Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

DIT UNIVERSITY
Dehradun

Detailed Course Structure & Syllabus of B.Tech – Civil Engineering

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
# Course Structure & Syllabus of B.Tech – Civil Engineering

**Applicable for Batch: 2018-2022**

## Year: 1st
### Semester: I

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### Semester: II

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# Course Structure & Syllabus of B.Tech – Civil Engineering

**Applicable for Batch: 2018-2022**

**Year: 2\(^{nd}\) Semester: III**

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**Humanities Elective 1**

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Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

Year: 3rd Semester: V

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Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
## Course Structure & Syllabus of B.Tech – Civil Engineering

**Applicable for Batch: 2018-2022**

**Year: 3\textsuperscript{rd}**  
**Semester: VI**

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### Course Structure & Syllabus of B.Tech – Civil Engineering

#### Applicable for Batch: 2018-2022

**Year: 4th**  
**Semester: VII**

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# Course Structure & Syllabus of B.Tech – Civil Engineering

**Applicable for Batch: 2018-2022**

**Year: 4\(^{th}\)  **

**Semester: VIII**

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<th>Course Title</th>
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<td>Industrial Project/Thesis</td>
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<td>DC</td>
<td>CE405</td>
<td>Earthquake Engineering</td>
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<td>CE406</td>
<td>Hydrology</td>
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<td>DE &amp; OE</td>
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**Total** 16

### Department Elective – 6

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<td>CE449</td>
<td>Environmental Management &amp; Sustainable Development</td>
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<tr>
<td>CE451</td>
<td>River Engineering</td>
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<tr>
<td>CE452</td>
<td>Hydro Power Engineering</td>
<td>2</td>
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<tr>
<td>CE453</td>
<td>Port &amp; Harbour Engineering</td>
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<td>CE454</td>
<td>Structural Geology</td>
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<td>CE455</td>
<td>Statistical Approach to Environmental Data Analysis</td>
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<td>CE456</td>
<td>Advanced Structural Design</td>
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### Humanities Elective 2

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<td>HS493</td>
<td>Indian Culture &amp; Tradition</td>
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<tr>
<td>HS483</td>
<td>Indian Philosophy</td>
</tr>
<tr>
<td>HS491</td>
<td>Industrial Sociology</td>
</tr>
<tr>
<td>HS485</td>
<td>Sustainable Development</td>
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### Open Elective- 2 and 3

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<th>Course code</th>
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<tr>
<td>CS482</td>
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<td>IT357</td>
<td>Internet of Things</td>
<td>3</td>
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<td>IT359</td>
<td>Mobile Computing and Services</td>
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<td>EC386</td>
<td>Fundamental of communication &amp; Networks</td>
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Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
# Course Structure & Syllabus of B.Tech – Civil Engineering

**Applicable for Batch: 2018-2022**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Year</th>
<th>Semester</th>
<th>Credit</th>
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<tbody>
<tr>
<td>EC382</td>
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<td>ME382</td>
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**Summary of the Credit**

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**Category wise classification of the Credit**

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<thead>
<tr>
<th>Category</th>
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<td>DE</td>
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<td>PRJT</td>
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Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Title</th>
<th>Professional Communication</th>
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<tr>
<td>LTP</td>
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<td>Credit 3</td>
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Course Outline:

Course Objective:
To develop the LSRW skills of students for effective communication, to equip the students for business environment, to prepare the students understand and present themselves effectively

Course Pre/Co-requisite (if any):

UNIT 1: Communication

UNIT 2: Listening & Speaking Skills
Listening Comprehension: identifying General and Specific information, Note taking and drawing inferences. Introduction to Phonetics: Articulation of consonants and vowel sounds.

UNIT 3: Reading Skills & Technical Writing Skills

UNIT 4: Business Letter Writing
Business Letter Writing, Job Application Letter & Resume, Interview Skills, Impression Management, Swot Analysis (Identifying Strength & Weakness), EQ and Its Dimensions

Learning Outcome
At the end of the course, the student will be able to:
CO1. Communicate smoothly
CO2. Write formal documents
CO3. Present themselves effectively

Text book [TB]:

Reference Books [RB]:

List of Experiments:
1. Neutralization of Mother Tongue Influence through manner of articulation, Introduction to Speech Sounds – Practicing Vowel and Consonant sounds
2. Listening (Biographies through software) & Presentation of Biographies
3. Listening & Role Play on Situational/Telephonic Conversation (through software)
4. Picture presentation
5. Public Speaking
6. Group Discussion
7. Case Studies
8. SWOT analysis
9. Interview
10. Final evaluation

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Outline:

Course Objective:

To introduce the fundamentals in Differential, Integral and Vector Calculus, use of tools for solving engineering problems.

Course Pre/Co-requisite (if any):

UNIT 1: Limit, Continuity and Differentiability
Review of Limit, Continuity and Differentiability; Indeterminate forms, L’ Hospital’s rule, Rolle’s Theorem, Mean Value theorem and its applications, Successive Differentiation, Leibnitz’s Theorem, Taylor’s and Maclaurin’s Series, Maxima and Minima, Asymptotes, Curvature, Evolutes, Involutes, Sketching of curves.

UNIT 2: Multivariable calculus (Differentiation)
Limit, Continuity, Partial Derivatives, Euler’s Theorem, Total Derivatives, Taylor’s series, Maxima and Minima, Method of Lagrange’s multipliers.

UNIT 3: Multiple Integral
Review of indefinite and definite integrals and its application to evaluate surface area and volume of revolutions, Beta and Gamma functions and their properties, Double integral, Change of order of integration, Change of variables, triple integral, Dirichlet’s integral and their applications.

UNIT 4: Vector Calculus

Learning Outcome

At the end of the course, the student will be able to:
CO1. Learn techniques in calculus, multivariate analysis and linear algebra.
CO2. Equip the students with standard concepts and tools for tackling advanced level of mathematics and applications.
CO3. Familiarity with fundamental tools of Differential, Integral and Vector Calculus.

Text book [TB]:

Reference Books [RB]:
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Title</th>
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<td>EE103</td>
<td>Basic Electrical Engineering</td>
<td>3-1-2 Credit 5 UC 1st Semester I / II</td>
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Course Outline:

Course Objective:

- To apprise students about electric charge, current, voltage and various circuit laws involved in analysis.
- To get acquainted with the basic idea of Generation, Transmission and Distribution of Electrical energy.
- To provide the basic knowledge of operation and working of different types of electrical equipment and their applications.

Course Pre/Co-requisite (if any):

UNIT 1: D.C. Network Theory
Review of basic circuit theory concepts, Mesh and Nodal analysis, Superposition theorem, Thevenin’s theorem, Norton’s theorem, Maximum power transfer theorem, Star – delta transformation, Magnetic Circuits.

UNIT 2: A.C. Circuits & Measuring Instruments
Three Phase A.C.: Star – delta connections, Relation between line and phase quantities, three phase power and its measurement, What is 3 phase 4 wire and 3 phase 3 wire system.
Measuring Instruments: Construction and principle of voltage and current measuring instruments.

UNIT 3: Power System & Transformers
Single line diagram of simple power system.

UNIT 4: D.C. & Synchronous Machines
D.C. Machines: Construction and working principle of d.c. generator and d.c. motor, Types of d.c. machines, E.M.F. equation, Torque equation, characteristics, Losses and efficiency, Need of starter in d.c. motors.
Synchronous Machines: Construction and Principle of operation of Alternator and Synchronous Motor.

UNIT 5: Induction Motors
Three Phase Induction Motors: Principle of operation of 3-Ø induction motor, Types of 3-Ø induction motor, Need of starters in 3-Ø induction motors, Slip – torque characteristics

Learning Outcome

At the end of the course, the student will be able to:
CO1. Students will be familiar about electrical charge, current, voltage and various basic electric circuit laws.
CO2. Acquaint students about DC circuit analysis and methods
CO3. Advanced approach for solving series parallel network of resistors by star delta transformation.
CO4. Acknowledge students with the use of transformers and its working.
CO5. To build an ability amongst students regarding the functioning of DC machines and its characteristics.
CO6. Students will recognize the need for synchronous machine in our electrical systems, its basic functioning and various advantages over other types of machines.

Text book [TB]:

Reference Books [RB]:
Course Structure & Syllabus of B.Tech – Civil Engineering
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List of Experiments:
1. Verification of Network Theorems.
2. Study of diode characteristics. Study of phenomenon of resonance in RLC series circuit.
3. Measurement of power in a three phase circuit by two wattmeter method.
5. Determination of parameters and losses in a single phase transformer by OC and SC test.
7. Study of characteristic of AC Motor.
8. DC generator characteristics.
9. Speed control of dc shunt motor.
10. Study running and reversing of a three phase induction motor.
11. Study of a single phase energy meter.
### Course Structure & Syllabus of B.Tech – Civil Engineering

Applicable for Batch: 2018-2022

- **Subject Code**: PY102
- **Subject Title**: Introduction to Mechanics
- **Subject Category**: UC
- **Credit**: 5
- **Year**: 1
- **1st Semester**: I / II

### COURSE OBJECTIVE:
To teach students the effects of electric charges at rest and in motion. Both positive and negative charges produce force field which is called “electric field”. Moving charges produce current, which gives rise to another force field called “magnetic field”. The electromagnetic theory studies the behavior of the electric and magnetic fields.

#### Unit 1: Electrostatics in vacuum

- Calculation of electric field and electrostatic potential for a charge distribution; Divergence and curl of electrostatic field; Laplace’s and Poisson’s equations for electrostatic potential and uniqueness of their solution and connection with steady state diffusion and thermal conduction; Practical examples like Faraday’s cage and coffee-ring effect; Boundary conditions of electric field and electrostatic potential; method of images; energy of a charge distribution and its expression in terms of electric field.

#### Unit 2: Electrostatics in a linear dielectric medium

- Electrostatic field and potential of a dipole. Bound charges due to electric polarization; Electric displacement; boundary conditions on displacement; solving simple electrostatics problems in presence of dielectrics – Point charge at the centre of a dielectric sphere, charge in front of a dielectric slab, dielectric slab and dielectric sphere in uniform electric field.

#### Unit 3: Magnetostatics

- Bio-Savart law, Divergence and curl of static magnetic field; vector potential and calculating it for a given magnetic field using Stokes’ theorem; the equation for the vector potential and its solution for given current densities

#### Unit 4: Magnetostatics in a linear magnetic medium

- Magnetization and associated bound currents; auxiliary magnetic field \( \vec{H} \); Boundary conditions on \( \vec{H} \) and \( \vec{H} \). Solving for magnetic field due to simple magnets like a bar magnet; magnetic susceptibility and ferromagnetic, paramagnetic and diamagnetic materials; Qualitative discussion of magnetic field in presence of magnetic materials.

#### Unit 5: Faraday’s law

- Faraday’s law in terms of EMF produced by changing magnetic flux; equivalence of Faraday’s law and motional EMF; Lenz’s law; Electromagnetic breaking and its applications; Differential form of Faraday’s law expressing curl of electric field in terms of time-derivative of magnetic field and calculating electric field due to changing magnetic fields in quasi-static approximation; energy stored in a magnetic field.

#### Unit 6: Displacement current, Magnetic field due to time-dependent electric field and Maxwell’s equations

- Continuity equation for current densities; Modifying equation for the curl of magnetic field to satisfy continuity equation; displace current and magnetic field arising from time-dependent electric field; calculating magnetic field due to changing electric fields in quasi-static approximation. Maxwell’s equation in vacuum and non-conducting medium; Energy in an electromagnetic field; Flow of energy and Poynting vector with examples. Qualitative discussion of momentum in electromagnetic fields.

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Course Structure & Syllabus of B.Tech – Civil Engineering
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Unit-7: Electromagnetic Waves (8L)

The wave equation; Plane electromagnetic waves in vacuum, their transverse nature and polarization; relation between electric and magnetic fields of an electromagnetic wave; energy carried by electromagnetic waves and examples. Momentum carried by electromagnetic waves and resultant pressure. Reflection and transmission of electromagnetic waves from a non-conducting medium-vacuum interface for normal incidence.

COURSE OUTCOME:
At the end of the course, the student can:
CO1. To know Newton’s laws of motion, potentials, conservation of energy, momentum and angular momentum, and be able to apply them to projectiles, circular motion, and gravity
CO2. Demonstrate an understanding of intermediate mechanics topics such as co-ordinate transformations, oscillatory motion, gravitation etc.
CO3. Demonstrate rigid body and rotational dynamics using the concept of angular velocity and momentum.
CO4. Understand the concept of non-inertial frames of reference, coriolis and centripetal accelerations and their applications.

