**UNIT – I**  
**Fundamentals of Groundwater**  
**Hours : 12**

Introduction - need for ground water development, advantages of Groundwater, Groundwater in Hydrological cycle - types of aquifers- Rock properties affecting groundwater movement- Porosity, Specific yield , specific retention , Storage coefficient - Permeability and transmissibility - Laboratory and field measurement of permeability - Basic Principles and Fundamental Equation of continuity - Darcy’s law - General differential equation governing groundwater flow for steady and unsteady flows - Application of aquifers- Flow nets.

**UNIT – II**  
**Well Hydraulics**  
**Hours : 12**

Steady flow to a well in a confined aquifer, unconfined aquifer and a leaky confined aquifer - Unsteady flow to a well in a confined aquifer, an unconfined and a leaky confined aquifer-- Partially penetrating wells - Method of images - Analysis of pump test data for the above aquifers - Problems.

**UNIT – III**  
**Water Wells**  
**Hours : 12**

Types of wells - well design - construction - well development - Testing of wells for yield – well completion and sanitary protection of wells.

**UNIT – IV**  
**Groundwater Exploration Techniques**  
**Hours : 12**

Surface investigations- geological , geophysical exploration, Remote sensing- Subsurface exploration methods (well logging methods)

**UNIT – V**  
**Groundwater Quality and Salt Water Intrusions**  
**Hours : 12**


**Total Contact Hours : 60**  
**Total Tutorials :**  
**Total Practical Class :**  
**Total Hours : 60**

**Text Books**

**Reference Books**
<table>
<thead>
<tr>
<th>Department</th>
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<tr>
<td>Subject Code</td>
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<tr>
<td>Subject</td>
<td>Irrigation Engineering</td>
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<td>Hours/Week</td>
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<tr>
<td>Prerequisite</td>
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</tbody>
</table>
| Objectives  | • To familiarize the students with various irrigation practices adopted  
|            | • To identify the irrigation requirements of various crops and to design irrigation channels |
| Outcome     | • Student should be able to identify the suitable method of irrigation and water requirement for a given soil and crop. Students should also be able to design and manage irrigation systems. |
| UNIT I      | Types of Irrigation Systems | Hours: 12 |
| UNIT II     | Irrigation Water Requirement | Hours: 12 |
| Evaporation, Evapotranspiration, Consumptive use and its estimation - Crop factor - Lysimeters - Effective rain fall and irrigation requirements - Water requirements of various crops - Duty of water - Quality of irrigation water. |
| UNIT III    | Methods of Irrigation | Hours: 12 |
| Surface, subsurface and overhead methods - Check basin, border & furrow, Drip and sprinkler irrigation - Irrigation efficiency, Depth, Rate and frequency of irrigation - Irrigation schedule. |
| UNIT IV     | Design of Irrigation Channels | Hours: 12 |
| Design of unlined and lined channels for irrigation - Location and design of canal regulation structures - Cross drainage structures - Measuring devices. |
| UNIT V      | Land Development and Management | Hours: 12 |
| Total Contact Hours: 60 | Total Tutorials: | Total Practical Classes: | Total Hours: 60 |
|             | 4. Das, M.M, Saikia, M.S Irrigation and water power Engineering, PHI, Learning, (P) Ltd, New Delhi, 2009 |
**Department:** Civil Engineering  
**Programme:** B.Tech (CE)

<table>
<thead>
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<th>Subject</th>
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<td>CEP11</td>
<td>Hydraulic Structures</td>
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<th>Prerequisite</th>
<th><strong>Objectives</strong></th>
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<tbody>
<tr>
<td></td>
<td>To introduce the fundamental planning for Dams.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>To learn about design principles of Gravity dam and Arch dam.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>To learn about spillways and dam maintenance</td>
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<table>
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<tr>
<th>Outcome</th>
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<tbody>
<tr>
<td></td>
<td>The student should have a through basic understanding about dam structure</td>
</tr>
<tr>
<td></td>
<td>Students will be able to plan dam and other related structure</td>
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<table>
<thead>
<tr>
<th>UNIT-I</th>
<th>Planning and Selection of Dams</th>
<th>Hours : 9</th>
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<tbody>
<tr>
<td></td>
<td>Planning, environmental considerations, storage requirements, sedimentation in reservoir, wave height and free board, selection of type of dam. Geological investigation, classification of insitu, rocks for Engineering purposes, foundation treatment, river diversion works</td>
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<table>
<thead>
<tr>
<th>UNIT-II</th>
<th>Gravity Dam</th>
<th>Hours : 9</th>
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<tbody>
<tr>
<td></td>
<td>Gravity dams: Definition, forces acting on the dam, non-overflow and overflow sections, causes of failure, design principles, elementary profile of a dam, high and low dam, stability analysis, temperature control in dams, construction and contraction joints, Galleries in dams.</td>
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<table>
<thead>
<tr>
<th>UNIT-III</th>
<th>Arch Dam &amp; Rock and Earth fill Dam</th>
<th>Hours : 9</th>
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<tbody>
<tr>
<td></td>
<td>Arch Dam: Classification and type, factors affecting layout, simple design criteria – thin cylinder theory trial load analysis, elastic theory, cantilever and Arch analysis. Earth &amp; Rock fill Dams: Types, profile and design principles of earth dams, height and top width, side slopes and its protection, core and casing, cutoff and seepage control, drainage system, construction methods and quality control.</td>
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<table>
<thead>
<tr>
<th>UNIT-IV</th>
<th>Spillways and Gates</th>
<th>Hours : 9</th>
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<tbody>
<tr>
<td></td>
<td>Spillways, sluices and crest gates: Definition and types of spillways, design storm and spillways capacity, energy dissipation, design criteria – design of crest gates and high head gates, supply and power sluices.</td>
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<table>
<thead>
<tr>
<th>UNIT-V</th>
<th>Dam Maintenance</th>
<th>Hours : 9</th>
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<tbody>
<tr>
<td></td>
<td>Instrumentation- Embedded instruments in dam section, foundation measurements of dam body, analysis of strain data, automatic control of dam safety.</td>
<td></td>
</tr>
</tbody>
</table>

**Total Contact Hours : 45 | Total Tutorials : 15 | Total Practical Class : | Total Hours : 60**

**Text Books**

1. Sharma, H.D., Concrete Dams, Metropolitan, 2002,

**Reference Books**

2. Creager, Justin and Hinds Engineering for dams. Vol I.II.III
# Course Information

**Department**: Civil Engineering  
**Programme**: B.Tech (CE)  
**Semester**:  
**Category**: TA  
**Subject Code**: CEP12  
**Subject**: Industrial Waste Disposal and Treatment  
**Hours / Week**: L 4, T 0, P 0, C 4  
**Credit**: 40  
**Maximum Marks**: 60  
**Total Contact Hours**: 60  

### Prerequisite

-  

### Objectives

- To have a knowledge on the uses of water by industries  
- To understand the process involved in industries and their waste water production  
- To learn about the treatment of waste water and safe disposal of treated effluents  

### Outcome

- An ability to use the recent techniques, skills, and modern engineering practices to solve problems related to Industrial Waste Water management and Disposal.  

### UNIT – I  
**Introduction**  
Hours: 12  
Uses of water by Industry - Sources and types of wastewaters, quality criteria, effluent standards- Individual and common effluent treatment plants - Population equivalent, Effects of industrial wastes on streams, land, air and waste water treatment plants  

### UNIT – II  
**Pretreatment methods**  
Hours: 12  
Pretreatment Methods: Process modification – methods and materials changes – Reduce, reuse and recycle methods, house keeping etc. to reduce waste discharge and strength of the waste and established methods for by products recovery within the plant operations  

### UNIT – III  
**Treatment methods of industrial wastes**  
Hours: 12  

### UNIT – IV  
**Treatment methods of residuals**  
Hours: 12  
Residuals of Industrial waste treatment — Characteristics of sludge – Thickening, digestion, conditioning, dewatering and disposal of sludge.  

### UNIT – V  
**Case studies**  
Hours: 12  

### Text Books


### Reference Books


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### Department: Civil Engineering  
**Programme:** B.Tech (CE)

<table>
<thead>
<tr>
<th>Subject Code</th>
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<td>CEP13</td>
<td>Environmental Impact Assessment</td>
<td>4 0 0 4 40 60</td>
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**Prerequisite:**
- To have a knowledge on the impact of various developmental Projects on environment
- To decide appropriate technologies to quantify the impact.
- To have a knowledge on the various mitigation measures.
- To prepare the EIS and EMP.

**Outcome:**
- An ability to identify and quantify the impacts due to various projects on environment and plan mitigation measures; to safeguard the environment.

#### UNIT - I  
**Laws and Acts**  
Hours 12


#### UNIT - II  
**Methodologies**  
Hours 12

EIA methodologies – Appropriate Methodologies, Quantification, - Cost benefit analysis - Risk assessment, Test Model format - Preliminary assessment

#### UNIT - III  
**Impact on Physical – Chemical Environment**  
Hours 12


#### UNIT - IV  
**Impact on Biological and Socio-Economic Environment**  
Hours 12

Energy impact considerations, data sources, energy conservation data, EIA of hydro, thermal and nuclear power plants, Vegetation and Wild life impact: Biological concepts and terms, impact on flora and fauna, mitigating measures, alternatives - Types, steps in performing socio economic impact assessment, analysis of public services and facilities, impacts, social impacts

#### UNIT - V  
**Summarization of Environmental Impacts**  
Hours 12


**Total Contact Hours : 60**  
**Total Tutorials :**  
**Total Practical Class :**  
**Total Hours :60**

**Text Books:**

**Reference Books:**
### Department: Civil Engineering  
**Programme:** B.Tech (CE)

<table>
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<td>4</td>
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<td>0</td>
<td>4</td>
<td>40</td>
<td>60</td>
<td>100</td>
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</table>

**Prerequisite**: -

**Objectives**
- To have a basic knowledge on the air pollution on environment
- To understand the interaction of air pollutants on the meteorological parameters
- To study about the control measures of air pollutants from various sources

**Outcome**
- An ability to formulate, analyze and solve problems related air environment caused by infrastructure development.

#### UNIT – I  
**Introduction**  
Hours: 12

Definition of clean air –air pollutants - Sources and classification - Effects of air pollution on man, animal, vegetation and properties - Ambient Air Quality Standards, Air pollution control legislation.

#### UNIT – II  
**Meteorology and Air pollution**  
Hours: 12


#### UNIT – III  
**Control of particulate pollutants**  
Hours: 12


#### UNIT – IV  
**Control of gaseous pollutants**  
Hours: 12

Gaseous pollution control – Absorption - Principles – Description of equipment, Adsorption – Principal adsorbents – Equipment descriptions – Condensation – Contact condensers, Incineration – Equipment description

#### UNIT – V  
**Control of Noise pollution**  
Hours: 12


**Total Contact Hours: 60**  
**Total Tutorials:**  
**Total Practical Class:**  
**Total Hours: 60**

**Text Books:**

**Reference Books:**
Department: Civil Engineering  
Programme: B.Tech (CE)  
Semester:  
Category: TA  

Subject Code | Subject                          | Hours / Week | Credit | Maximum Marks |
-------------|---------------------------------|--------------|--------|---------------|
CEP15        | Energy and Environment Management | 4 0 0 4 40 60 100 |

Prerequisite: -

Objectives:  
- To study about the Energy principles and procedure for energy audit.  
- To have a knowledge on the impact of various developmental Projects on environment.  
- To decide appropriate technologies to quantify the impact.  
- To have a knowledge on the various mitigation measures.  
- To prepare the BIS and EMP.

Outcome:  
- An ability to identify and quantify the impacts due to various projects on environment and plan, mitigation measures; to safeguard the environment.

UNIT – I  
Introduction  

UNIT – II  
Energy Audit  

UNIT – III  
Environmental Management  

UNIT – IV  
Legal aspects in Environmental Management  

UNIT – V  
EIA  

Total Contact Hours: 60  
Total Tutorials:  
Total Practical Class:  
Total Hours: 60

Text Books:  
Department: Civil Engineering  
Programme: B.Tech. (CE)

<table>
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<th>Subject Code</th>
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<tr>
<td>CEP16</td>
<td>Green Concepts in Building Construction</td>
<td>4 0 - 4 40 60 100</td>
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**Objectives**
- Upon completion of this course, the student will be conversant on the subject of high-performance green building systems,
- To introduce various building assessment standards and codes.

**Outcome**
- On successful completion of the course, students will be able to:
  - Understand the basics of green building concepts
  - Have the ability to rate the building system

**UNIT – I**  
Introduction to high-performance green buildings - Impacts of building construction, operation, and disposal - Methods and tools for building assessment - LEED, IGBC. Building energy system strategies - Water cycle strategies and Materials selection strategies

**UNIT – II**  
Renewable Energy Resources - Wind energy, solar Energy and Hydroelectric energy. Biomass - sources and uses

**UNIT – III**  
Sustainability Concepts - Sustainable Design and Construction - illustration of a vegetative roof, rainwater harvesting; greywater harvesting including, mechanical and natural processes. Passive solar heating or cooling, Geothermal heat generation

**UNIT – IV**  
Materials - Alternate Materials for Construction - Use of recycled content building materials - Rapidly renewable building material products - FSC Lumber - Composite/alternative material use

**UNIT – V**  
Certification - Advancing Green building technologies and innovations - Construction industry’s sustainable field best practices - Real-life project examples of achieving LEED certification - Identifying the steps of integrating sustainability with Virtual Building

Total contact Hours: 60  
Total Tutorials:  
Total Practical Classes:  
Total Hours: 60

**Text Books:**

**References**
<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject</th>
<th>Hours / Week</th>
<th>Credit</th>
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<td>CA</td>
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<tr>
<td>CEP17</td>
<td>Finite Element Analysis</td>
<td>3 1 0 4</td>
<td>40</td>
<td>60</td>
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</table>

**Prerequisite**

- To gain basic knowledge in modeling of structures using finite element Methods
- To understand the concepts of developing finite elements and FE packages

**Objectives**

- An ability to generate the shape functions of various elements used in FE packages
- Understand the assembly and solution techniques.

**Outcome**


**UNIT I – Introduction**

**UNIT II – I-D elements**


**UNIT III – II – D Elements**


**UNIT IV – Beam & III-D Elements**

Beam elements – Axisymmetric elements Tetrahedral, hexahedral elements – Formation of shape functions only.

**UNIT V – Solution Techniques**


**Total Contact Hours : 45**  **Total Tutorials : 15**  **Total Practical Class :**  **Total Hours : 60**

**Text Books**


**Reference**

Department: Civil Engineering  
Programme: B.Tech  
Programme: Elective  
Category: TB

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<tr>
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<tr>
<td>CEP18</td>
<td>Matrix Methods of Structural Analysis</td>
<td>3 1 0 4</td>
<td>40 60</td>
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</table>

Objectives
- To introduce flexibility method of analysis of various structures
- To introduce stiffness method of analysis of various structures
- To familiarize special techniques in matrix methods of analysis.

Outcome
- Capability to formulate flexibility and stiffness methods and procedures
- Able develop own programs for stiffness and flexibility methods of analysis.
- Ability to choose correct method of analysis.

UNIT –I  Flexibility Characteristics of Structures  

UNIT –II  Analysis of beams and trusses by flexibility method  
Analysis of continuous beams and trusses with two or three unknowns by flexibility method- support settlement

UNIT –III  Stiffness Characteristics of Structures  

UNIT –IV  Analysis of frames by stiffness method  
Analysis of frames and trusses with two or three unknowns by stiffness method- lack of fit and temperature stress, Comparison and choice of methods.

UNIT –V  Special techniques  
Modification of stiffness matrix including shear deformation, Members with discontinuity, Method of sub-structures, Reanalysis Technique.

Total Contact Hours: 45  
Total Tutorials: 15  
Total Practical Classes: 0  
Total Hours: 60

Text Books

Reference Books
<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject</th>
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<tr>
<td>CEP19</td>
<td>Design of RCC Structures</td>
<td>L 3 T 1 P 0</td>
<td>C 4</td>
<td>CA 40 SE 60</td>
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</table>

**Prerequisite**
- To understand the design of special RCC structures in civil engineering, by using the basic concepts of design of RCC structural elements as per Indian standards

**Objectives**
- Student should able to design RCC structures and formwork for construction.

**Outcome**
- To understand the design of special RCC structures in civil engineering, by using the basic concepts of design of RCC structural elements as per Indian standards

**UNIT – I**
**Design of Wall and Beam-Column Joint**
- Design of Cantilever and Counterfort Retaining walls, Design of Beam-Column Joints- detailing of joints.