TEXT BOOKS

REFERENCE BOOKS

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<th>LIST OF EXPERIMENTS (ANY TEN)</th>
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<tbody>
<tr>
<td>1</td>
<td>Identification of various electronic components.</td>
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<tr>
<td>2</td>
<td>Use of multimeter for testing diodes, LEDs, transistors and measurements of resistance, capacitance, inductance, dc voltage, dc current, ac voltage, ac current and frequency of ac mains.</td>
</tr>
<tr>
<td>3</td>
<td>Charging and discharging of capacitor through resistance and determination of time constant.</td>
</tr>
<tr>
<td>4</td>
<td>To determine the specific resistance of a given wire using Carey Foster’s bridge.</td>
</tr>
<tr>
<td>5</td>
<td>To verify Stefan’s law by electrical method.</td>
</tr>
<tr>
<td>6</td>
<td>To study the variation of magnetic field with distance along the axis of a current carrying coil and determination of radius of the coil.</td>
</tr>
<tr>
<td>7</td>
<td>To calibrate the given voltmeter using potentiometer.</td>
</tr>
<tr>
<td>8</td>
<td>To calibrate the given ammeter using potentiometer.</td>
</tr>
<tr>
<td>9</td>
<td>To determine the band gap of a semiconductor p-n junction.</td>
</tr>
<tr>
<td>10</td>
<td>To determine the resistance of a sample using four probe method.</td>
</tr>
<tr>
<td>11</td>
<td>To determine the band gap of semiconductor using four probe method.</td>
</tr>
<tr>
<td>12</td>
<td>To determine a unknown resistance using Wheatstone bridge.</td>
</tr>
</tbody>
</table>

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
COURSE OBJECTIVE: The objective of this course is to develop a fundamental basis of waves, optical phenomenon, concepts of quantum mechanics and semiconductor physics which the engineering students can apply to their respective area of specialization.

Unit 1: Waves
Mechanical and electrical simple harmonic oscillators, damped harmonic oscillator, forced mechanical and electrical oscillators, impedance, steady state motion of forced damped harmonic oscillator

Unit 2: Non-dispersive transverse and longitudinal waves
Transverse wave on a string, the wave equation on a string, Harmonic waves, reflection and transmission of waves at a boundary, impedance matching, standing waves and their Eigen frequencies, longitudinal waves and the wave equation for them, acoustics waves

Unit 3: Light and Optics
Light as an electromagnetic wave and Fresnel equations, reflectance and transmittance, Brewster’s angle, total internal reflection, and evanescent wave. Mirrors and lenses and optical instruments based on them.

Unit 4: Wave Optics
Huygens’ principle, superposition of waves and interference of light by wavefront splitting and amplitude splitting; Young’s double slit experiment, Newton’s rings, Michelson interferometer, Mach Zehnder interferometer. Farunhofer diffraction from a single slit and a circular aperture, the Rayleigh criterion for limit of resolution and its application to vision; Diffraction gratings and their resolving power

Unit 5: Lasers
Einstein’s theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: gas lasers (He-Ne, CO2), solid-state lasers (ruby, Neodymium), dye lasers; Properties of laser beams: mono-chromaticity

Unit 6: Introduction to Quantum Mechanics
Wave nature of Particles, Time-dependent and time-independent Schrodinger equation for wave function, Born interpretation, probability current, Expectation values, Free-particle wave function and wave-packets, Uncertainty principle.

Unit 7: Solution of Wave Equation
Solution of stationary-state Schrodinger equation for one dimensional problems–particle in a box, particle in attractive delta-function potential, square-well potential, linear harmonic oscillator. Scattering from a potential barrier and tunneling; related examples like alpha decay, field-ionization and scanning tunneling microscope, tunneling in semiconductor structures. Three-dimensional problems: particle in three dimensional box and related examples.

Unit 8: Introduction to Solids and Semiconductors
Free electron theory of metals, Fermi level, density of states in 1, 2 and 3 dimensions, Bloch’s theorem for particles in a periodic potential, Kronig-Penney model and origin of energy bands. Types of electronic materials: metals, semiconductors, and insulators. Intrinsic and extrinsic semiconductors, Dependence of Fermi level on
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

carrier-concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, p - n junction

TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOME:
At the end of the course, the student will be able to:
CO1. To acquire skills allowing the student to identify and apply formulas of optics and wave physics using course literature.
CO2. To be able to identify and illustrate physical concepts and terminology used in optics and to be able to explain them in appropriate detail.
CO3. To be able to make approximate judgments about optical and other wave phenomena when necessary.
CO4. To acquire skills allowing the student to organize and plan simpler laboratory course experiments and to prepare an associated oral and written report.
CO5. To have basic knowledge of Quantum Mechanics and Semiconductors.

<table>
<thead>
<tr>
<th>SR.NO.</th>
<th>LIST OF EXPERIMENTS</th>
</tr>
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</table>
| 1      | (a) To determine wavelength of sodium light using Newton’s Rings.  
(b) To determine the refractive index of a liquid using Newton’s Rings. |
| 2      | To determine wavelength of sodium light using Fresnel’s Biprism. |
| 3      | (a) To determine wavelength of prominent lines of mercury using plane diffraction grating.  
(b) To determine the dispersive power of a plane transmission diffraction grating. |
| 4      | To determine the specific rotation of cane sugar solution using bi-quartz polarimeter |
| 5      | To study the diffraction pattern of Single slab and hence determine the slit width. |
| 6      | (a) To verify cosine square law (Malus Law) for plane polarized light.  
(b) To study the nature of polarization using a quarter wave plate. |
| 7      | To study the variation of refractive index of the material of the prism with wavelength and to verify Cauchy’s dispersion formula |
| 8      | (a) To study photoelectric effect and determine the value of Planck’s constant.  
(b) To verify inverse square law using photocell. |
| 9      | To determine the frequency of AC mains using sonometer. |
| 10     | To determine the frequency of AC mains or of an electric vibrator by Melde’s experiment |
| 11     | To measure the numerical aperture (NA) of an optical fiber. |
Course Outline:

Course Objective:
To teach students the effects of electric charges at rest and in motion. Both positive and negative charges produce force field which is called “electric field”. Moving charges produce current, which gives rise to another force field called “magnetic field”. The electromagnetic theory studies the behavior of the electric and magnetic fields.

Course Pre/Co- requisite (if any):

UNIT 1: Electrostatics in vacuum
Calculation of electric field and electrostatic potential for a charge distribution; Divergence and curl of electrostatic field; Laplace’s and Poisson’s equations for electrostatic potential and uniqueness of their solution and connection with steady state diffusion and thermal conduction; Practical examples like Faraday’s cage and coffee-ring effect; Boundary conditions of electric field and electrostatic potential; method of images; energy of a charge distribution and its expression in terms of electric field.

UNIT 2: Electrostatics in a linear dielectric medium
Electrostatic field and potential of a dipole. Bound charges due to electric polarization; Electric displacement; boundary conditions on displacement; solving simple electrostatics problems in presence of dielectrics – Point charge at the centre of a dielectric sphere, charge in front of a dielectric slab, dielectric slab and dielectric sphere in uniform electric field.

UNIT 3: Magnetostatics
Bio-Savart law, Divergence and curl of static magnetic field; vector potential and calculating it for a given magnetic field using Stokes’ theorem; the equation for the vector potential and its solution for given current densities.

UNIT 4: Magnetostatics in a linear magnetic medium
Magnetization and associated bound currents; auxiliary magnetic field \( \vec{H} \); Boundary conditions on \( \vec{B} \) and \( \vec{H} \). Solving for magnetic field due to simple magnets like a bar magnet; magnetic susceptibility and ferromagnetic, paramagnetic and diamagnetic materials; Qualitative discussion of magnetic field in presence of magnetic materials.

UNIT 5: Faraday’s law
Faraday’s law in terms of EMF produced by changing magnetic flux; equivalence of Faraday’s law and motional EMF; Lenz’s law; Electromagnetic breaking and its applications; Differential form of Faraday’s law expressing curl of electric field in terms of time-derivative of magnetic field and calculating electric field due to changing magnetic fields in quasi-static approximation; energy stored in a magnetic field.

UNIT 6: Displacement current, Magnetic field due to time-dependent electric field and Maxwell’s equations
Continuity equation for current densities; Modifying equation for the curl of magnetic field to satisfy continuity equation; displace current and magnetic field arising from time-dependent electric field; calculating magnetic field due to changing electric fields in quasi-static approximation. Maxwell’s equation in vacuum and non-conducting medium; Energy in an electromagnetic field; Flow of energy and Poynting vector with examples. Qualitative discussion of momentum in electromagnetic fields.

UNIT 7: Electromagnetic waves
The wave equation; Plane electromagnetic waves in vacuum, their transverse nature and polarization; relation between electric and magnetic fields of an electromagnetic wave; energy carried by electromagnetic waves and examples. Momentum carried by electromagnetic waves and resultant pressure. Reflection and transmission of electromagnetic waves from a non-conducting medium-vacuum interface for normal incidence.

Learning Outcome
At the end of the course, the student will be able to:
1. CO1. The use of Coulomb's law and Gauss' law for the electrostatic force
Course Structure & Syllabus of B.Tech – Civil Engineering
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CO2. The relationship between electrostatic field and electrostatic potential
CO3. The use of the Lorentz force law for the magnetic force
CO4. The use of Ampere’s law to calculate magnetic fields
CO5. The use of Faraday’s law in induction problems
CO6. The basic laws that underlie the properties of electric circuit elements

Text book [TB]:

Reference Books [RB]:

List of Experiments:
1. To compare capacitances using De’Sauty’s bridge.
2. Measurement of field strength B and its variation in a solenoid (determine dB/dx)
3. To verify the Thevenin and Norton theorems.
4. To verify the Superposition, and Maximum power transfer theorems
5. To determine self-inductance of a coil by Anderson’s bridge.
6. To study response curve of a Series LCR circuit and determine its (a) Resonant frequency, (b) Impedance at resonance, (c) Quality factor Q, and (d) Band width.
7. To study the response curve of a parallel LCR circuit and determine its (a) Antiresonant frequency and (b) Quality factor Q.
8. Measurement of charge and current sensitivity and CDR of Ballistic Galvanometer

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
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Course Outline:

Course Objective:
The objectives of this course are to enable students to acquire and use engineering graphics skills as a means of accurately and clearly communicating ideas, information and instructions for technical communication.

Course Pre/Co- requisite (if any):

Detailed Syllabus

UNIT 1: Introduction to Engineering Graphics
Introduction to Engineering Drawing covering, Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Involutes; Scales Plain, Diagonal

UNIT 2: Projection of Points and Planes
Orthographic Projections covering, Principles of Orthographic Projections, Projections of Points and lines inclined to both planes; Projections of planes inclined Planes

UNIT 3: Projection of Solids
Projections of solids in simple position, projections of solids with axes inclined to one reference plane and parallel to other. Projections of solids with axes inclined to both of the reference plane

UNIT 4: Section of Solids and Development of Surfaces
Sections and Sectional Views of Right Angular Solids covering, Prism, Cylinder, Pyramid, Cone, Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone

UNIT 5: Isometric Projection and Auto CAD
Isometric Projections, Freehand Sketching, Simple and compound Solids, Conversion of Isometric Views to Orthographic Views (simple machine components according to first angle projection method), Basic AutoCAD commands & its applications

Learning Outcome

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

CO1: Be able to use Engineering Drawing Skills as a means of accurately and clearly communicating ideas, information and instructions.

CO2: Acquire requisite knowledge, techniques and attitude for advanced study of engineering drawing.

CO3: Comprehend and draw a simple engineering drawing primarily in first angle Orthographic projections.

CO4: To create section views of simple engineering objects

CO5: To understand basic AutoCAD commands and appreciate the need of AutoCAD over Manual Drafting.

Text book [TB]:

Reference Books [RB]:
5. (Corresponding set of) CAD Software Theory and User Manuals
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<table>
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Course Outline:

Course Objective:
The objective of the course is to introduce the fundamentals in Matrices and Linear Algebra, Solving Ordinary Differential Equations, Convergence of an Infinite Series, Laplace Transform and Fourier Series relevant to engineering applications.

Course Pre/Co-requisite (if any):

UNIT 1: Linear Algebra

UNIT 2: Differential Equations
Methods of solving differential equations of first order and first degree, Bernoulli equation, Wronskian, Solutions of linear differential equations of higher order with constant coefficients, Cauchy-Euler linear differential equation, Solution of second order linear differential equation with variable coefficients, Method of variation of parameters. Solution of simultaneous linear differential equations of first order.

UNIT 3: Infinite Series
Introduction to sequences and series, Convergence and divergence, Series of positive terms, Comparison test, Cauchy’s integral test, D’Alembert’s ratio test, Cauchy’s root test, Raabe’s test, Logarithmic test, Alternating series, Leibnitz test.

UNIT 4: Fourier Series
Periodic functions, Fourier series of Periodic functions, Euler’s formulae, Functions having arbitrary period, Change of intervals, Even and odd functions, Half range sine and cosine series

UNIT 5: Laplace Transform

Learning Outcome
At the end of the course, the student will be able to:
CO1. Equip the students to deal with advanced level of mathematics and applications.
CO2. Familiarity with fundamental tools of Matrices and Linear Algebra, Ordinary Differential Equations, Infinite Series, Laplace Transforms and Fourier Series.
CO3. Use of tools to solve engineering applications.