**UNIT – II**
**Design of Slabs and Floors**
- Design of Slabs by Yield Line theory and Hillerborg’s Strip method, Design of Flat Slabs, Design of Grid floors by Approximate Analysis

**UNIT – III**
**Design of Beams**

**UNIT – IV**
**Design of Storage Structures**
- Design of Bunkers and Silos, Design of Overhead Circular and Rectangular Water Tanks (without staging)

**UNIT – V**
**Design of Formwork**
- Introduction to Formwork, Design of Formwork for wall, column, beam and slab elements, Introduction to Composite Construction, Design of Steel-Concrete Composite beams, Design of beams with cast in situ slab.

**Total Contact Hours** : 45  
**Total Tutorials** : 15  
**Total Practical Class** :  
**Total Hours** : 60

**Text Books**

**Reference Books**
**Department** : Civil Engineering  
**Programme** : B.Tech (CE)  
**Semester** :  
**Category** : TB  

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject</th>
<th>Hours / Week</th>
<th>Credit</th>
<th>Maximum Marks</th>
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<tbody>
<tr>
<td>CEP20</td>
<td>Advanced Steel Design</td>
<td>L 3 T 1 P 0</td>
<td>C 4</td>
<td>CA 40 SE 60 TM 100</td>
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</tbody>
</table>

**Prerequisite**  
- 

**Objectives**  
- To analyse the few important steel structures  
- To understand the codal provisions for design of various steel structures.

**Outcome**  
- At the end of this course the student is able to design the industrial steel structures.

**UNIT-I**  
**Design of Beam-Columns**  
**Hours : 9**  
Behaviour – torsional buckling in beam-columns- interaction under biaxial loading- design of beam-columns – design of eccentrically loaded base plates.

**UNIT-II**  
**Industrial Structures:**  
**Hours : 9**  
Loads – wind load calculations - design of Trusses, Design of gantry girders, and gantry girder columns.

**UNIT-III**  
**Chimneys &Towers**  
**Hours : 9**  
Chimneys: loading and load combinations – design and stability considerations – design of baseand foundations for chimneys.  
Towers: Analysis and design of lattice towers- transmission line towers- configurations- types-loadsand load combinations- temperature effect-design principles.

**UNIT-IV**  
**Bridges**  
**Hours : 9**  

**UNIT-V**  
**Cold Formed Steel Design**  
**Hours : 9**  

**Total Contact Hours : 45**  
**Total Tutorials : 15**  
**Total Practical Class :**  
**Total Hours : 60**

**Text Books**


**Reference Books**

<table>
<thead>
<tr>
<th>Subject Code</th>
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<tbody>
<tr>
<td>CEP21</td>
<td>Design and Construction of Prefabricated Structures</td>
<td>4 0 0 4 40 60 100</td>
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<td>Prerequisite</td>
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**Objectives**
- To familiarize the design of basic elements in precast construction.
- To familiarize the students with various prefabrication construction techniques adopted in practice.

**Outcome**
- Student should be able to design precast elements and be able to execute the construction sequence in a project with precast elements.

**UNIT -I** Materials in Precast Structures
- Materials, admixtures, pigments - Modular co-ordination, standardization and tolerances - System of pre-fabrication.
- Pre-cast concrete manufacturing techniques, Moulds – construction design, maintenance and repair.

**UNIT -II** Precast Construction Techniques
- Pre-casting techniques - Planning, analysis and design considerations - Handling techniques - Transportation Storage and erection of structures.
- Curing techniques including accelerated curing such as steam curing, hot air blowing, etc.

**UNIT -III** Precast concrete floors and beams
- Simplified frame analysis, Precast concrete flooring options, flooring arrangements, structural design of individual units, design of composite floors, Composite and non-composite reinforced beams

**UNIT -IV** Precast concrete columns and connections
- Precast concrete columns and their design. Basic mechanism of joints and connections, compression joints, shear joints, tension joints. Connections-pin jointed and moment resisting connections.

**UNIT -V** Application of Prefabricated structures
- Pre-cast and pre-fabricating technology for low cost and mass housing schemes. Small pre-cast products like door frames, shutters, Ferro-cement in housing - Water tank service core unit.

**Text Books**

**Reference Books**
3. Lewicki B., Building with Large Pre-fabrications, Elsevier Publishers
Department: Civil Engineering
Programme: B.Tech (CE)

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject</th>
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<tr>
<td>CEP22</td>
<td>Design of Prestressed Concrete Structures</td>
<td>3 1 0 4 40 60 100</td>
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</table>

Prerequisite:
- To make the students understand the basic concept of prestressed concrete structures, losses of prestress and materials for prestressed concrete.
- To determine the flexural, shear and bond strength of prestressed concrete beam. Design of prestressed concrete beam for flexure, shear and end anchorages as per IS 1343-2012.
- To determine the deflections, methods of prestressing, partial prestressing, and design of composite prestressed concrete beams.
- To design the water tanks, pipes, tension members and compression members.
- To determine the concordant cable profile and the analysis of prestressed continuous beams.

Objectives:
- To determine the losses of prestress and the cable profiles.
- To design the prestressed concrete beam and to check the deflections of prestressed concrete beams.
- To design the composite beams and to design tension and compression members.
- To design water tanks and pipes.
- To design continuous beams.

Outcome:
- To determine the losses of prestress and the cable profiles.
- To design the prestressed concrete beam and to check the deflections of prestressed concrete beams.
- To design the composite beams and to design tension and compression members.
- To design water tanks and pipes.
- To design continuous beams.

Unit – I
Basic Principle of Prestressing

Unit – II
Prestressed Concrete Beams

Unit – III
Deflections and Composite Beams
Deflection of pre-stressed concrete members – Methods of pre-stressing - principles of partial pre-stressing - non-pre-stressed reinforcements - Analysis and Design of composite beams.

Unit – IV
Axial and Circular Prestressing
Design of Tension and Compression members - Circular pre-stressing - Pipes - Water Tanks - Analysis and design – IS Code provisions.

Unit – V
Prestressed Continuous Beams
Analysis of continuous beams – Primary moment-secondary moment-cable layout - Linear Transformation – Concordant cable.

Total Contact Hours: 45
Total Tutorials: 15
Total Practical Class: Total Hours: 60

Programme Out come
The student shall have a basic knowledge of the prestressed concrete elements, design of beams, bridge elements and precast elements namely pipes and water tanks.

Text Books

Reference Books
# Earthquake Resistant Structures

<table>
<thead>
<tr>
<th>Subject Code</th>
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</tbody>
</table>

**Prerequisite:**  
- To study the effect of earthquake loading on the behaviour of structures.
- To provide a basic understanding of Engineering seismology and dynamics of structures.
- To learn the provisions in the IS codes for earthquake resistant design of structures.

**Objectives:**  
- Students are expected to compute design lateral loads for seismic analysis and to adopt detailing of reinforcement in accordance with codal provisions.

**UNIT - I**  
**Elements of Engineering Seismology**  
Hours: 12  
Elements of engineering seismology - characteristics of earthquake - earthquake size - plate tectonics - types of seismic waves – seismographs - effect of earthquake - earthquake history - seismicity of India.

**UNIT - II**  
**Theory of Vibrations**  
Hours: 12  
Theory of vibrations - formulation of equation of motion - single degree of freedom system - free and forced vibrations - damped and undamped vibrations - Basic introduction to multiple degree of freedom systems.

**UNIT - III**  
**Structural Systems**  
Hours: 12  
Performance of structures under past earthquakes - lessons learnt from past earthquakes - soil liquefaction - Principles of earthquake resistant design - Structural system requirements of buildings – Plan and vertical irregularities - Earthquake Resistant Masonry Buildings

**UNIT - IV**  
**Introduction to IS Codes**  
Hours: 12  

**UNIT - V**  
**Computation of Design lateral loads/ Introduction to Retrofitting**  
Hours: 12  

**Text Books**  

**Reference Books**  
Department : Civil Engineering  
Programme : B.Tech (CE)

<table>
<thead>
<tr>
<th>Subject Code</th>
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<tr>
<td>CEP24</td>
<td>Failure Assessment and Rehabilitation of Structures</td>
<td>4 0 0 4 40 60 100</td>
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</table>

Prerequisite

Objectives

- To understand the deterioration process of materials
- To know about repair materials
- To assess the condition of the structure

Outcome

- Ability to analyse The distress structure and propose repair methodology

UNIT – I  
Assessment of Structures  
Hours : 12


UNIT -II  
Deterioration Process  
Hours : 12

Agencies causing material deterioration - shrinkage, settlement, weathering, chemical attack, creep, fire, honey combing etc., durability of materials –Safety evaluation of existing structures

UNIT -III  
Types of Cracks  
Hours : 12

Structural and non-structural cracks -Types of structural distress in foundations, roofs, floors, walls.