Text book [TB]:

Reference Books [RB]:
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<table>
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<th>Subject Code</th>
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Course Outline:

Course Objective:
The objectives of this course are to provide a summary on water chemistry, water treatment, green chemistry and synthetic chemistry. The course intends to provide an overview of the working principles, mechanism of reactions and application of the building blocks like batteries, fuel cells, polymers and an overview of surface coatings in order to protect the metal

Course Pre/Co-requisite (if any):

UNIT 1: Water Treatment and Analysis

UNIT 2: Electrochemistry & Corrosion
Electrochemical cell, Electrode potential & EMF of a Galvanic cell, Nernst Equation, Migration of ions, Transport number, Determination of Transport number by Hittorf’s method, Conductometric titrations, Types of electrode: Calomel and glass electrode, Liquid junction potential.
Corrosion and its economic aspects, Types of corrosion: Galvanic, Erosion, Crevice, Pitting, Waterline, Soil, Microbiological. Theories of corrosion: Acid, Direct Chemical attack, Electrochemical. Corrosion prevention by metallic, organic/inorganic coatings and corrosion inhibitors

UNIT 3: Polymers & Biomolecules
Introduction; Classification of Polymers; Functionality; Mechanism of Polymerization; Plastics; Individual Polymers; LDPE, HDPE, PVC, Polystyrene, Bakelite, Teflon, PMMA, PET, Nylon-6, Rubbers (BUNA-S and BUNA-N); Specialty Polymers (Conducting Polymers, Silicones and Polycarbonates), Structural and functional attributes of cell and cell organelles; Biomolecules (Proteins, Carbohydrates, Lipids, Enzymes, Nucleic acids)

UNIT 4: Fuels, Battery & Lubrication
Classification of fuels, Calorific value, Cetane number, Octane number, Comparison of solid, liquid and gaseous fuel, properties of fuel, Biofuels, Power alcohol and synthetic petrol, Battery, Metal-air battery, Lithium and nickel battery. Introduction of Lubricants, Functions of Lubricants, Classification of lubricants, Mechanisms of Lubrication, Properties of Lubricants.

UNIT 5: Green Chemistry & Nano Chemistry
Emergence of green chemistry, Twelve principle of green chemistry, use of alternative feedstock (biofuels), Use of innocuous reagents, use of alternative solvents, design of safer chemicals, designing alternative reaction methodology, minimizing energy consumption. Introduction to Nano chemistry, properties of Nano materials, preparation of nanomaterial, self-assembly, Different Nano materials, Applications of Nano materials

Learning Outcome
At the end of the course, the student will be able to:
CO1: To understand about the treatment of water, sewage water and hardness related calculation
CO2: An overview of surface coatings in order to protect the metal.
CO3: An ability to identify and formulate polymers and have a knowledge of various polymers like polythene, PVC, PS, Teflon, Bakelite, Nylon which have engineering applications. To gain acquaintance regarding
biomolecules and their application in Engineering. To gain acquaintance regarding biomolecules and their application in engineering.

CO4: An overview of the working principles, mechanism of reactions and application of the building blocks like batteries, fuel cells,

CO5: An ability to handle various instruments like spectroscope, flame photometer etc. Have a knowledge of synthesizing Nano materials and their applications in industry. Know the properties of Fuels and Lubricants. Have a scope in the area of Material Chemistry.

Text book [TB]:

Reference books [RB]:
5. Basic Biotechnology by S Ignacimuthu. Tata Mcgraw-Hills

List of Experiments:
1. Determination of alkalinity in the given water sample.
2. Estimation of temporary and permanent hardness in water sample using EDTA as standard solution.
3. To determine the percentage of available chlorine in bleaching powder.
4. To determine the chloride content in the given water sample by Mohr’s method
5. Determination of iron content in the given ore by using External indicator
6. To determine the Dissolved Oxygen in a given water sample.
7. To determine the strength of unknown acid pH-metrically
8. To analyze the coal sample by proximate analysis.
9. To determine the Flash and Fire point of a fuel sample.
10. To determine the Viscosity of a lubricant by redwood viscometer.
11. To determine the rate constant and order of reaction
12. To determine the strength of a given solution conductometrically
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<th>Subject Code</th>
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<td>ME105</td>
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Course Outline:

Course Objective:

The objectives of this course is to learn basics concepts of engineering mechanics and increase the ability to solve problems involving forces, loads and moments and to know their applications in allied subjects

Course Pre/Co-requisite (if any):

Detailed Syllabus

UNIT 1: Introduction to Engineering Mechanics
Basic idealizations - Particle, Continuum and Rigid body; Newton’s laws of Force and its characteristics, types of forces-Gravity, Lateral and its distribution on surfaces, Classification of force systems, Principle of physical independence, superposition, transmissibility of forces, Introduction to SI units. 
Couple, Moment of a couple Characteristics of couple, Moment of a force, Equivalent force - couple system; Numerical problems on moment of forces and couples, on equivalent force - couple system.

UNIT 2: Equilibrium of forces
Equilibrium of forces - Definition of Equilibrant; Conditions of static equilibrium for different force systems, Lami’s theorem; Numerical problems on equilibrium of coplanar – concurrent and non-concurrent force systems Application- Static Friction in rigid bodies in contact, Types of friction, Laws of static friction, Limiting friction, Angle of friction, angle of repose; Impending motion on horizontal and inclined planes; Numerical Problems on single and two blocks on inclined planes, ladder and wedge friction.

UNIT 3: Analysis of Plane truss and Beam
Support Reaction in beams: Types of beams, Types of Loads and Supports, statically determinate beams, Numerical problems on support reactions for statically determinate beams with Point load (Normal and inclined) and uniformly distributed and uniformly varying loads and Moments. 
Plane Truss: Perfect and imperfect truss Assumptions and Analysis of Plane Truss by Method of joints and Method of section.

UNIT 4: Center of Gravity and Centroids
Introduction to the concept, Centroids of line and area, Centroids of basic geometrical figures, computing Centroids for– T, L, I, and full/quadrant circular sections.

UNIT 5: Kinetics of Particle
Newton’s law of motion; Motion of bodies in Rectangular coordinates; D’Alembert’s Principle.

Learning Outcome

At the end of the course, the student will be able to:
CO1. Identify principles of mechanics to be used for solving real life engineering problems.
CO2. Apply basic Engineering concepts based on force, shape and dimension for selection of material
CO3. Comprehend the action of Forces, Moments and other loads on systems of rigid bodies.
CO4. Compute the reactive forces and the effects that develop as a result of the external loads.
CO5. Express the relationship between the motions of bodies.

Text book [TB]:


Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
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Reference Books [RB):
1. Hibler and Gupta (2010), Engineering Mechanics (Statics, Dynamics) by Pearson Education

List of Experiments:
1. Study of different types of beam.
2. Calculation and Verification of forces in truss elements.
3. Calculation and verification of equilibrium condition on beam model.
4. Calculation to find the redundant force in a truss.
5. Mechanical advantage over pulley arrangement.
6. Determining the coefficient of friction.
7. Optional Tensile Strength
8. Optional Hardness Measurement

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Course Outline:

Course Objective:
Ability to prepare simple objects using machines and machine tools to make students aware of fundamental operations of manufacturing an engineering component, enhance visualization and motivate them to innovate

Course Pre/Co-requisite (if any):

UNIT 1: Machine Shop
To make a machined-component using lathe with mild steel round bar or hexagonal bar
Comprising of common turning operations with reference to drawing given in the manual.
Any one of the following jobs
Jobs: Hex Bolt, Axle for cycle wheel, Jig Bush, a typical turning specimen.

UNIT 2: Sheet Metal Shop
To make a sheet metal component with galvanized iron sheet as per the drawing provided in the manual having spot welding joint.
Any one of the following jobs
Jobs: Square tray, Scoop, Funnel

UNIT 3: Fitting Shop
To make a joint using fitting tools with mild steel flats, round bars or square bars as per the drawing provided in the manual.

UNIT 4: Welding Shop- Arc Welding
To prepare a welding joint with mild steel flat using Manual Metal Arc welding machine according to the drawing provided in the manual.
Any one of the following jobs
Jobs: Lap joint, Butt joint, Fillet/Corner joint

UNIT 5: Gas & Spot Welding
To observe the demonstration of making a Lap joint/Butt joint with mild steel sheet using oxyacetylene flame as per the drawing provided in the manual.

UNIT 6: Minor Project:
To make a minor project by the students in batches comprising the operations performed in different shops

Learning Outcome
At the end of the course, the student will be able to:

CO1: Have Capability to identify hand tools and instruments for machining and other workshop practices.

CO2: Obtain basic skills in the trades of fitting, carpentry, welding and machining

CO3: Acquire measuring skills, using standard workshop instruments & tools.

CO4: Gain eye hand co-ordination, enhance psycho motor skills and attitude.

Textbook [TB]:

Reference Books [RB]:

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Course Outline:

Course Objective:

The objective of the course is to make the students understand the key hardware components in a modern computer system and as to how the software is mapped to the hardware. The student shall also be able to learn make the computer programs using C language by exploring the various features of C.

Course Pre/Co-requisite (if any):

Detailed Syllabus

UNIT 1: Introduction to Computer, Programming & algorithms
Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.)
Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples, From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code

UNIT 2: Arithmetic Expression, and Conditional statements, Loops
Expression:
Arithmetic, Logical , Relational expressions and precedence.
Loops & Branching: Writing and evaluation of conditionals and consequent branching, Iteration and loops.

UNIT 3: Arrays & Functions
Arrays: Arrays (1-D, 2-D), Character arrays and Strings.
Functions: functions (including using built in libraries), Parameter passing in functions, call by value, passing arrays to functions: idea of call by reference.
Searching & Sorting: Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)

UNIT 4: Fuels, Battery & Lubrication
Recursion:
Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc.
Structure:
Structures, Defining structures and Array of Structures.

UNIT 5: Pointers & File handling
File handling: different modes of opening a file in C, reading, writing from files.

Learning Outcome

At the end of the course, the student will be able to:
CO1. To formulate simple algorithms for arithmetic and logical problems.
CO2. To implement conditional branching, iteration and recursion.
CO3. To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
CO4. To use arrays, pointers and structures to formulate algorithms and programs.
CO5. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems
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**Text book [TB]:**

**List of Experiments:**
1. Familiarization with programming environment.
2. Programming for Simple computational problems using arithmetic expressions.
3. Programming for Problems involving if-then-else structures.
4. Programming for Iterative problems e.g., sum of series.
5. Programming for 1-D Array manipulation.
7. Programming for Simple functions
10. Programming for File operations
11. Programming for solving Numerical methods problems

*Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018*
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OBJECTIVE
To impart basic knowledge about the environment and its allied problems and to develop an attitude of concern for the environment. Further the course structure will create the awareness about environmental problems among students and motivate the students to participate in environment protection and environment improvement programs. The course aims to develop skills to help the concerned individuals in identifying and solving environmental problems.

Unit 1: Basics of Environment and Natural Resources: 04 Hrs

Unit 2: Ecosystems: 04 Hrs

Unit 3: Biodiversity and its conservation: 04 Hrs

Unit 4: Environmental Pollutions: 05 Hrs

Unit 5: Social Issues and Environment: 04 Hrs

Field work: 03 Hrs
- Visit to a local area to document environmental asset: river/forest/grassland/hill/mountain
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural
- Study of common flora and fauna.
- Study of a common ecosystem-pond, river, hill slopes, etc.

Course Outcome:
At the end of the course, the student will be able to:
CO1. Demonstrate depleting nature of Environmental Resources and Ecosystem concepts.
CO2. Able to identify the structure and functioning of natural ecosystems.
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CO4. Adapt to 3R (Reuse, Recovery, Recycle). Identify the causes and control measures related to Pollutions.
CO 5. Illustrate and analyse various Case Studies related to Environmental issues and Env. Legislation.

TEXT BOOKS

REFERENCES
OBJECTIVE
To familiarize the students with the features of the Indian Constitution
To provide a knowledge of their constitutional rights

Unit 1 Introduction
Constitution- meaning of the term, basic features Indian Constitution: Sources and constitutional history.
Features: Citizenship, Preamble, Fundamental Rights and Duties, Directive, Principles of State Policy, debates on
Fundamental Rights and Directive. 1 Hr

Unit 2 Union Government and its Administration
Structure of the Indian Union: Federalism, Centre- State relationship, 2 Hrs
President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha 2 Hrs
Institutional Functioning: Prime Minister, Parliament and Judiciary, Power Structure in India: Caste, class and patriarchy 2 Hrs

Unit 3 State Government and its Administration
Governor: Role and Position, CM and Council of ministers, State Secretariat: Organisation, Structure and Functions 3 Hrs

Unit 4 Local Administration
District’s Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected, Representative, CEO of Municipal Corporation. 3 Hrs
Panchayati Raj: Introduction, PRI: Zila Pachayat, Elected officials and their roles, CEO Zila Pachayat: Position and role, Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy 4 Hrs

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

COURSE OUTCOME:
CO 1 Enable the students to protect their rights
CO 2 The students will be engaged in the political system of India

TEXT BOOKS
Course Structure & Syllabus of B.Tech – Civil Engineering
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REFERENCE BOOKS

# Course Structure & Syllabus of B.Tech – Civil Engineering

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**Objective:**
- Introduce the fundamentals in Complex variable.
- Solving Partial Differential Equations.
- Legendre polynomial of first kind with properties.
- Bessel function of first kind and its properties.

**UNIT I: Complex variable - I** (8)
Elementary functions, limit, continuity & differentiability, Analytic Functions; Cauchy – Riemann equations, Harmonic functions, Line integral in the complex plane, Cauchy’s Integral theorem, Cauchy’s Integral formula for derivatives of analytic function.

**UNIT II: Complex Variables - II** (6)
Power series, Taylor’s series, Laurent’s series, Poles, Zeros, Singularities, Residue Theorem, Evaluation of real integrals of the type \[ \int_{0}^{2\pi} f(\cos \theta, \sin \theta) d\theta \] and \[ \int_{-\infty}^{\infty} f(x) dx \].

**UNIT III: Special Functions** (8)
Series solution of ODE of 2nd order with variable coefficient with special emphasis to Legendre and Bessel differential equation by Frobenious method, Legendre polynomial of first kind, Bessel function of first kind and their properties.

**UNIT IV: Fourier Transform & Z-transform** (8)
Fourier integral, Fourier transform, Fourier sine and cosine transforms, Linearity, Scaling, frequency shifting and time shifting properties, Convolution theorem and its application.


**UNIT V: Partial differential equations and its Applications** (8)
Introduction to partial differential equations; Linear partial differential equations with constant coefficients of second order and their classification; Method of Separation of Variables for solving Partial Differential Equations, One-Dimensional Wave Equation, One Dimensional heat equation.

**Course Outcomes:**
- Familiarity with methods of solving partial differential equations.
- Learn differentiation and Integration of complex functions.
- Solving real integrals with complex integration.
- Learn Fourier and Z-transform rules with applications.

**Text Books:**

**Reference Books:**

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
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Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
OBJECTIVE:
The course is designed to gain knowledge regarding the flow characteristics and its effects on the Civil Engineering Structures.

Unit 1: Fluid Properties and Hydrostatics

Unit 2: Kinematics and Dynamics of Fluid Flow
Introduction, Classification of flow, Three dimensional continuity equation (Cartesian coordinates), General Continuity equation, Stream function, Velocity potential, Stream line, Equipotential line, (Two dimensional only). Concept of inertia force and forces causing motion. Derivation of Euler’s equation & Bernoulli’s equation with assumptions and limitations, problems on application of Bernoulli’s equation

Unit 3 Flow through Pipes
Introduction, Reynolds’s number and its significance, Laminar and Turbulent Flow, Hegen- poiseuille’s equation, Major and minor losses in pipe flow Equation for head loss due to friction (Darcy’s), Equation for head loss due to sudden expansion Pipes in series, pipes in parallel and equivalent pipes, Water Hammer in pipes.

Unit-4 Dimensional Analysis and Model Studies
Introduction to Dimensional analysis, Units and dimensions, Dimensional Homogeneity. Raleigh’s and Buckingham’s methods of analysis, Model studies, similitude, dimensional parameters, Types of models, Froude’s models: Reynold’s models

Unit- 5:Flow Measurements

COURSE OUTCOME:
At the end of the course, the student can:
CO1. Calculate Hydrostatic forces on bodies by applying concepts of fluid properties.
CO2. Apply knowledge of Fluid statics and Fluid dynamics in CFD analysis.
CO3. Compute major and minor losses in pipe and water hammer pressure.
CO4. Apply Knowledge of Model laws and Dimensional analysis.
CO5. Measure discharge through Notches and Orifices.

TEXT BOOKS
REFERENCES

SR.NO.      EXPERIMENT NAME
1            Verification of Bernoullis Theorem
2            Metacentric Height
3            Calibration of V- Notch
4            Calibration of Rectangular Notch
5            Calibration of Trapezoidal Notch
6            Calibration of Venturimeter
7            Calibration of Orificemeter
8            Losses in Pipes
**Subject Code**: CE202  
**Subject Title**: SOLID MECHANICS

<table>
<thead>
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<th>Semester</th>
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<td>2(^{nd})</td>
<td>III</td>
</tr>
</tbody>
</table>

**OBJECTIVE:**
The course objective is to learn the strength behavior of materials and properties of those materials used in Civil Engineering.

**Unit 1: Simple Stresses and Strains**


**Unit 2: Principal Stresses and Strains**
Introduction, Stress components on inclined planes, General two dimensional stress system, Principal planes and stresses, Mohr’s Circle of stresses.

6 L

**Unit 3: Bending Moment and Shear Force in Beams**
Introduction, Types of beams, loadings and supports, Shear force and Bending moment, Sign conventions, Relationship between loading, shear force and bending moment, Shear force and bending moment equations, SFD and BMD with salient values for cantilever beams, simply supported beams and overhanging beams for Point loads, UDL, Triangular loads and Couple.

10 L

**Unit 4: Bending and Shear Stress in Beams**

8 L

**Unit 5: Deflection of Prismatic Beams & Elastic Stability of Columns**
Definitions of slope, deflection, Elastic curve derivation of differential equation for flexure, Slope and deflection using Macaulay’s method for simply supported and cantilever beams subjected to point loads, UDL and Couple. Elastic stability of columns- Introduction – Short and long columns, Euler’s theory on columns, Effective length slenderness ratio, radius of gyration, buckling load, Assumptions, derivations of Euler’s Buckling load for different end conditions, Limitations of Euler’s theory, Rankine’s formula and problems.

10 L

**COURSE OUTCOME:**
At the end of the course, the student can:
CO1. Calculate the properties of materials, stresses and strains developed under different types of loadings and the relationship between Elastic Moduli’s
CO2. Know the types of beams with different end conditions and also to find S.F. and B.M. at any section of the beam subjected to different types of loadings.
CO3. Determine bending stress and shear stress distribution across various beam sections
CO4. To determine the bending and shear stresses.

**TEXT BOOKS**

**Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018**
REFERENCES
OBJECTIVE:
The course is designed to gain knowledge about surveying and its relevance in mapping and to introduce the students with various methods of calculating areas and volumes using maps.

Unit 1: Introduction
Importance of surveying to engineers. Types and classification of survey. Concept of scale, Symbols & colours, Principles of surveying. Concept of field and office work. Horizontal and vertical control. Units of measurement. Definition of maps and understanding topographical maps of Survey of India.

Unit 2: Horizontal control
Operation and use of metric chain and tape. Sources of errors and corrections. Use of ranging rods, cross staff, arrows, pegs etc. Use of prismatic compass and Surveyor’s compass - Bearings - Whole circle and Reduced Bearing - Traversing - Local attraction - Magnetic dip and declination. Plane table survey and accessories - Radiation, intersection and traversing. Two point problem, Three point problem.

Unit 3 Vertical Control
Definitions of terms used in levelling, different types of levels, adjustments, bench marks. Booking and reducing the levels - rise and fall method and plane of collimation method. Profile levelling - longitudinal and cross sectioning – Plotting. Contouring - definition and characteristics of contours. Uses of contours. Methods of contouring-direct and indirect.

Unit-4 Theodolite Survey

Unit- 5: Areas and Volumes
General methods for determining areas. Areas from offsets to a base line, area by double meridian distances, coordinates, map measurements and planimeter. Measurement of volume by prismoidal and trapezoidal formula, volume from spot levels and volume from contour plans.

COURSE OUTCOME:
At the end of the course, the student can:
CO1. Identify principles of surveying to be used for solving real life engineering problems.
CO2. Know how to interpret maps in surveying.
CO3. Perform Theodolite survey for horizontal control and leveling for vertical control
CO4. Students can compute area and volume of large area using different methods for use in surveying.

TEXT BOOKS
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

REFERENCES

<table>
<thead>
<tr>
<th>SR.NO.</th>
<th>EXPERIMENT NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Study of different types of maps, their scales, latitude, longitude, colours and symbols.</td>
</tr>
<tr>
<td>2</td>
<td>Setting out polygons using prismatic compass; Location of details using compass traversing.</td>
</tr>
<tr>
<td>3</td>
<td>Method of radiation and intersection by plane tabling.</td>
</tr>
<tr>
<td>4</td>
<td>Two point and three point problem.</td>
</tr>
<tr>
<td>5</td>
<td>Finding elevations using dumpy level with change point and using plane of collimation method.</td>
</tr>
<tr>
<td>6</td>
<td>Plotting of contours by block levelling.</td>
</tr>
<tr>
<td>7</td>
<td>Finding horizontal angle by method of repetition, method of reiteration and measurement of vertical angles.</td>
</tr>
<tr>
<td>8</td>
<td>Finding out height and elevation of an object by single plane method.</td>
</tr>
<tr>
<td>9</td>
<td>Setting out simple curves by offsets from long chord &amp; chord produced method.</td>
</tr>
<tr>
<td>10</td>
<td>Setting out simple curves by Rankine’s deflection angle method.</td>
</tr>
</tbody>
</table>
OBJECTIVE:
The course provides an understanding of drinking water quality, treatment and design of treatment units, water supply and water connections to households.

Unit 1: Need for public water supply and role of engineers
Quantity of water, Different water demands, design period and population forecast-Arithmetic mean, Geometric mean and incremental increase method. Sources of water.

Unit 2: Quality of water
Physical, chemical and bacteriological water quality parameters, Standards of Water quality desired for domestic water supplies – BIS and WHO Standards - Water borne diseases.

Unit 3: Treatment of water

Unit 4: Storage and distribution of water
Layouts of distribution systems, Methods of distribution: pressure and gravity distribution systems, concept of service and balancing reservoirs, capacity of distribution reservoirs; general design guidelines for distribution system, Hardy - Cross method of pipe network analysis.

Unit 5: Water supply to buildings
Components of house water supply system, Pipe sizes and recommended velocities and pressures. Pipe fittings and pipe joints. Valves and taps. Hot water supply, Rainwater harvesting, Fire safety and firefighting installation in buildings.

COURSE OUTCOME:
The students will be able to learn about
CO1. Various water demand quantities and basic knowledge about drinking water parameters.
CO2. Treatment of public water supply.
CO3. Design of water treatment plants and storage capacity of reservoir
CO4: Understanding of various components of house water supply system

TEXT BOOKS

REFERENCES

SR.NO.
1. Determination of turbidity, color and conductivity
2. Determination of pH, alkalinity and acidity

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

3  Determination of hardness and chlorides
4  Determination of residual chlorine and chlorine demand
5  Determination of dissolved oxygen
6  Measurement of sound level with sound level meter
7  Determine the quantity of alum required to coagulate a given sample of raw water
8  Find out suspended solids, dissolved solids, total solids

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
OBJECTIVE:
The objectives of this course is to learn to know about the supporting structures and building amenities.

Unit 1: Introduction to Building Materials
Bricks: Classification, ingredients, different tests and its applications; Timber: It’s Varieties, defects, tests, seasoning, applications; Application of Plywood and Veneers; Tests for fine aggregates.

Unit 2: Lime, Mortar and Stones
Lime: Classification and its application; Stone: Types of building stone, uses, deterioration and preservation, dressing stones and tests; Mortar: Importance, types and its ingredients.

Unit 3 Foundations
Requirement of good foundation; Bearing Capacity of soil; classifications and various Applications.

Unit-4 Flooring and Roofing, Stairs Doors and Windows
Requirements of good floors; Selection of flooring materials; Types of roof and different roofing materials; Types of doors and Windows.

Unit- 5:Masonry and Plastering
Brick masonry (Bonds); Purpose, methods and defects of plastering, damp proofing.

TEXT BOOKS

REFERENCES

COURSE OUTCOME:
At the end of the course, the student can:
CO1. About the different types of materials used for building construction
CO2. Understand types of doors and stairs and its uses and masonry, floors, and roofs.
CO3. Able to decide the types of materials to be used based on the extent of work to be done.
CO4. Select suitable type of flooring, plastering and also suitable color to the building.
CO5. Select and design suitable type of framework.
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Title</th>
<th>LTP</th>
<th>Credit</th>
<th>Subject Category</th>
<th>Year</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>HS201</td>
<td>Aptitude and Soft Skills I</td>
<td>2 00</td>
<td>0</td>
<td>AC</td>
<td>II</td>
<td>III</td>
</tr>
</tbody>
</table>

Course Outline: This is a module having basics of aptitude coupled with Soft Skills to help students set the tone for aptitude training to create readiness for campus placement and various competitive exams for Government & non-corporate set-ups. The various tools used in the classes will help them rediscover & reinvent themselves.

Course Objective:
1. Prepare students for becoming confident and corporate-culture fit
2. Get them equipped with the aptitude tools to handle workplace stressors and manage time properly
3. Help them improve their interpersonal skills

Course Pre/Co-requisite (if any): Basic understanding of elementary Mathematics and Logical reasoning and basic understanding of Soft Skills.

Detailed Syllabus

UNIT 1: QUANTITATIVE APTITUDE 05 hours
Simplification: Duplex method for finding square; Vedic mathematics tricks for multiplication of 2, 3, 4 digit numbers; BODMAS application, Finding square roots and cube roots; Introduction to Surds and Indices.
Ages: Problems based on ages solving with algebraic equations; Concept of hence time and past time.
Averages: Basic Concepts; Weighted Average; Basic understanding of mean, median and mode; Application of average on ages, speed time distance and series.

UNIT 2: VERBAL APTITUDE 05 hours
Sentences- Types of sentences, Parts of Speech- application based approach.
Vocabulary: Understanding word structure, common roots, prefixes, suffixes, Mnemonic method.
Speed Reading: Easy to medium passages-techniques and practical applications, Idioms and phrases.
Activities- Words from Dictionary, Newspaper and other sources (theme based).