UNIT -IV  
Repair Materials and Techniques  
Hours : 12


UNIT -V  
Corrosion Process & Monitoring of Structures  
Hours : 12

Factors influencing corrosion of rebar steel – Corrosion protection in concrete / steel structures – Masonry deterioration, Seismic retrofitting, introduction to health monitoring of structures.

Total Contact Hours : 60  
Total Tutorials :  
Total Practical Class :  
Total Hours :60

Text Books


Reference Books

<table>
<thead>
<tr>
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<tr>
<td>CEP25</td>
<td>Formwork for Concrete Structures</td>
<td>4 0 0 4</td>
<td>40 60 100</td>
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</table>

| Prerequisite | -                                            |            |        |               |

| Objectives   | • To emphasis on the importance of formworks in construction industry.  
              • To familiarize the students with various forms of formworks suitable for concrete structures. |

| Outcome      | • Student will able to appreciate the pros and cons of various formworks and identify suitable formwork for specific purpose. |

**UNIT - I** Formwork Materials and Design Concepts

**Hours : 12**


**UNIT - II** Forms for Footings, Walls and Columns

**Hours : 12**

Conventional Formwork for Foundation, Conventional Wall Formwork, Design illustrations. Conventional Column Formwork, Modular Column Formwork System, Disposable Column Formwork, All Metal Column Formwork, Achieving Formwork Economy in Column Construction, Design illustration for Column Formwork

**UNIT - III** Slab and Beam Formwork

**Hours : 12**

Traditional Slab and Beam Formwork, Various Slab and Beam Formwork Solutions Offered, Achieving Economy in Slab Construction, Design of Slab and Beam Formwork, Illustration of Slab and Beam Formwork Design

**UNIT - IV** Formwork for Special Structures

**Hours : 12**

Formwork for Shells, Domes, Overhead Water Tanks, Tunnel, Bridge formwork and flying formwork, Advantages and Limitations of Flying Forms, Slip forms Form failures-causes, Avoiding Formwork Failure

**UNIT - V** Formwork Supports and Scaffold

**Hours : 12**

Shores/Props and Dropheads, Multi-Legged Shoring Towers, Design of Vertical Supports for Formwork, Classification of Scaffolds, Timber Scaffolds and Metal Scaffolds

**Total Contact Hours: 60**

**Total Tutorials:**

**Total Practical Classes:**

**Total Hours : 60**

**Text Books**


**Reference Books**

Department : Civil Engineering  
Programme : B.Tech (CE)  
Category : TA

<table>
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<th>Subject Code</th>
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<tr>
<td>CEP26</td>
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<td>3 L 1 T 0 P 4</td>
<td>40 CA 60 SE 100</td>
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</table>

Prerequisite -

Objectives
- To know the investigation of Bridges (ii) to know the design of Bridge foundation (iii)
- To know the bridge loads (iv) to know the Bridge construction and maintenance

Outcome
- At the end of the course, the student is able to select the type of bridge, design and its construction

UNIT – I  Introduction  Hours 9
History and Development of Bridges, Classification of Bridges – Investigations for culverts, minor bridge and for major bridges – Topography, Catchment, Hydrology, Geotechnical aspects, Construction Resources – Design Flood Discharge – Methods – Linear waterway.

UNIT – II  Bridge Foundation  Hours 9

UNIT – III  Loads on Bridges  Hours 9
Loading standards for road and railway bridges - design of RC solid slab bridges for IRC loading - design of kerb - design of Tee beam bridges.

UNIT – IV  Construction of Bridges  Hours 9
Setting out of piers and abutments for: minor bridges and culverts, Single span and multispans Bridges – Superstructure supports and centering for RC bridges – erection process of RC girders and steel girders for bridges. Construction precast and cast in situ box girder bridges (Segmental and span by span methods)

UNIT – V  Maintenance of Bridges  Hours 9
Maintenance - Inspection of bridges, Maintenance of substructure and substructures - Load testing on bridges - Temporary and movable bridges - bridge failure - rehabilitation of RC bridges - Case studies.

Total Contact Hours : 45  Total Tutorials : 15  Total Practical Class:  Total Hours : 60

Text Books

Reference Books
### Subject: Experimental Stress Analysis

**Subject Code:** CEP27  
**Credit:** 4  
**Maximum Marks:** 60  
**Hours / Week:** 4  

**Prerequisite:**  
- To learn the principles of measurements of strains and deformations in structures.  
- To introduce the basic testing methods and measurement methods.

**Objectives:**  
- To learn the principles of measurements of strains and deformations in structures.  
- To introduce the basic testing methods and measurement methods.

**Outcome:**  
- The students will be able to plan and measure stress an strains  
- Able to analysis the results without error.

### UNIT – I  
**Introduction**  
**Hours:** 12  
Experimental stress analysis – its scope and importance - Strain gauges – Mechanical, optical, acoustic, electrical inductance and capacitance pneumatic types – description and working principles- Dynamic testing methods

### UNIT -II  
**Strain measurement**  
**Hours:** 12  

### UNIT -III  
**Model analysis**  
**Hours:** 12  
Model analysis – direct and indirect models – law of structural similitude – choice of scales –Model materials – limitations of model studies –Buckingham PI theorem – design of direct and indirect models – Beggsdeform meter and its applications.

### UNIT -IV  
**Optical Methods**  
**Hours:** 12  

### UNIT -V  
**Coatings**  
**Hours:** 12  
Fundamental of Photo elastic coatings, Moire fringe and brittle coating techniques –Introduction to stress freezing techniques – Introduction to non-destructive testing’s

**Total Contact Hours:** 60  
**Total Tutorials:** 60  
**Total Practical Class:** 60  
**Total Hours:** 60

### Text Books

### Reference Books
Department: Civil Engineering  
Programme: B.Tech (CE)

<table>
<thead>
<tr>
<th>Subject Code</th>
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<th>Hours / Week</th>
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<td>CEP28</td>
<td>Experimental Techniques in Structural</td>
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<td>Engineering</td>
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</tbody>
</table>

**Prerequisite**

- 

**Objectives**

- To learn the principles of measurements of strains and deformations in structural elements under static forces and its response in vibrations.

**Outcome**

- Students can carry out experimental investigations involving measurements of strains and deformations in structural elements.

**UNIT – I Forces and Strain Measurement**  
Hours: 12


**UNIT - II Vibration Measurements**  
Hours: 12


**UNIT-III Acoustics and Wind Flow Measures**  
Hours: 12

Principles of Pressure and flow measurements - pressure transducers - sound level meter - Venturimeter and flow meters - wind tunnel and its use in structural analysis - structural modeling - direct and indirect model analysis.

**UNIT-IV Measurements and Control**  
Hours: 12

Diagnosis of distress in structures - crack observation and measurements - corrosion of reinforcement in concrete - Half cell, construction and use - damage assessment - controlled blasting for demolition

**UNIT-V Non Destructive Testing Methods**  
Hours: 12

Load testing on structures, buildings, bridges and towers - Rebound Hammer - acoustic emission - ultrasonic testing principles and application - Holography - use of laser for structural testing - Brittle coating.

**Text Books**


**Reference Books**

Department: Civil Engineering
Programme: B.Tech (CE)

<table>
<thead>
<tr>
<th>Subject Code</th>
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<th>Hours / Week</th>
<th>Credit</th>
<th>Maximum Marks</th>
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<tbody>
<tr>
<td>CEP29</td>
<td>Railways, Airport and Harbour Engineering</td>
<td>4 0 0 4</td>
<td>60 40 100</td>
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</tbody>
</table>

**Prerequisite**
- 

**Objectives**
- To study the modern transit systems
- To study railway track construction and operation.
- To know about the fundamentals of airports

**Outcome**
- The student will be able to plan and design the permanent way
- Able to functionally design an air

**UNIT – I**
**Railways Planning**

Permanent way – gauges, components of permanent way, rails; functions, requirements, types, failures, creep of rails; Sleepers - types, requirements; Ballast – functions requirements, track fittings and fastenings. - MRTS

**UNIT – II**
**Design Concepts**

Geometric design of the track – gradients, grade compensation, speed, super-elevation, cant deficiency, negative cant transition curve. Points and crossings – turn outs, switches, crossings, types of crossings, Design of turnouts; stations - site selection, requirements of a railway station, classification of stations; yards – types of yards

**UNIT – III**
**Airport Planning**

Airport planning – Aircraft characteristics –airport planning, obstructions, types of airport, Wind rose diagram, Runway orientation.

**UNIT – IV**
**Runways**

Basic runway length and corrections. Design of exit taxiway, Runway marking and lighting, LCN and PCN, airport drainage, Problems on LCN & PCN

**UNIT – V**
**Port Planning**


**Total Contact Hours : 60**
**Total Tutorials:**
**Total Practical Class:**
**Total Hours : 60**

**Text Books**
4. Air Transportation Planning and Design by Virender Kumar & Satish Chandra, Galgotia

**Reference Books**
### Subject: Highway and Airport Pavement Design

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject</th>
<th>Hours / Week</th>
<th>Credit</th>
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<tr>
<td>CEP30</td>
<td>Highway and Airport Pavement Design</td>
<td>L 3 T 1 P 0 C 4 CA 40 SE 60 TM 100</td>
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</table>

**Prerequisite:**
- 

**Objectives:**
- Students are expected to understand the difference between highway airport pavements.
- He should understand the analysis and design of pavement for the above two cases.

**Outcome:**
- By the end of the course the student should have understood the difference between the flexible and rigid pavement.

### UNIT – I Pavement Types


### UNIT – II Flexible Pavements


### UNIT – III Rigid Pavements


### UNIT – VI Concrete Pavements


### UNIT – V Condition Assessment

Evaluation of pavement condition: pavement instrumentation – types of pavement distress – roughness and skid resistance. Environmental influence and effects- pavements maintenance and overlays

**Text Books**

**Reference Books**
1. IRC - 37 Tentative guidelines for the design of Flexible pavements, 2012
2. IRC-58 Tentative guidelines for the design of rigid pavements 2012
Department: Civil Engineering
Programme: B.Tech (CE)
Semester: Category: TA

<table>
<thead>
<tr>
<th>Subject Code</th>
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<td>CEP31</td>
<td>Traffic Engineering and Management</td>
<td>L 4 T 0 P 0 C 4 CA 40 SE 60</td>
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</tbody>
</table>

Prerequisite: -

Objectives:
- Students are expected to learn the importance of traffic engineering and relationship between the traffic engineering & management.

Outcome:
- Student should have learnt basic terminology of traffic engineering.
- He should have learnt the importance of carrying out traffic surveys & its interpretation.
- Should appreciate the importance of Management concepts.

UNIT – I Introduction Hours: 12
Significance and scope, characteristics of vehicles and Road users, Stream flow characteristics, q-k-v relationships, Skid Resistance and braking Efficiency(Problems), Components of Traffic Engineering-Road, traffic and land Use characteristics.

UNIT – II Traffic Surveys and analysis Hours: 12
Surveys and analysis- Volume, Capacity, Speed and Delays, Origin and Destination, Parking, Pedestrian Studies, Accident Studies and Safety level of Services.

UNIT – III Traffic Control and regulations Hours: 12
Traffic Signs, Road Markings, Design of Traffic Signals and Signal Coordination(Problems), Traffic Control Aids and Street Furniture, Street Lighting, Computer applications in signal design – Traffic safety.

UNIT – IV Geometric Design of Intersections Hours: 12
Intersections, Conflicts at Intersections, Classification of intersections: ‘At Grade Intersections, - Channelized Intersections, Rotaries, grade separated intersection and design principles of Intersections – Road Safety.

UNIT – V Traffic Management Hours: 12
Traffic Management- Transportation System Management (TSM) – Travel Demand Management (TDM), Traffic Forecasting Techniques, Restrictions On Turning Movements, One Way Streets, Traffic Segregation, Traffic Calming, Tidal Flow Operations, Exclusive Bus Lanes, Introduction To Intelligent Transportation System(ITS)

Total Contact Hours: 60 Total Tutorials: Total Practical Class: Total Hours: 60

Text Books
2. Khanna K and Justo CEG, Highway Engineering, Khanna publishers, Roorkee, 2014

Reference Books
1. IRC Specifications: guidelines and special Publications on Traffic planning and Management
<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject</th>
<th>Hours/ Week</th>
<th>Credit</th>
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<tbody>
<tr>
<td>CEP32</td>
<td>Geotechnical Processes and Application</td>
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</table>

Prerequisite

Objectives

- To provide the students the basic understanding of various ground improvement techniques
- To introduce the students the concept of physical, chemical modification of soil using various techniques.

Outcome

On successful completion of the course, students will be able to:

- Identify problematic soil and their associated problems, propose suitable remedial techniques and design.

UNIT – I

**Introduction**

*Hours: 12*


UNIT – II

**Drainage Methods**

*Hours: 12*

Drainage methods: Well point systems, deep well drainage, vacuum dewatering system, design of dewatering system – field permeability tests, dewatering by electro osmosis. Preloading, sand drains, wick drains- Thermal methods case studies.

UNIT – III

**Grouting**

*Hours: 12*


UNIT – IV

**Stabilization**

*Hours: 12*


UNIT – V

**Geo synthesis**

*Hours: 12*

Geo synthetics: Geotextiles, Geogrids, Geomembranes, Geonets, Geomats, Geomeshes, principles Design and applications – Case studies.

**Total Contact Hours: 60**  **Total Tutorials:**  **Total Practical Class:**  **Total Hours: 60**

**Text Books**


**Reference Books**

1. Koerner, R.M., Construction & Geotechnical methods in foundation engineering, MGH, New York, 1985
### Subject Code: CEP33  Subject: Machine Foundation

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject</th>
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<tr>
<td>CEP33</td>
<td>Machine Foundation</td>
<td>4 L 0 T 0 P 4</td>
<td>40 CA 60 SE 100 TM</td>
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</table>

### Prerequisite
- None

### Objectives
- To provide the student the basic concept of soil dynamics
- Introduce the students the concept of analysis and design foundations subjected to dynamic loads.
- To introduce the techniques to resolve problems associated with machine foundations

### Outcome:
On successful completion of the course, students will be able to:
- Understand the basics of dynamics – dynamic behaviour of soils – effects of dynamic forces and the various design methods.

### UNIT – I  Theory of vibration  Hours: 12
Introduction, nature of dynamic loads free vibrations of spring mass systems, forced vibrations viscous damping, principles of vibration measuring equipments.

### UNIT – II  Dynamic soil properties and behaviour  Hours: 12
Dynamic properties of soils: Elastic properties of soils, coefficient of elastic uniform and non-uniform compression and shear, effect of vibration on the dissipative properties of soils, determination of dynamic properties of soils, Codal provisions.

### UNIT – III  Foundations Of Reciprocating Machines  Hours: 12

### UNIT – IV  Foundation For Impact And Rotary Machines  Hours: 12

### UNIT – V  Vibration Control  Hours: 12
Vibration isolation, passive and active isolation, use of springs and springs and damping materials, construction aspects of machine foundations.

### Total Contact Hours : 60  Total Tutorials :  Total Practical Classes:  Total Hours: 60

### Text Books

### Reference Books
## Course Details

**Department**: Civil Engineering  
**Programme**: B.Tech (CE)  
**Semester**:  
**Category**: TA

<table>
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<th>Subject Code</th>
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<tr>
<td>CEP34</td>
<td>Earth Retaining Structures</td>
<td>4 0 0 4 40 60 100</td>
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</table>

**Prerequisite**:  
- To familiarize the concept of earth pressure, design of earth retaining structures.
- To introduce the students the essential steps involved in design of temporary ERS
- To introduce the techniques involved in construction temporary ERS.

**Objectives**:  
- To familiarize the concept of earth pressure, design of earth retaining structures.
- To introduce the students the essential steps involved in design of temporary ERS.
- To introduce the techniques involved in construction temporary ERS.

**Outcome**:  
At the end of this course, students are expected to:  
- Analyse and design rigid, flexible earth retaining structures, slurry supported trenches and deep cuts.

**UNIT – I**  
**Earth Pressure**  
**Hours : 12**

- Introduction, development of earth pressure theory, classical solutions, graphical techniques, active, passive cases, earth pressure due to external loads, Empirical approaches, arching of soil, stress distribution in shafts, around tunnels, buried conduits.

**UNIT – II**  
**Retaining Walls**  
**Hours : 12**


**UNIT – III**  
**Sheet Pile Walls**  
**Hours : 12**

- Types of sheet pile walls, analysis and design of cantilever and anchored sheet pile walls, construction methods.