UNIT 3: LOGICAL REASONING 06 hours
Clock and Calendar, Cubes – Structure of cube, cutting rules, cutting the painted cube into identical cubelets and Dice reasoning – rule detection, pattern completion, image analysis.
Missing Number, Mathematical operation, Inequality, Number puzzles.

UNIT 4: SELF-ANALYSIS & INTERPERSONAL SKILLS 05 hours
MBTI and other personality tests, strategies to develop interpersonal skills.

UNIT 5: PRESENTATION SKILLS 05 hours
Principles of Effective Presentations, Do’s and Don’ts of Formal Presentations, How to prepare for a formal presentation, Presentation Exercises a) Welcome speech, c) Farewell Speech, d) Vote of thanks etc.
Suggested Activities & Games: (i) Stand Up for Fillers, (ii) Mimes, (iii) Short Speech Challenge.

Learning Outcome
1: Get to know more about their personality and gain people skills.
2: Be able to deliver presentations more confidently.
3: Will have a firm base ready for the upcoming years for the aptitude part.

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

Text book [TB]:

Reference books [RB]:

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

Humanities Electives I

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Title</th>
<th>Education and Social Change</th>
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<tbody>
<tr>
<td>HS241</td>
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<td>LTP</td>
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<td>Year II</td>
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<tr>
<td>Credit</td>
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<td>Semester IV</td>
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</table>

Course Objective

- To define the various types of education policies
- To understand the role in striving for social change.
- To overview on education and its implications on social changes to the students.

Unit 1
6 Hrs
General introduction to the place of learning in society. Learning, education and training. Changing meanings of education across time and society. A brief historical perspective on education in India.

Unit 2
6 Hrs
Social-political arithmetic as a spurious way of understanding education and social change. Structural functionalist perspectives and structural-conflict perspectives on education.

Unit 3
7 Hrs

Unit 4
7 Hrs

LEARNING OUTCOME:

- The students will understand how the education system assesses the importance of education in society.
- The students will be able to take a significant action in area of education to maintain social change.
- The student will be able to participate in the changes required in society.
- Education will be used as a tool to implement adequate changes in society.

TEXT BOOKS

REFERENCE BOOKS
- Gadgil, Madhav & Ramachandra Guha (1993), *This Fissured Land: An Ecological History of India*, OU Press.
- Dhanagare, D.N., *Themes and Perspectives in Indian Sociology*, Rawat
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

Humanities Electives I

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>HS242</th>
<th>Subject Title</th>
<th>Introduction to Psychology</th>
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<tr>
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<tr>
<td>Subject Category</td>
<td>Elective</td>
<td>Year</td>
<td>II</td>
</tr>
</tbody>
</table>

Course Objective
• To understand the basic psychological processes and their applications in everyday life.

Unit 1 Introduction
Psychology as a science, perspective, origin and development of Psychology, Psychology in India, Methods: experimental and case study.

Unit 2 Cognitive Processes - Perception
Nature of perception, laws of perceptual organization, learning, conditioning observational learning, memory processing, information processing model, techniques for improving memory

Unit 3 Motivation and Emotion
Motives: Biogenic and Sociogenic; Emotion: Nature of Emotions, key Emotion

Unit 4 Personality and Intelligence - Personality
Nature and Theories; Intelligence: Nature and Theories

Course Outcome:
• The students will develop an understanding of the various psychological processes to maintain their daily activities
• The students will understand themselves better.
• The students will be better equipped for life.
• The Students will be able to demonstrate critical and creative thinking and scientific approach to understand human behaviour.

Text Books:

REFERENCE BOOKS:

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Humanities Electives I

<table>
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<tr>
<th>Subject Code</th>
<th>Subject Title</th>
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<tr>
<td>HS243</td>
<td>Science, Technology &amp; Society</td>
<td>2-0-0</td>
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<td>Elective</td>
<td>II</td>
<td>IV</td>
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</table>

Course Objective
To increase the basic understanding of students towards science and technology, and basic implications of science & technology on social development.

Unit 1
Introduction of society, Sociological imagination, the two revolutions and their socio-economic technological and scientific implications; Social significance of science and technology, ideas beyond technology.

Unit 2
Perspectives on relations between science and technology; Sociological perspective on scientific knowledge: Karl Marx, Emile Durkheim and Karl Mannhen’s Sociology of knowledge; Merton’s approach to science and technology.

Unit 3
Ethos of science, Matthew effect in science, Thomas theorem and Mathew effect; Thomas Kunn’s notions paradigm and paradigm-based science, Scientific community and growth of scientific knowledge.

Unit 4
Science in India: science and technology policies in India, Scientific communities and their linkages, national and international Science, Ethics in science & engineering, environment and science and technology

COURSE OUTCOME:
- Enable students to examine the role of science and technology in social and economic development.
- The students will understand perspectives on relations between science and technology.
- The student will be able to understand the scientific temper & its social significance.
- The student will be able to understand and implement technological policies for the betterment of society.

TEXT BOOKS

REFERENCE BOOKS
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022
Humanities Electives I

<table>
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<th>Subject Code</th>
<th>Subject Title</th>
<th>Ethics &amp; Self Awareness</th>
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<td>2-0-0</td>
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<td>Elective</td>
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</table>

Course Objective
- To introduce the concepts pertaining to ethical and moral reasoning and action
- To develop self – awareness

Unit 1 Introduction
Definition of Ethics; Approaches to Ethics: Psychological, Philosophical, Social.

Unit 2 Psycho-social theories of moral development
View of Kohlberg, Morality and Ideology, Culture and Morality, Morality in everyday context

Unit 3
Ethical Concerns: Work Ethics and Work Values, Business Ethics, Human values in organizations, Self-Awareness: Self Concept: Johari Window, Self and Culture, Self-Knowledge, Self-Esteem

Unit 4

COURSE OUTCOME
- Students will develop an understanding of the ethical values and their application in daily activities
- Students will learn business ethics and work ethically in every sphere.
- Students will understand themselves better and develop healthy interpersonal relationships.
- Students will be able to develop themselves into wholesome personalities.

TEXT BOOKS

REFERENCE BOOKS

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

<table>
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<th>Subject Title</th>
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<tr>
<td>LTP</td>
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<td>Credit 4</td>
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<tr>
<td>Subject Category</td>
<td>DC</td>
<td>Year 2nd</td>
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</table>

Course Objective:
The course is designed to make students aware about the basic concepts of structural analysis and different design principles used there in.

Course Pre/Co-requisite (if any): NA

Detailed Syllabus

Unit 1: Introduction and Analysis of Plane Trusses
8 L
Structural forms, Conditions of equilibrium, Degree of freedom, Linear and Nonlinear analysis, Static and Kinematic indeterminacies of structural systems, Types of trusses, Assumptions in analysis, Analysis of determinate trusses by method of joints and method of sections.

Unit 2: Deflection of Beams
8 L
Deflection of determinate beams by Moment area and Conjugate beam methods, Strain energy due to axial force, Principle of virtual work and Castigliano’s theorems, Maxwell’s Reciprocal Theorem, Unit load and its application to deflection of determinate beams and trusses

Unit 3: Arches and Cable Structures
8 L
Three hinged parabolic arches with supports at same and different levels, Determination of normal thrust, radial shear and bending moment, Analysis of cables under point loads and UDL, Length of cables for supports at same and at different levels.

Unit-4: Influence Lines and Moving loads
10 L
Concept of influence lines, ILD for reactions, SF and BM for determinate beams, Muller Breslau Principle, ILD for axial forces in determinate trusses, BM, SF and axial forces in determinate systems using ILD, Maximum BM and SF in determinate beams using rolling loads concepts.

Unit- 5: Analysis of Indeterminate Structures
5 L
Slope Deflection method and Moment distribution method

Learning Outcome

At the end of the course, the student can:
CO1. Analyze the framed structures.
CO2. Find out forces in different members of a truss.
CO3. Analyze the beams with moving loads and drawing influence lines.
CO4. Analyze the various components of Indeterminate Structures

TEXT BOOKS

REFERENCES

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Objective:

The objectives of this course are to learn the design concrete mixes for various mix proportions using different types of blending materials such as silica fume, fly ash and blast furnace slag.

Course Pre/Co-requisite (if any): NA

Detailed Syllabus

Unit 1: Concrete Ingredients and Microstructure 9 L

Unit 2: Fresh Concrete 7 L

Unit 3 Hardened Concrete 10 L

Unit 4 Concrete Mix design 5 L
Concept of mix design, variables in proportioning, exposure conditions, procedure of mix design as per IS 10262-1982, numerical examples of mix design.

Unit 5: Special Concretes 8 L

Learning Outcome
At the end of the course, the student can:
CO1. Study the microstructure of basic constituents of concrete.
CO2. Study the behavior of fresh concrete and hardened concrete.
CO3. Design different types of concrete mixes.
CO3. Design different types of special concretes.
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

TEXT BOOKS

REFERENCES

<table>
<thead>
<tr>
<th>SR.NO.</th>
<th>EXPERIMENT NAME</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Normal consistency of cement.</td>
</tr>
<tr>
<td>2</td>
<td>Initial and final setting time of cement.</td>
</tr>
<tr>
<td>3</td>
<td>Compressive strength of cement.</td>
</tr>
<tr>
<td>4</td>
<td>Soundness of cement.</td>
</tr>
<tr>
<td>5</td>
<td>Tensile strength of cement</td>
</tr>
<tr>
<td>6</td>
<td>Bulking of sand</td>
</tr>
<tr>
<td>7</td>
<td>Water absorption of bricks.</td>
</tr>
<tr>
<td>8</td>
<td>Compressive strength of bricks.</td>
</tr>
<tr>
<td>9</td>
<td>Workability test: Slump Test and Compaction Factor Test</td>
</tr>
<tr>
<td>10</td>
<td>Flow Test</td>
</tr>
<tr>
<td>11</td>
<td>Compressive Strength Test of Hardened Concrete.</td>
</tr>
<tr>
<td>12</td>
<td>Flexural Strength Test of Hardened Concrete.</td>
</tr>
<tr>
<td>13</td>
<td>Split Tensile Strength Test of Hardened Concrete.</td>
</tr>
<tr>
<td>14</td>
<td>Non Destructive Testing of Concrete</td>
</tr>
<tr>
<td>15</td>
<td>Concrete mixed design as per Indian Standard recommendation guidelines.</td>
</tr>
</tbody>
</table>
Course Objective:
The objectives of this course are to apply geological concepts and approaches on rock engineering projects and also to use the geologic literature to establish the geotechnical framework.

Course Pre/Co-requisite (if any): NA

Detailed Syllabus

Unit 1: Physical Geology
Geology and its importance in civil engineering projects; internal structure of the earth and its composition; Epigene and Hypogene geological agents; Weathering of rocks, Kinds of weathering; Formation of soil and its classification, Soil profile, Soil Texture; Geological hazards such as landslides, volcanoes and earthquakes- causes, effects and remedial measures; Concept of plate tectonics and seafloor spreading.

Unit 2: Applied Mineralogy
Definition of mineral, Physical and chemical properties in minerals, Classification of minerals based on chemistry such as rock forming Minerals, Economic ore minerals and industrial minerals. Study of Common Rock forming minerals: Silicate Structure, Quartz and its verities, Feldspars group, Pyroxene Group and Olivine Group

Unit 3 Petrology
Igneous rocks: Mode of occurrence, Classification, Texture and Structure. Sedimentary rock: Mode of occurrence, textures and structures. Metamorphic rocks- Metamorphism, Agents of metamorphism, Types of metamorphism, Textures and Structure

Unit- 4 Structural Geology
Dip and Strike; Compass clinometer; Description of folds, Faults, Joints and Unconformities with their Types; Recognition of folds and faults in the field and its consideration in Civil Engineering projects.

Unit- 5: Engineering and Hydrogeology

Learning Outcome
At the end of the course, the student can:
CO1. Able to interpret the geological data and information required for the safe development of civil works.
CO2. Apply basic Engineering concepts to assessment and mitigation of geologic hazards such earthquakes, landslides, flooding;
CO3. Focus on the core activities of engineering geologists, site characterization for civil work projects
CO4. Distinguish the characteristic of most important geological formations and problems that may arise in various public works.
CO5. Understand issues concerning the geological basement and structure of a region.

TEXT BOOKS

REFERENCES
<table>
<thead>
<tr>
<th>SR.NO.</th>
<th>EXPERIMENT NAME</th>
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<tbody>
<tr>
<td>1</td>
<td>Identification of minerals in hand specimen</td>
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<td>2</td>
<td>Identification of igneous rocks in hand specimen</td>
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<td>Identification of sedimentary rocks in hand specimen</td>
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<td>Identification of metamorphic rocks in hand specimen</td>
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<td>Study and Interpretation of Contour</td>
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<td>6</td>
<td>Topography and Geological Maps</td>
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<td>7</td>
<td>Solving Dip and Strike Problems</td>
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Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
**Course Structure & Syllabus of B.Tech – Civil Engineering**

**Applicable for Batch: 2018-2022**

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</table>

**Course Objective:**
This course provides in-depth exposure to highway development and planning, construction materials and their testing, highway geometric design, types of highway, highway design and their construction methods along with guidelines for their maintenance.