**UNIT – IV**  
**Coffer dams**  
**Hours : 12**

- Types and uses of coffer dams- analysis, design and stability of braced cofferdams – analysis, design and stability of cellular cofferdams - trenches - soil anchor - Design and construction.

**UNIT – V**  
**Diaphragm Wall**  
**Hours : 12**

- Analysis, design, Equipment and Construction method of Diaphragm wall – Slurry walls - pile wall, soldier pile and lagging walls, soil nailing wall- Design and construction.

**Total Contact Hours : 60**  
**Total Tutorials :**  
**Total Practical Class :**  
**Total Hours : 60**

**Text Books**


**Reference Books**

<table>
<thead>
<tr>
<th>Subject Code</th>
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<th>Hours / Week</th>
<th>Credit</th>
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<tr>
<td>CEP35</td>
<td>Construction of Underground Structures</td>
<td>4 0 0 4</td>
<td>40 60 100</td>
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</table>

**Prerequisite**

- 

**Objectives**

- To introduce the students the concept of design of underground structures.
- To introduce the various construction techniques in construction of underground structures.

**UNIT – I**

**Tunnel Planning**

Hours: 12


**UNIT – II**

**Tunnel Construction Methods**

Hours: 12


**UNIT – III**

**Safety Provisions**

Hours: 12


**UNIT – IV**

**Underground structures:**

Hours: 12

Advantages – Planning– planning for underground parking – civic facilities – Liquid storage facilities. – Construction Methods: cut and cover methods

**UNIT – V**

**Buried Structures**

Hours: 12

Design of buried pipelines – Box jacking - Trenchless Technology: construction Methods and Machines – Repair and rehabilitation of buried pipelines

**Total Contact Hours:** 60

**Total Tutorials:**

**Total Practical Class:**

**Total Hours:** 60

**Text Books**


**Reference Books**

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<td>CEG01</td>
<td>Entrepreneurship Development</td>
<td>4 0 0 4</td>
<td>40 60 100</td>
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</table>

**Prerequisite**
- 

**Objectives**
- Create an awareness of the value of an entrepreneurial educational experience
- Create an awareness of the relationship between entrepreneurship and engineering
- Create an awareness of the career paths available to the entrepreneur
- Introduce the relationship between technological innovation, research and entrepreneurial activity

**Outcome**
- Student will be familiarized with the terminology and fundamental concepts of planning designing coastal and offshore structures.

**UNIT – I**
**Entrepreneurship**

Hours : 12
Entrepreneurship- Concept, Functions, Need and Importance, Myths about Entrepreneurship, Pros and Cons of Entrepreneurship, Process of Entrepreneurship.

**An Entrepreneur:** Types of Entrepreneurs, Competencies and Characteristics; Ethical Entrepreneurship, Entrepreneurial Value: Values, Attitudes and Motivation, Mindset of an Employee and an Entrepreneur-Difference, Intrapreneur: Importance in Any Organization.

**UNIT – II**
**Entrepreneurship as Innovation and Problem Solving**

Hours : 12
Entrepreneurs- as problem solvers, Innovations and Entrepreneurial Ventures, Social Entrepreneurship-Concept and Importance, Risk taking-Concept; types of business risks, The role of technology/ social media in creating new forms of firms, organizations, networks and cooperative clusters, Barriers to Entrepreneurship, Support structure for promoting entrepreneurship (various government schemes).

Sensing Entrepreneurial Opportunities, Environment Scanning, Problem Identification, Spotting Trends, Creativity and Innovation, Selecting the Right Opportunity

**UNIT – III**
**Entrepreneurship Journey, Enterprise Planning**

Hours : 12
Self-Assessment of Qualities, Skills, Resources and Dreams, Generation of Ideas, Feasibility Study, Opportunity Assessment, Business Plan Preparation, Execution of Business Plan, Role of Society and Family in the growth of an entrepreneur,


**UNIT – VI**
**Understanding the Market, Enterprise Marketing**

Hours : 12

Goals of Business; Goal Setting. SMART Goals, Marketing and Sales strategy, Branding – Business name, logo, tag line, Promotion strategy, Negotiations – Importance and methods, Customer Relations, Employee and Vendor Management, Quality, Timeliness and Customer Satisfaction, Business Failure – Reasons

**UNIT – V**
**Business Arithmetic, Resource Mobilization**

Hours : 12
Simplified Cash Register and Record Keeping, Unit of Sale, Unit Price and Unit Cost – for single product or service ,Types of Costs – Start up, Variable and Fixed Income Statement, Cash flow Projections, Break Even Analysis – for single product or service Taxes

Types of Resources – Human, Capital and other Resources, Selection and utilization of human resources and professionals. Role and Importance of a Mentor, Estimating Financial Resources required, Methods of meeting the financial requirements, Size and capital based classification of business enterprises. Angel Investor, Venture Capital Funds, Stock Market – raising funds , Institutions Specialized Financial

**Total Contact Hours : 60**
**Total Tutorials :**
**Total Practical Class :**
**Total Hours : 60**

**Prescribed Books:**
1. Udyamita (in Hindi) by Dr. MMP. Akhouri and S.P Mishra, pub. By National Institute for Entrepreneurship and Small Business Development (NIESBUD), NSIC-PATC Campus, Okhla
2. Entrepreneurial Development by C.B Gupta and N.PSrinivasan, Publisher Sultan Chand & Sons, 1992
3. Everyday Entrepreneurs - The harbingers of Prosperity and creators of Jobs - Dr. ArunaBhargava.

### Magazines

2. Science Tec. Entrepreneur (A Bi Monthly Publication), centre for Enterprenurship Development, M.P (CEDMAP), 60 Jail Road, Jhangerbad, Bhopal - 462008
3. LaghuUdhyogSamachar
4. Project Profile by DCSSI
**Department**: Civil Engineering  
**Programme**: B.Tech

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<td>CEG02</td>
<td>Finite Element Analysis</td>
<td>L 3 T 1 P 0 C 4 CA 40 SE 60 TM 100</td>
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</table>

**Prerequisite**: -

**Objectives**
- To gain basic knowledge in modeling of structures using finite element Methods
- To understand the concepts of developing finite elements and FE packages

**Out come**
- An ability to generate the shape functions of various elements used in FE packages understand the assembly and solution techniques.

**UNIT – I**  
**Introduction**  
Hours : 9


**UNIT – II**  
**I-D elements**  
Hours : 9


**UNIT – III**  
**II – D Elements**  
Hours : 9


**UNIT – IV**  
**Beam & III-D Elements**  
Hours : 9

Beam elements –Axisymmetric elements Tetrahedral, hexahedral elements –Formation of shape functions only.

**UNIT – V**  
**Solution Techniques**  
Hours : 9


**Text Books**

**Reference**
Department : Civil Engineering  
Programme : B.Tech

<table>
<thead>
<tr>
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<td>CEG03</td>
<td>Fluid Mechanics and Machines</td>
<td>3 1 - 4 40 60 100</td>
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</table>

Prerequisite -

Objectives
- The student is introduced to the mechanics of fluids through a thorough understanding of the properties of the fluids. The dynamics of fluids is introduced through the control volume approach which gives an integrated understanding of the transport of mass, momentum and energy.
- The applications of the conservation laws to flow through pipes and hydraulics machines are studied.

Outcome
- The student should have a thorough basic understanding of mechanics of fluids
- Able to use the knowledge to identify elementary practical problems and solve them.

UNIT – I  Introduction  Hours: 9
Units & Dimensions. Properties of fluids – Specific gravity, specific weight, viscosity, compressibility, vapour pressure and gas laws – capillarity and surface tension. Flow characteristics: concepts of system and control volume. Application of control volume to continuity equation, energy equation, momentum equation and moment of momentum equation.

UNIT – II  Flow through Circular Conduits  Hours: 9

UNIT – III  Dimensional Analysis  Hours: 9
Dimension and units: Buckingham’s П theorem. Discussion on dimensionless parameters. Models and similitude. Applications of dimensionless parameters.

UNIT – IV  Roto Dynamic Machines  Hours: 9

UNIT – V  Positive Displacement Machines  Hours: 9

Total contact Hours: 45  Total Tutorials: 15  Total Practical Classes: -  Total Hours: 60

Text Books:

Reference Books:
### Subject: Building Maintenance

**Subject Code:** CEG04  
**Subject:** Building Maintenance  
**Hours/Week:** L 4, T 0, P 0  
**Credit:** 4  
**Maximum Marks:** 60

#### Prerequisite
- None

#### Objectives
- To preserve building and services, in good operating and habitable condition.  
- To ensure safety of the occupants or the public at large

#### Outcome
- Student will able to understand building maintenance very well.

#### UNIT I - Maintenance

- **Hours:** 12
- **Objectives:** Maintenance Service - Means of effecting maintenance - Repair estimates - Service Centre - Complaint Register - Modalities of maintenance - Through directly employed labour - Through contracts and Comprehensive Outsourcing - Register of Buildings - Safety of Buildings - Cleanliness in the colonies - Service to be attended by local bodies and Services to be provided by different disciplines of - Monitoring of maintenance.