**Course Pre/Co-requisite (if any) :** NA

**Detailed Syllabus**

**Unit 1: Highway Development and Planning:** 6 L
Importance of transportation, Different modes of transportation and their characteristics, Classification of roads, Different road patterns, Jaykar committee recommendations and implementation, Twenty year road development plans in India, Introduction to recent developments in road network in India, Highway planning and alignment

**Unit 2: Highway Materials and Properties** 8 L
Classification of subgrade soil, CBR and plate load tests on soil, Properties and requirements of road aggregates and bitumen, Cutbacks and bituminous emulsions, Introduction to new materials in pavements

**Unit 3 Geometric Design** 8 L
Highway Cross sectional elements, Sight distances, Super elevation, Camber, Extra widening on curves, Design of horizontal and vertical alignments

**Unit 4 Pavement Design and Maintenance:** 11 L
Various factors of pavement design, Concept of ESWL, Design of flexible pavement by IRC method, Stresses in rigid pavement, Design of rigid pavement thickness by IRC method. Highway Construction ,Various types of Pavement failures, Design of Overlay thickness by Benkelman Beam Method

**Unit 5: Traffic Engineering** 6 L
Introduction to Traffic Engineering, Traffic Characteristics, Road user and vehicular characteristics, Traffic Studies, Traffic operations, Traffic control devices

**Learning Outcome**
After learning the course the students will be able to:
CO1. Plan effectively the road system.
CO2. Judge the suitability of the road materials
CO3. Design, construct and maintain effectively the roads.
CO4. Solve the traffic problems by properly designing the geometric elements of the road ensuring traffic safety.

**TEXT BOOKS**
**Course Structure & Syllabus of B.Tech – Civil Engineering**  
**Applicable for Batch: 2018-2022**

**REFERENCES**  

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<td>Flash point and fire point test of bitumen</td>
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<td>Stripping Test on aggregate</td>
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<td>Abrasion test of aggregate</td>
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<td>Shape test (flakiness, elongation and angularity number) of aggregate</td>
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<td>11</td>
<td>Impact value test of aggregate</td>
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<td>12</td>
<td>Specific gravity test of aggregate</td>
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<td>13</td>
<td>Crushing strength of aggregate</td>
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<td>14</td>
<td>Marshall Test for stability and flow value</td>
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<td>15</td>
<td>Benkelman Beam Test (Demonstration)</td>
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</table>

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
**Course Structure & Syllabus of B.Tech – Civil Engineering**

**Applicable for Batch: 2018-2022**

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<th>Subject Code</th>
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<td>Credit 5</td>
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</table>

**Course Objective:**

The objectives of this course are to understand the basic properties of soil, to determine the strength of soil so that various properties can be known before design and to undertake a variety of laboratory tests on soils.

**Course Pre/Co-requisite (if any): NA**

**Detailed Syllabus**

**Unit 1: Introduction Properties of Soils:**

Definition of void ratio, Porosity, percentage air voids, Air Content, Degree of saturation, moisture content, specific Gravity, Bulk density. Dry density, saturated density, Submerged density and their inter relationships.

Index property of soil – particle size Distribution, Relative Density, consistency limits and indices, in situ density, laboratory method of determination of index properties of soil: moisture content, specific gravity, particle size distribution (Sieve analysis and hydrometer analysis only), in situ density by Core cutter & sand replacement methods, relative density, liquid limit - Casagrande and Cone penetration method, Plastic limit and Shrinkage limit determination.

**Unit 2: Classification of soils and Clay mineralogy and Soil Structure:**

Purpose of soil classification, basis of soil classification, particle size classification - MIT classification and IS classification, plasticity chart and its importance, field identification of soil.

single grained, honey combed, flocculent and dispersed structure, Electric diffuse a double layer, Adsorb water, Base Exchange capacity, Isomorphous substitution. Common Clay mineral in soil and their structure - Kaolonite, Illite and montmorillonite. Thixotropy of clay, Soil water system, Effective stress concept total pressure and effective stress, quick sand phenomenon, capillary phenomenon.

**Unit 3: Flow of Water Through Soils and Compaction of Soils:**

Darcy’s law - assumptions and validity, coefficient of permeability and its determination (laboratory and field) factor affecting permeability, permeability of stratified soil, seepage velocity, superficial velocity and coefficient of percolation.

Principle of compaction, standard and modified proctor’s tests, factor affecting compaction, effect of compaction on soil properties, field compaction control, proctor needle, compacting equipments.

**Unit 4: Consolidation of Soils**

Definition, Mass spring Analogy, Terzaghi’s one dimensional consolidation theory assumption and limitation, normally consolidated, under consolidated and over consolidated soils pre consolidation pressure and its determination by Casagrande’s method. Consolidation characteristics of soil, laboratory one dimensional consolidation test, Determination of consolidation characteristic Proportioning of soil compression index and coefficient of consolidation, determination of coefficient of consolidation by square root of time fitting method, logarithmic time fitting method.

**Unit 5: Shear Strength of Soils**

Concept of shear strength, Mohr-coulomb theory, conventional and modified failure envelope, total and effective shear strength parameters, concept of pore Pressure, factor affecting shear strength of soils, sensitivity, Measurement of shear strength - direct shear test, Unconfined compression test, Triaxial compression test and Vane shear test, shear tests and under different drainage condition.

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Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Structure & Syllabus of B.Tech – Civil Engineering
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Learning Outcome
At the end of the course, the student can:
CO1. Develop and understand the physical relationships between physical characteristics and mechanical properties of soil.
CO2. Understand and experience experimental measurement of physical and mechanical soil properties commonly used in engineering practice.
CO3. Learn compaction and consolidation of soil
CO4. Learn analysis and measurement of shear strength of soil

TEXT BOOKS

REFERENCES

<table>
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<tr>
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<th>EXPERIMENT NAME</th>
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<td>1</td>
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<td>Hydrometer Analysis</td>
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<td>3</td>
<td>Liquid, Plastic &amp; Shrinkage Limit Test</td>
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<tr>
<td>4</td>
<td>Proctor Compaction Test</td>
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<tr>
<td>5</td>
<td>Triaxial Compression Test</td>
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<td>6</td>
<td>Specific Gravity Determination of Coarse and Fine Grained Soils</td>
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<tr>
<td>7</td>
<td>In Situ Density-Core Cutter &amp; Sand Replacement Test</td>
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<td>8</td>
<td>Permeability Test</td>
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<td>9</td>
<td>Direct Shear Test</td>
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<td>10</td>
<td>Static Cone Penetration Test</td>
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<td>11</td>
<td>Standard/Dynamic Cone Penetration Test</td>
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</tbody>
</table>
Course Structure & Syllabus of B.Tech – Civil Engineering
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Course Outline: This module is focused on providing students more hands-on practice on aptitude problems and prepare a stronger fundamental base for Aptitude and Soft Skills III and IV. Employability skills will help students improve their employability.

Course Objective:
1. Prepare a ground for the students to be ready in Quantitative, Logical Aptitude and Verbal Aptitude
2. Prepare them for becoming confident and corporate-culture fit as present-day workplace requires professionals who are not only well qualified and competent but also possess Soft Skills like interpersonal skills and good presentation skills

Course Pre/Co-requisite (if any): Basic understanding of simplification and calculation tricks, non-verbal pattern completion LR, covered in Aptitude and Soft Skills I.

Detailed Syllabus

UNIT 1: QUANTITATIVE APTITUDE
Basic algebraic equations (linear equations in one variable), polynomials and Algebraic Inequalities; logarithm. Quadratic Equations (concept of determinant, real, non-real, rational and conjugate roots); Geometry and Mensuration; Heights and Distances.

UNIT 2: VERBAL APTITUDE
Figures of speech; Determiners. Creative Writing: Essay, Report Writing, Article, Letters, E-mail, difference between formal and informal tone, appropriate use of transition words, creating a signature, understanding different situations and the responses they require (situation-based writing), Proper use of connectors.

UNIT 3: LOGICAL REASONING
Input Output – Sequential output tracing of logical operations applied on machine input, Ranking and Order- Test - Ordering of measurable attributes like height / weight / performances, etc. Eligibility test, Logical sequences and series, Completion of incomplete pattern, Odd figures or Odd man out, Analogies, Coding Decoding basics.

UNIT 4: LEADERSHIP & TEAM BUILDING SKILLS

UNIT 5: EMPLOYABILITY SKILLS & CV WRITING

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
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Learning Outcome
1: Develop Leadership & Team Building Skills.
2: Receive hands-on guidance to develop an effective CV.
3: The students would be able to understand the basic trends of questions asked in the aptitude part of placements.

Textbook [TB]:
3. Verbal Aptitude: English is Easy- Chetanand Singh, BSC Publication-2018

Reference Books [RB]:
   Soft Skills: No Excuses – Dr Wayne Dyer, Hay House Inc.

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Objective:

The course is designed to have the knowledge about different types of sewerages and sewage treatment procedures

Course Pre/Co-requisite (if any) : NA

Detailed Syllabus

<table>
<thead>
<tr>
<th>Unit</th>
<th>Title</th>
<th>LTP</th>
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<tr>
<td>1</td>
<td>Introduction</td>
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<td>2</td>
<td>Design of Sewers</td>
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<td>3</td>
<td>Wastewater Characterization</td>
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<td>4</td>
<td>Treatment of Sewage</td>
<td>5</td>
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<td>5</td>
<td>Secondary Treatment</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

Learning Outcome

At the end of the course, students must be in a position to:

- CO1. To apply sewage treatment knowledge in various rural and urban city planning.
- CO2. Estimate waste water characteristics.
- CO3. Design of sewerage tanks and pipes for sewers after determining the capacity.
- CO4. Design of sewerage treatment plants based on characteristics.

TEXT BOOKS

REFERENCES
Course Structure & Syllabus of B.Tech – Civil Engineering
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<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Title</th>
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<td>3rd</td>
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Course Objective:
This course covers complete knowledge of “Cross-section, Components, and geometric design of railway track as well as development of railway station and yards.” In this course all Airport characteristics, Geometric design and Air traffic control are covered.

Course Pre/Co-requisite (if any): NA

Detailed Syllabus

Unit 1: Introduction and Components: 12 L
Role of railways in transportation, The Permanent way, Gauges in railway track, Typical cross sections of railway track, Coning of wheels, Track components: Type of rails, Rail Joints and Welding of rails, Sleepers, Ballast, and Fixtures, Stresses in rails, Tractive resistances.

Unit 2: Geometric Design of Railway Tracks 8 L
Geometric design of tracks- speed calculations, Gradients- ruling, momentum, pusher and minimum gradient, Super elevation, Cant Deficiency, Negative super elevation, Component of turn outs, points and crossings, Track Junctions.

Unit 3: Railway Station and Yards: 4 L
Classification of railway Stations, Types of station Yards, Signalling and Control System, Interlocking of Signals and Points. Modern Development of Railways

Unit 4: Airport Characteristics: 6 L
Role of Airways in transportation, Aeroplane Component Parts, Aircraft Characteristics, Airport planning, Site selection, Airport Obstructions

Unit 5: Geometric Design and Air Traffic Control: 9 L
Wind rose diagram, Basic runway length, and corrected runway length, Geometric runway and Taxiway Design, Turning radius of taxiway, Exit taxiway- design factors and elements, Airport markings and lightings, Air traffic control, Instrument landing systems

Learning Outcome
This course will help the students in learning of:
CO1. Working of world’s largest rail network,
CO2. Designing of rail tracks.
CO4. Airport runway designing.
CO5. Air traffic control in the busiest route.

TEXT BOOKS

REFERENCES

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Subject Code  | Subject Title | Design of Reinforced Concrete Elements
---|---|---
CE303 | LTP 3 1 0 | Credit 4 | Subject Category DC | Year 3rd | Semester V

Course Objective:
The course is designed to make students aware about the various principles of reinforced concrete structures and to design various elements using limit state method.

Course Pre/Co-requisite (if any): CE202 (Solid Mechanics)

Detailed Syllabus

Unit 1: Introduction to Working Stress Design
Introduction to working stress method, elastic behavior of rectangular section, under, balanced and over reinforced section. Deflection and cracking in beams and slabs using IS code provisions. Design of singly reinforced beams

Unit 2: Introduction to Limit State Design
Philosophy and principle of limit state design along with the assumptions, partial safety factors, characteristic load and strength. Introduction to stress block parameters, concept of balanced, under reinforced and over reinforced sections, limit state of collapse in flexure of rectangle and flanged sections with examples. Limit state of collapse in shear and torsional strength of sections with examples

Unit 3: Limit state design of beams
Design principles and procedures for critical sections for bending moment and shear forces. Flexural and shear design example of singly and doubly reinforced simply supported and cantilever beams using the codal provision. Detailing of longitudinal and shear reinforcement, anchorage of bars, check for development length. Reinforcement requirements, slenderness limits for beams for lateral stability. Flexural and shear design of simply supported T and L beams. Design of rectangular section for torsion

Unit 4: Limit State Design of Slabs
Introduction to one way and two way slabs, design of one way cantilever, simply supported and continuous slab and design of two way slabs

Unit 5: Limit State Design of Columns and Footings
General design aspects of compression members. Design of short axially loaded columns with reinforcement detailing. Design of uniaxial and biaxial bending columns using SP-16 charts and design of slender column. Design and detailing of isolated rectangular footing for axial load and uniaxial moment and design of pedestal

Learning Outcome
At the end of the course, the student can:

CO1. Understand the principle of RC Structure
CO2. Understand the design of structure with limit state analysis
CO3. Identify different elements of a R.C.C structure as per IS code provisions
CO4. Understand the reinforcement detailing of various building components

TEXT BOOKS
1. Reinforced concrete design by N. Krishna Raju and R.N. Pranesh, New age International Publishers, New Delhi
REFERENCES

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Structure & Syllabus of B.Tech – Civil Engineering

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Course Objective:
The objective of this course is to learn application of soil mechanics and other related techniques to design and analyze various types of foundation by learning methods of soil exploration; bearing capacity and settlements determination for shallow and deep foundation and provision of earth retaining structures.