#### UNIT II - Annual Action Plan and Contract System

- **Hours:** 12

#### UNIT III - Service Centres Maintenance

- **Hours:** 12
- **Objectives:** Online Maintenance Service - Disposal of Dismantled Material - Maintenance Stores - Occupation / Vacation of premises - Review of Performance of Service Centres - Tasks to be performed by various officers - Task and responsibilities of JEs, Assistant Engineers, Executive Engineers, Superintending Engineer and Chief Engineer.

#### UNIT IV - Day to Day and Annual Repairs

- **Hours:** 12
- **Objectives:** Day to day repairs - Annual Repairs - Register of periodical repairs - Major Complaints - Special repair - Additions / alterations / Up gradation - Preventive maintenance - Design stage, Construction stage, Handling stage.

#### UNIT V - Encroachment

- **Hours:** 12
- **Objectives:** Responsibility for detection / removal of encroachments - Removal of Encroachments on Public Land - Role of local bodies in prevention of encroachment - Government Instructions to local bodies - Outsourcing of maintenance - Nature of Outsourcing - Scope of Outsourcing work - For Housekeeping Activities.

**Total Contact Hours:** 60  
**Total Tutorials:**  
**Total Practical Classes:**  
**Total Hours:** 60

### Text Books

### Reference Books
**Department:** Civil Engineering  
**Programme:** B.Tech  
**Semester:**  
**Category:** TA  

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</table>

**Prerequisite:**  
- To study human heat balance and comfort  
- To know the design of auditorium as per the reverberation time using sound absorbent and insulation materials.  
- To know the design of natural day light and illumination system of structures.  
- To know the design of natural ventilation, mechanical ventilation and air conditioning system of the structure.

**Objectives**  
- The student will have exposure to identify the functional requirements of structures and its design as per the climatic zone

**Outcome**  

**UNIT – I  
Climatic and Human Comfort  
Hours : 12**  

**UNIT – II  
Thermal Comfort  
Hours : 12**  
Thermal comfort factors, comfort indices, thermal quantities, heat exchange in buildings, periodic heat flow, thermal control and moisture control in buildings.

**UNIT – III  
Ventilation Comfort  
Hours : 12**  
Ventilation: Ventilation due to wind - ventilation due to stack effect -ventilation due to combined effect - infiltration - ventilation of industrial building - calculation of natural ventilation - mechanical ventilation - examples - building regulation - air conditioning – summary.

**UNIT – IV  
Visual Comfort  
Hours : 12**  
Lighting: Day lighting (or) Natural lighting - design of windows -orientation of buildings - lighting for industrial structures - supplementary illumination - artificial illumination –summary.

**UNIT – V  
Acoustic Comfort  
Hours : 12**  
Acoustics: Sound - Velocity of sound - frequency and intensity of sound - reflection of sound -reverberation - absorption of sound - Sabin’s equation - absorption materials - conditions for good acoustics. Acoustical design of an auditorium- defects in an auditorium and their remedies- acoustics of studies -noise and its effects - type of noises-transmission of noise -sound insulation -transmission loss -acceptable noise levels

**Total Contact Hours : 60**  
**Total Tutorials :**  
**Total Practical Class :**  
**Total Hours : 60**

**Text Books:**  
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<td>CEG06</td>
<td>Non Destructive Testing Methods</td>
<td>4 0 0 4</td>
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</table>

**Prerequisite**
- 

**Objectives**
- To learn the principles, Methodology, Limitations, Applications of NDT methods

**Outcome**
- Students can understand the principles of NDT and can carry out NDT testing.

**UNIT – I**
**Surface Examination Method**
- Visual Inspection
  - Liquid Penetrant
  - Magnetic Particle
  - Eddy Current
- Physical Principles, Methodology, Limitations, Applications.

**UNIT – II**
**Volumetric Examination Method-Part1**
- Ultrasonic Testing

**UNIT – III**
**Volumetric Examination Method-Part2**
- Radiography Testing
- Principles of X-ray NDT, Equipment, Calibration, Image Collection, Quantification, and Interpretation. High power sources and high quality films. Digital Radiography, Introduction to Tomography and Laminography

**UNIT – IV**
**Condition Monitoring Method**
- Thermography
- Principles of thermography and approaches in NDT, Sources and detectors, capabilities and limitations, measurement of diffusivity and wall thickness. **Infrared Testing - Vibration Analysis.**

**UNIT – V**
**Special NDT methods**
- Introduction to special NDT methods
  - Magnetic resonance imaging, vibration monitoring, laser ultrasonics, holography, computed tomography

**Total Contact Hours : 60**
**Total Tutorials :**
**Total Practical Class :**
**Total Hours :60**

**Text Books**

**Reference Books**
1. NDT Handbooks Vol 1-17, ASNT Press, OH, USA
**Department:** Civil Engineering  
**Programme:** B.Tech.

<table>
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<td>CEG07</td>
<td>Building Automation and Smart Structures</td>
<td>4 0 0 4 40 60 100</td>
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</table>

**Prerequisite**
- 

**Objectives**
- The course is designed to give an insight into the latest developments in construction field regarding the automated building services, smart materials and their use in structures.

**Outcome**
- Students enabled to understand and construct automated and smart buildings.

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**UNIT – I  
Building Automation**  
Hours: 12


**UNIT – II  
Building Service Control Systems**  
Hours: 12

Building service control systems: Introduction, Building Management System (BMS)- control theory, benefits, Safety systems- life safety system, access control system, smoke detection system, fire sprinkler system, Comfort systems- occupancy sensors, temperature sensors, smart glass, light control system.

**UNIT – III  
Eco friendly Buildings**  
Hours: 12

Eco friendly buildings – concepts of Green building, sustainable sites, brown field development, water conservation, energy conservation, ozone depletion, eco-friendly building materials and resources, indoor environment quality maintenance, new innovative building designs for eco friendliness.

**UNIT – IV  
Smart Materials**  
Hours: 12

Smart materials: Introduction, Piezoelectric materials, Piezoelectric properties, Vibration control, Embedded actuators, Fiber optics, Fiber characteristics, Fiber optic strain sensors, Applications of optical fibers, Electrorheological and Magnetorheological fluids, mechanism and properties, Applications.

**UNIT – V  
Control of Structures**  
Hours: 12

Control of structures: Control strategies and limitations, Classification of control systems, Classical control, Modern control, Optimal control and Digital control.

**Total contact Hours:** 60  
**Total Tutorials:**  
**Total Practical Classes:**  
**Total Hours:** 60

**Reference Books:**
<table>
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<tr>
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<td>Health Monitoring of Structures</td>
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</tbody>
</table>

### Prerequisite

- To gain basic knowledge of concepts and techniques in structural health monitoring

### Outcome

- Student will be able to apply the health monitoring concepts to civil engineering structures

---

**UNIT I - Introduction**

**Hours : 12**

Introduction- Need for structural health monitoring (SHM) and its concepts, sensor systems and hardware requirements, piezo-electric materials and other smart materials for structural health monitoring

Laboratory : Sensor installation and diagnostics, model shape extraction.

---

**UNIT II - Techniques in SHM**

**Hours : 12**

global and local techniques, global dynamic techniques, experimental mode shapes, damage localization and quantification,

---

**UNIT III - Electro-magnetic Techniques in SHM**

**Hours : 12**

Computational aspects of electro-mechanical impedance (EMI) technique, adaptations of EMI technique, location and quantification of damage using global dynamic techniques, damage detection using electro – mechanical impedance technique, remote monitoring.

---

**UNIT IV - Materials for SHM**

**Hours : 12**

Piezo-electric materials and other smart materials for structural health monitoring

---

**UNIT V - Case Studies**

**Hours : 12**

SHM applied to bridges and off-shore structures- Case studies

Total Contact Hours: 60  Total Tutorials:  Total Practical Classes:  Total Contact Hours: 60

Outcome: Student will be able to apply the health monitoring concepts to civil engineering structures

---

**Text Books**

2. Ayman Batisha, Structural Health monitoring of off-shore structures, Lambert Publishers, 2010

**Reference Books**

1. You Lin Xu and Yong Xia, Structural health monitoring of Long span suspension bridges, CRC Press. 2011
Department: Civil Engineering  
Programme: B.Tech

<table>
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<td>CEG09</td>
<td>Remote Sensing and GIS</td>
<td>4 0 0 4</td>
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**Prerequisite:**

**Objectives:**
1. To introduce the students to the basic concepts and principles of various components of remote sensing.
2. To provide an exposure to GIS and its practical applications in civil engineering.

**Outcome:**
1. The students will be familiarized with basic concepts of remote sensing and GIS and their applications in Civil Engineering.

**UNIT – I**

**EMR and its Interaction with Atmosphere & Earth Material**

Definition of remote sensing and its components – Electromagnetic spectrum – wavelength regions, important to remote sensing – Wave theory, Particle theory, Stefan-Boltzman and Wein’s Displacement Law – Atmospheric scattering, absorption – Atmospheric windows – spectral signature concepts – typical spectral reflective characteristics of water, vegetation and soil.

**UNIT – II**

**Platforms And Sensors**

Types of sensor systems - Types of remote sensing platforms – remote sensing satellite orbit types, Sun-synchronous and Geosynchronous – Passive and Active sensors – resolution concept – Pay load description of important Earth Resources and Meteorological satellites – Airborne and space-borne TIR and microwave sensors.

**UNIT – III**

**Image Interpretation and Analysis**


**UNIT – IV**

**Geographic Information Systems**


**UNIT – V**

**Data Entry, Storage and Analysis**


Total Contact Hours: 60  
Total Tutorials:  
Total Practical Class:  
Total Hours: 60

**Text Books**


**Reference Books**

   John Willey and Sons (P) Ltd., 2013.
Department: Civil Engineering  
Programme: B.Tech

<table>
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<tr>
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<td>Experimental Stress Analysis</td>
<td>60</td>
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</table>

Prerequisite: -

Objectives:
- To learn the principles of measurements of strains and deformations in structures.
- To introduce the basic testing methods and measurement methods.

Outcome:
- The students will be able to plan and measure stress an strains
- Able to analysis the results without error.

UNIT – I Introduction
Experimental stress analysis – its scope and importance - Strain gauges – Mechanical, optical, acoustic, electrical inductance and capacitance pneumatic types – description and working principles

UNIT -II Strain Measurement

UNIT-III Model Analysis

UNIT-IV Optical Methods

UNIT -V Coatings
Fundamental of Photo elastic coatings, Moire fringe and brittle coating techniques –Introduction to stress freezing techniques – Introduction to non-destructive testings

Text Books

Reference Books
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<td>CEG11</td>
<td>Environmental Impact Assessment</td>
<td>L T P C CA SE TM</td>
<td>4 0 0 4 40 60 100</td>
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**Prerequisite**
- To have a knowledge on the impact of various developmental Projects on environment
- To decide appropriate technologies to quantify the impact.
- To have a knowledge on the various mitigation measures.
- To prepare the EIS and EMP.

**Objectives**
- An ability to identify and quantify the impacts due to various projects on environment and plan mitigation measures; to safeguard the environment.

**Outcome**
- An ability to identify and quantify the impacts due to various projects on environment and plan mitigation measures; to safeguard the environment.

**UNIT -I**
**Laws and Acts**

**UNIT - II**
**Methodologies**
- EIA methodologies – Appropriate Methodologies, Quantification, - Cost benefit analysis - Risk assessment, Test Model format - Preliminary assessment

**UNIT - III**
**Impact on Physical – Chemical Environment**

**UNIT - IV**
**Impact on Biological and Socio-Economic Environment**
- Energy impact considerations, data sources, energy conservation data,EIA of hydro, thermal and nuclear power plants, Vegetation and Wild life impact: Biological concepts and terms, impact on flora and fauna, mitigating measures, alternatives - Types, steps in performing socio economic impact assessment, analysis of public services and facilities, impacts, social impacts

**UNIT - V**
**Summarization of Environmental Impacts**

**Text Books:**

**Reference Books:**
<table>
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<td>CEG12</td>
<td>Industrial Waste Disposal and Treatment</td>
<td>4 0 0 4 40 60 100</td>
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**Prerequisite**
- 

**Objectives**
- To have a knowledge on the uses of water by industries
- To understand the process involved in industries and their waste water production
- To learn about the treatment of waste water and safe disposal of treated effluents

**Outcome**
- An ability to use the recent techniques, skills, and modern engineering practices to solve problems related to Industrial Waste Water management and Disposal.

**UNIT – I** Introduction
- Uses of water by Industry - Sources and types of wastewaters, quality criteria, effluent standards- Individual and common effluent treatment plants - Population equivalent, Effects of industrial wastes on streams, land, air and waste water treatment plants

**UNIT – II** Pretreatment Methods
- Pretreatment Methods: Process modification – methods and materials changes – Reduce, reuse and recycle methods, house keeping etc. to reduce waste discharge and strength of the waste and established methods for by products recovery within the plant operations

**UNIT – III** Treatment Methods of Industrial Wastes

**UNIT – IV** Treatment Methods of Residuals
- Residuals of Industrial waste treatment — Characteristics of sludge – Thickening, digestion, conditioning, dewatering and disposal of sludge.

**UNIT – V** Case Studies

**Text Books**

**Reference Books**
## Department: Civil Engineering  
### Programme: B.Tech

### Semester:  
**Category:** TA

<table>
<thead>
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### Prerequisite:
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### Objectives:
- To study & understand the importance of Management Principles and Project Management.
- To study the Project Formulation Concept and Appraisal criteria.
- To know Project Staff Recruitment procedure, Labor Welfare Laws, Safety & Trade Union Moves.

### Outcome:
- One should have attained knowledge on importance of management & project management.
- Should be able to make feasible project report.
- Should be able to form and manage an organization.

### UNIT – I  
**Principles of Management**  

### UNIT-II  
**Project Management Principles**  

### UNIT-III  
**Project Formulation**  

### UNIT-IV  
**Project Staffing**  

### UNIT-V  
**Law, Safety & Relationships**  

Total Contact Hours: 60  
Total Tutorials:  
Total Practical Class:  
Total Hours: 60

### Text Books

### Reference Books
<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject</th>
<th>Hours / Week</th>
<th>Credit</th>
<th>Maximum Marks</th>
</tr>
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<tbody>
<tr>
<td>CEG14</td>
<td>Fluid Mechanics and Strength of Materials</td>
<td>3 1 0 4 40 60 100</td>
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</tbody>
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**Prerequisite:**

- To make the student to understand the basic properties of fluids and principles of mechanics of fluids.
- To develop an understanding of the relationship between external loads applied to a deformable body and the internal stress, strain induced in the body.

**Objectives:**

- To make the student to understand the basic properties of fluids and principles of mechanics of fluids.
- To develop an understanding of the relationship between external loads applied to a deformable body and the internal stress, strain induced in the body.

**Outcome:**

- The student should have a through basic understanding of mechanics of fluids
- Students will be able to calculate and understand the concepts of stress and strain
- Calculate, describe, and estimate external loadings, including axial load, shear force, bending, and torsion,

**UNIT-I Fluid Property and Flow Characteristics**

Fluid Property - Newtons law of Viscosity - Fluid pressure and its measurement - Types of Flow- Reynolds number - Continuity equation - Euler’s Equation of Motion.

**UNIT-II Flow Dynamics and Pipe Flow**

Bernoulli’s Equations - Venturi meter and orifice meter - Pressure losses along the flow - Major and minor losses - Flow through circular pipes - Friction factor - Pipes in series and parallel - Hydraulic gradient.

**UNIT-III Turbines and Pumps**

Introduction and Classification of Turbines - Specific Speed - Turbine characteristics, Speed Governance - Classification of Centrifugal Pumps - Pump characteristics - Efficiency - Reciprocating Pumps - Air vessels.

**UNIT – IV Deformation of Solids and Bending of Beams**

Concept of stress and strain - Normal and shear stresses - Simple and compund Stresses - Elasticity and elastic moduli - Poisson’s ratio - Concept of Shear Force and Bending Moment - Bending moment and shear force diagrams for simply supported, cantilever and over hanging beams.

**UNIT-V Shafts and Springs**

Torsion - Shear stresses in circular solid and hollow shafts - Torque and power - Helical and leaf springs - Load, deflection, stress and stiffness relationships.

**Text Books**


**Reference Books**