Course Pre/Co-requisite (if any): CE211 (Soil Mechanics)

Detailed Syllabus

Unit 1: Introduction & Soil Exploration
Brief review of soil mechanics principles used in foundation engineering, Methods of soil exploration, Boring, Sampling, Penetration tests, Correlations between penetration resistance and soil design parameters, geophysical and advance soil exploration methods.

Unit 2: Earth Pressures and Slope Stability
Earth pressure at rest, Active and passive earth pressure, Rankine’s and Coulomb’s earth pressure theories, Earth pressure due to surcharge, Retaining walls, Stability analysis of retaining walls, Slopes: Mode of failure-Mechanism, Stability analysis of infinite slopes, Swedish slip circle method, Taylor’s stability number

Unit 3: Shallow Foundations
Types of Foundations, Mechanism of load transfer in shallow and deep foundations, Shallow foundations, Terzaghi’s bearing capacity theory, Computation of bearing capacity in soil, Effect of various factors, Use of field test data in design of shallow foundations, Stress below the foundations, Settlement of footings and rafts, proportioning of footings and rafts, Sheeting and bracing of foundation excavation

Unit-4 Deep Foundations
Types and methods of construction, estimation of pile capacity, Capacity and settlement of group of piles, Proportioning of piles, Methods of construction of well foundation, Tilt and Shift, Remedial measures, Bearing capacity, Settlement and lateral stability of well foundation.

Unit-5: Reinforced Earth and Geotextiles
Reinforced Earth, Geotextile: Definition, types, functions. Use of Geotextiles in Earth dams, roads, railways, erosion control and bearing capacity improvement. Storage, handling and placement of Geotextiles

Learning Outcome
At the end of the course, the student can:
CO1. Learn about types and purposes of different foundation systems and structures.
CO2. Learn about the systematic methods for designing foundations.
CO3. Evaluate the feasibility of foundation solutions to different types of soil conditions
CO4. Learn about applications of geotextiles for reinforced earth and soil stabilization.

TEXT BOOKS

REFERENCES
Course Objective:
To learn the basic structural behavior under different loading patterns and variation in geometry

Course Pre/Co-requisite (if any) : CE206 (Structural Analysis)

Detailed Syllabus

List of Experiments
1. Redundant Joint Apparatus
2. Elastically Coupled Beam Structure
3. Deflection of Truss Apparatus
4. Three Hinged Arch Apparatus
5. Beam Model
6. Two Hinged Arch Apparatus
7. Elastic Properties of Deflected Beam Apparatus
8. Column Apparatus
9. Portal Frame Apparatus
10. Curved Member Apparatus
Course Objective:
The objectives of this course is to introduce the students to latest methods of pavement construction and to enable students to design different types of pavements as per the requirement.

Course Pre/Co-requisite (if any) : CE209 (Transportation Engineering-I)

Detailed Syllabus

Unit 1: Introduction:

Unit 2: Road Materials:
Tests on soil (Triaxial), strength of pavement materials, importance and functions of each layer of pavement and subgrade, Alternate forms of aggregates, theory of specifications of fillers, additives, emulsions, cutbacks and modified binder, Bituminous Mix design Methods( Marshall, Hubbard Field and Hveem), Soil Stabilized Roads:Properties of Soil- Aggregate mixtures, Proportioning, types of stabilization, advantages and limitation, Highway drainage- Surface and Sub surface drainage.

Unit 3: Design of Flexible Pavements:
Design of Flexible Pavements: Design factors, empirical, semi empirical and analytical design method: California bearing ratio, Triaxial, Mcleod and Burmister method, advantages and limitations, IRC method of design (as per IRC 37:2012). Pavement Failures, Overlay design

Unit 4 Design of Rigid Pavements
Design of Rigid Pavements: Design factors, load and temperature stresses, load transfer devices, design of Dowel bar and Tie bar, Type of Joints, IRC methods of design of SFRC pavements, construction techniques and specifications, quality control tests, continuously reinforced concrete pavements. Pavement Failures, Overlay design.

Unit 5: Highway Construction:
Construction of Water bound Macadam road, Bituminous Pavements, Concrete Roads. Reinforced Concrete Roads, Prestressed Concrete Pavements.

Learning Outcome
This course enables the students to:
CO1. Use various materials for pavement constructions.
CO2. Apply the principles of pavement design.
CO3. Various methods of mix design.
CO4. Various design methodologies of pavement construction

TEXT BOOKS

REFERENCES
**Course Objective:**
The objectives of this course are to learn basics concepts of Environmental components, Impact assessment, Natural hazards and mitigation strategies.

**Course Pre/Co- requisite (if any) :** CH201 (Environmental Science)

**Detailed Syllabus**

**Unit 1: Environmental attributes and assessment**
6 L
Introduction and Scope utility of the Environmental Impact Assessment process, expended and narrowed scope of Environmental Impact Assessment, impacts of development activities, planning and management of impact studies. Environmental attributes and environmental indices and indicators, environmental assessment, methods and techniques, matrices, network and checklist methods, prediction techniques for quality of environmental attributes.

**Unit 2: Environmental Impact and Risk Assessment**
7 L

**Unit 3 Understanding Disasters**
7 L

**Unit 4 Disaster Risk Reduction and Role of various Organizations**
3 L
Disaster Management: Prevention, Preparedness and Mitigation. Roles and responsibilities of different agencies and Government. Technologies for Disaster Management. Disaster Mitigation Strategies.

**Unit 5: Disasters, Environment and Development**
3 L
Factors affecting vulnerability such as impact of developmental projects and environmental modifications (including of dams, land use changes, urbanization etc.), sustainable and environmental friendly recovery; reconstruction and development methods.

**Learning Outcome**
At the end of the course, the student can:
CO1. Identify environmental attributes, necessity and components of Impact assessment and its various methods
CO2. Have the complete knowledge about natural and human induced disasters.
CO3. Gain the idea about various mitigation measures, remedial actions to minimize the loss of resource and lives.
CO4. Identify the roles of various Government and non-Government agencies for enforcing Environmental laws and disaster mitigations.
TEXT BOOKS
1. CK Rajan, N Pandharinath – 2009, Earth and Atmospheric Disaster Management: Nature and Man-made, BS publications

REFERENCES
Course Objective:

The course is designed to make students aware about theory of errors and the advanced methods and techniques of surveying, establishing horizontal & vertical control over the terrain with the degree of accuracy as desired.

Course Pre/Co- requisite (if any) : CE203 (Basic Surveying)

Detailed Syllabus

Unit 1: Theory of Errors
5 L
Types and sources of errors, theory of least squares, method of weights, method of correlates, angle and station adjustment, figure adjustment.

Unit 2: Triangulation
6 L
Necessity of Control Surveying, Principle of Triangulation, Classification of Triangulation Systems, Station Marks, Towers and Signals, Satellite station, Reconnaissance, Inter-visibility of stations, Angular Measurement, Base line measurement and its extension.

Unit 3 Project surveys
5 L
General requirements and specifications for engineering project surveys, reconnaissance, preliminary and locations surveys for highway, earthen bund and canals. Layout of culverts, canals, and buildings—both load bearing wall structure and column structures by centerline method. Modern trends—EDM, electronic Theodolites and Electronic Total Station.

Unit 4 Introduction to remote sensing
5 L

Unit 5: Global Positioning System
5 L

Learning Outcome

t the end of the course, the student can:

CO1. Identify and correct errors in field measurements.
CO2. Apply procedures of triangulation in field survey.
CO3. Comprehend the use and applications of advanced methods of data collection like remote sensing.
CO3. Understand the working principles of GPS.

TEXT BOOKS
REFERENCES

<table>
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<th>EXPERIMENT NAME</th>
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<tbody>
<tr>
<td>1.</td>
<td>Marking of building by centre line method for load bearing wall residential building.</td>
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<tr>
<td>3.</td>
<td>Exposure to the use of Total Station.</td>
</tr>
<tr>
<td>4.</td>
<td>Measurement and data logging of distances, horizontal angles and vertical angles using Total Station.</td>
</tr>
<tr>
<td>5.</td>
<td>Measurement of Areas using total station</td>
</tr>
<tr>
<td>6.</td>
<td>Collection of field data using GPS.</td>
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</tbody>
</table>
Course Objective:

The objective of this course is to learn drawing of each element of construction on paper before beginning the actual construction in field and To gain knowledge about construction of structures in steps.

Course Pre/Co-requisite (if any) : ME103 [Engineering Graphics]

Detailed Syllabus

Unit 1: Introduction
Introduction to concept of drawings, Interpretation of typical drawings, Planning drawings to show information concisely and comprehensively; optimal layout of drawings and Scales; Introduction to computer aided drawing, coordinate systems, reference planes. Commands: Initial settings, Drawing aids, Drawing basic entities, Modify commands, Layers, Text and Dimensioning, Blocks. Drawing presentation norms and standards.

Unit 2: SYMBOLS AND SIGN CONVENTIONS

Unit 3: MASONRY BONDS
English Bond and Flemish Bond – Corner wall and Cross walls - One brick wall and one and half brick wall, Doors & windows

Unit 4: BUILDING DRAWING
Terms, Elements of planning building drawing, Methods of making line drawing and detailed drawing. Site plan, floor plan, elevation and section drawing of small residential buildings, Foundation plan

Unit- 5: PICTORIAL VIEW
Principles of isometrics and perspective drawing. Perspective view of building.

SR.NO. EXPERIMENT NAME
1 Buildings with load bearing walls including details of doors and windows.
2 Taking standard drawings of a typical two storeyed building including all MEP, joinery, rebars, finishing and other details and writing out a description of the Facility in about 500-700 words.
3 RCC framed structures
4 Reinforcement drawings for typical slabs, beams, columns and spread footings.
5 Industrial buildings - North light roof structures - Trusses
6 Perspective view of one and two storey buildings.

Learning Outcome
At the end of the course, the student can:
CO1. Learn details of different construction elements and will enable them to read a construction drawing which is a requisite for an economic and speedy construction
CO2. Learn various projection techniques used in Engineering Drawings
CO3. Learn the standards of various building components as per national building code
CO4. Learn the building by laws in Indian context

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
TEXT BOOKS
3. Sham Tickoo Swapna D (2009), “AUTOCAD for Engineers and Designers”, Pearson Education,

REFERENCES
2. (Corresponding set of) CAD Software Theory and User Manuals.
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Title</th>
<th>Credit</th>
<th>Subject Category</th>
<th>Year</th>
<th>Semester</th>
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</thead>
<tbody>
<tr>
<td>CE345</td>
<td>Photogrammetry &amp; Remote Sensing</td>
<td>3</td>
<td>DE</td>
<td>3rd</td>
<td>V</td>
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</tbody>
</table>

LTP 2 0 2

Course Objective:
The course objective is to make students aware of the photogrammetry and the concepts of stereoscopy, also to learn photo interpretation techniques.

Course Pre/Co-requisite (if any): CE208 (Engineering geology)

Detailed Syllabus

Unit 1: Fundamentals of Aerial Photogrammetry 7 L
Fundamentals of Aerial Photogrammetry: Introduction, Classification, Aerial Camera, Films and Filters, Geometrical elements of vertical photograph, Scale, Relief Displacements, photo and ground coordinates, flight planning.

Unit 2: Stereoscopy 6 L
Stereoscopic vision, Lens and Mirror stereoscope, parallax equations, Parallax bar, Measurement of heights and heights and slopes, Ground control for aerial Photography, Topo sheets, Photographs and Mosaics.

Unit 3 Aerial Photo Interpretation 4 L
Basic considerations, principles of photo interpretation, Characteristics of photographic images, Techniques of photo interpretation, photo interpretation key, Ground truth verification.

Unit 4 Principles of Remote Sensing 5 L
Sources of Energy, active and passive radiation, Electromagnetic spectrum, radiation laws, interaction of energy with atmosphere scattering, absorption, atmospheric windows, interaction of EMR with earth surface features-spectral signatures, stages in remote sensing.

Unit 5: Remote Sensing Applications in Civil Engineering 4 L

SR.NO. EXPERIMENT NAME
1. Study of different types of satellite data products
2. Visual interpretation of satellite images of different resolutions.
3. Study of aerial photographs in 3D using stereoscope.
4. Extraction of thematic information from satellite images
5. Use of satellite images for land use mapping.

Learning Outcome
At the end of the course, the student can:
CO1. Make measurements from aerial photographs.
CO2. Retrieve the information content of remotely sensed data.
CO3. Analyse the energy interactions in the atmosphere and earth surface features.
CO4. Understand land use and land cover mapping.

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Structure & Syllabus of B.Tech – Civil Engineering
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TEXT BOOKS

REFERENCES

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Title</th>
<th>APTITUDE &amp; SOFT SKILLS III</th>
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<tr>
<td>HS301</td>
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</table>

LTP | 3 0 0 | Credit | 0 | Subject Category | AC | Year | III | Semester | V |

**Course Outline:** The first step of an intensive two step placement training module equips the students to successfully handle the placement program of any on-campus/off-campus company. It not only provides career guidance about the selection process but also helps students in profile building; self-introduction and proactive internship search techniques.

**Course Objective:**
1. Interpret the questions of aptitude building objectively and prepare for various competitive examinations
2. Understand the optimized approach of dealing with placement questions
3. Learn ways of representing themselves effectively in formal settings

**Course Pre / Co-requisite (if any):** Understanding of writing concepts, general intelligence of LR, algebra concepts and equation formation, time management and presentation skills covered in Aptitude and Soft Skills I and II.

**Detailed Syllabus**

**UNIT 1 - QUANTITATIVE APTITUDE**

<table>
<thead>
<tr>
<th>Subtopics</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number System</td>
<td>03</td>
</tr>
<tr>
<td>Types of numbers; Factors; Divisibility test; Place and face Value; Base system; Remainder theorem; digits at the unit places and finding last two digits in a given expression; Calculating number of zeroes, Finding maximum power of any prime number or any composite number in any factorial, HCF and LCM.</td>
<td></td>
</tr>
<tr>
<td>Fractions–Types of fractions; Conversion of terminating and non-terminating types of decimal into fraction; Subtraction, addition and multiplication of terminating and non-terminating decimals.</td>
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</tr>
<tr>
<td>Percentage</td>
<td>02</td>
</tr>
<tr>
<td>Basic concepts; Conversion from fraction to percentage; Application of percentage in – Expenditure, Cost, Consumption problems; Population increase or decrease problems; Production, Manpower and Working hour problems; successive increment or decrement; Comparison of salary or numbers; Percentage change in area or volume, etc.</td>
<td></td>
</tr>
<tr>
<td>Ratio and Proportion</td>
<td>02</td>
</tr>
<tr>
<td>Ratio, Proportion and Variation: Ratio- Introduction; Types of ratios; Comparison of Ratios; Concept of duplicate, triplicate, sub-duplicate and sub-triplicate ratios.</td>
<td></td>
</tr>
<tr>
<td>Proportion and variation – Concept of direct, inverse, continuous and mean proportions.</td>
<td></td>
</tr>
<tr>
<td>Profit and Loss</td>
<td>02</td>
</tr>
<tr>
<td>Introduction; Concept of single, double and triple discount and marked price.</td>
<td></td>
</tr>
<tr>
<td>Simple / Compound Interest</td>
<td>02</td>
</tr>
<tr>
<td>Simple Interest and compound Interest: Basic concept of Principal, Time, Amount and Rate of Interest; Concept of Lent money.</td>
<td></td>
</tr>
</tbody>
</table>

**UNIT 2- VERBAL APTITUDE**

<table>
<thead>
<tr>
<th>Subtopics</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tenses</td>
<td>02</td>
</tr>
<tr>
<td>Understanding and aligning them with the various question types.</td>
<td></td>
</tr>
<tr>
<td>Subject – Verb Agreement</td>
<td>02</td>
</tr>
<tr>
<td>Subject-Verb Agreement: Rules and Applications; commonly confused words-II; Gerunds, Active and Passive voice.</td>
<td></td>
</tr>
</tbody>
</table>

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Question Types 03 hours Introduction to Question types-I: Fill in the blanks, One word Substitution, Spellings, understanding the right word choice, concept of para jumbles and para completion, reading comprehension, verbal analogies, odd man out, phrases and idioms.
Introduction to Question types-II: Error identification, Homophones, Usage of the various figures of speech, commonly confused words and phrases, techniques for tackling synonyms and antonyms.

Reading Comprehensions 02 hours Reading Comprehension: Basics of Comprehensions, different tones of comprehensions, cracking question types like contextual vocabulary, fill in the blanks, true/false questions, reference to context, summary and title of the passage, paraphrasing the text.

UNIT 3- LOGICAL REASONING 10 HOURS
Coding Decoding and Sequences 02 hours Coding Decoding, Cryptarithmetic, Sequence and Series - Finding the missing term/wrong term in the logical sequence of letter/number/word/alphanumeric, Continuous pattern series.

Verbal Analogies and Odd man out 02 hours Verbal Analogy based on various parameters - Antonym / synonym relationship, Quantity and unit, Individual and Group, Product and Raw material, cause and Effect etc.
Odd man out based on several kind of relationship – Relationship based on meaning, functional relationship, even-odd or prime-composite, divisibility rule, etc.

Blood Relation and Direction Sense 02 hours Blood Relation- Indicating form / puzzle form / coding form, Direction Sense, Direction puzzles.

Seating Arrangements 02 hours Seating Arrangements – Linear / Circular / Distribution / comparison/ Floor and box arrangement /Quant based arrangements/ etc.

Critical Reasoning– I 02 hours Statement and assumptions, course of action, statement and conclusion, probably true/false.

UNIT 4- NON VERBAL COMMUNICATION 04 HOURS
Types of Non Verbal Communication, Body Language-Exercises and Activities, Error Analysis & Feedback Sharing.

UNIT 5- ONLINE PROFILING & SOCIAL MEDIA ETHICS 05 HOURS
Social Media ethics and etiquette, Do's & Don'ts, LinkedIn Profile Development, Example Sharing, Feedback Sharing & Error Analysis.

Suggested Activities & Exercises: (i) Online Portfolio Creation, (ii) Fun Social Media Projects, (iii) LinkedIn profile development project with feedback sharing and error analysis

LEARNING OUTCOME:
By the end of this semester, students will be able to perceive and analyse the requirements of placement trends as detailed information about the selection process would be provided by career guidance. They will be more confident and will be able to develop a professional profile, both online and offline.

Text book [TB]:
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022


Reference books [RB]:
   VA: Fun with grammar- Suzanne W. Woodward Pearson Education ESL-1996
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Title</th>
<th>Design of Steel Structure</th>
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<tbody>
<tr>
<td>CE309</td>
<td>LTP</td>
<td>3 2 0</td>
</tr>
<tr>
<td>Credit</td>
<td>Subject Category</td>
<td>DC</td>
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<td></td>
<td>Year</td>
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<tr>
<td>Year</td>
<td>Semester</td>
<td>VI</td>
</tr>
</tbody>
</table>

Course Objective:
The course objective is to gain the knowledge regarding design of steel structures, stability, strength and serviceability.

Course Pre/Co-requisite (if any): CE206 (Structural Analysis)

Detailed Syllabus

Unit 1: Introduction & Connections
Introduction, Types & properties of structural steel rolled sections, Grades of steel, Codal Provisions, Concept in the design of connections, Codal Provisions, Simple and moment resistant riveted, welded and bolted connections and eccentric connections

Unit 2: Tension Members
Introduction, Codal provisions, Analysis and design of tension members with different cross sections subjected to axial tension, splicing of tension member and Lug angle

Unit 3: Compression Members
Codal provisions, Slenderness ratio, Analysis and design of simple compression members (angles and I-Sections), including continuous strut and discontinuous strut. Built up compression members, Lacing and battening.

Unit-4: Flexural Members
Concept in the design of flexural member, Codal provisions, Analysis and design of laterally restrained and unrestrained beams, built up beams, Web buckling and web crippling. Introduction to lintels, purlins and castellated beams.

Unit- 5: Plate Girder
Design of plate girders including stiffeners, splices and curtailment of flange plates. Introduction to gantry girder.

Learning Outcome
At the end of the course, the student can :
CO1. Design of Structural members with different types of connections.
CO2. Design of Compression members.
CO3. Design of Beams.
CO4. Understand flexural behavior of steel components

TEXT BOOKS
1. Design of Steel structures by K.S. Sai Ram, Person Education.
4. Structural Design and Drawing by N.Krishna Raju, Universities

REFERENCES
1. Limit State Design Steel Structures, S .k. Duggal, Tata Mc Grawhill.
2. Design of Steel Structures - N. Subramanian, Oxford University Press

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Objective:

The objective of this course is to introduce the students to various hydraulic engineering problems like open channel flows and hydraulic machines. At the completion of the course, the student should be able to relate the theory and practice of problems in hydraulic engineering.

Course Pre/Co-requisite (if any): CE201 (Fluid Mechanics)

Detailed Syllabus

Unit 1: Open Channel Flow
Definition of open channel, Geometric properties, Uniform flows in open channels: Chezy and Manning’s equation, Velocity Distribution in Open Channel. Most Economical sections: Rectangle and Trapezoidal

Unit 2: Specific Energy
Specific Energy, Specific energy curve, condition for minimum specific energy and maximum discharge, Critical flow in Rectangular channels, Problems. Gradually Varied Flow, Flow profiles, Hydraulic Jump in a rectangular channels, classification of jump.

Unit 3: Impact of Jet on Vanes
Introduction to impulse momentum equation and its applications, Force exerted by a jet on a fixed target, Derivations, Force exerted by a jet on a moving target, derivations, Force exerted by a jet on a series of a curved vanes, concept of velocity triangles, equation for work done and efficiency.

Unit 4: Hydraulic Turbines
Introduction, types and classifications, Pelton wheel, equation for work done and efficiency, Specific speed, Francis turbine- Theory, equation for work done and efficiency, Design parameters, Draft tube.

Unit 5: Centrifugal and Reciprocating Pumps
Definition of pumps and classification, Principle of working, priming and methods, Specific speed, Work done and efficiencies of centrifugal and reciprocating pumps, Minimum starting speed, Cavitation in centrifugal pumps, multistage pumps

SR.NO.   EXPERIMENT NAME
1      To determine the Manning’s Co-efficient of roughness for a given Channel bed
2      To study the characteristics of Pelton Turbine
3      To study the characteristics of hydraulic jump
4      To find the efficiency of Francis Turbine
5      To find the efficiency of Centrifugal Pump
6      To find the efficiency of Reciprocating Pump
7      To find the coefficient of Jet Impact

Learning Outcome
At the end of the course, the student can;
CO1. Apply their knowledge of fluid mechanics in addressing problems in open channels.
CO2. Possess the skills to solve problems in uniform, gradually and rapidly varied flows in steady state conditions
CO3. Compute forces on Flat plate and Curved vanes by the impact of water Jet.
CO4. Solve problems related to hydraulic machineries (pumps and turbines).
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

TEXT BOOKS

REFERENCES
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Title</th>
<th>Course Objective:</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE312</td>
<td>Design of Reinforced Concrete Structures</td>
<td>The course is designed to familiarize students with design concepts of reinforced structures like stair case, retaining walls, water tanks and flat slab.</td>
</tr>
</tbody>
</table>

Course Pre/Co-requisite (if any): CE303 (Design of Reinforced Concrete Elements)

Detailed Syllabus

Unit 1: Design of Stair Cases
- General specifications, Types of stair cases, Loads on stair cases, Effective span of stairs, Design of dog legged stair case, Design principles of other type of staircase

Unit 2: Design of Retaining Walls
- General specifications, Forces acting on retaining walls, Stability consideration, Wall proportioning, Design of cantilever type retaining walls, Design of counterfort type retaining walls.

Unit 3: Design of Water Tanks
- Types of water tanks, Design of circular water tanks resting on ground with rigid base, Design of circular water tanks resting on ground with flexible base, Design of overhead water tank (Intz type tank)

Unit 4: Design of Continuous Beams
- Introduction to continuous beams, Design of continuous RC beams, Moment redistribution

Unit 5: Multi-storey Building Frames
- Introduction to multi-storey building frames, Analysis of multi-storey frames, Method of substitute frames

Learning Outcome
At the end of the course, the student can:
CO1. Design the staircases, Retaining walls
CO2. Design water tanks
CO3. Design continuous Beams
CO4. Design multi-storey building frames

TEXT BOOKS
1. Reinforced concrete design by N. Krishna Raju and R.N. Pranesh, New age International Publishers, New Delhi

REFERENCES
4. SP 34: “Handbook on Concrete Reinforcement and Detailing”, BIS, New Delhi.
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Title</th>
<th>Credit</th>
<th>Subject Category</th>
<th>Year</th>
<th>Semester</th>
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<tbody>
<tr>
<td>CE346</td>
<td>Traffic Engineering and Management</td>
<td>3</td>
<td>DE</td>
<td>3rd</td>
<td>VI</td>
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</table>

| LTP         | 2 0 2 |

Course Objective:
The objectives of this course is to familiarize the students with the concepts of transportation planning and analysis and to ensure that students are able to use the knowledge in solving real time problems in traffic engineering field.

Course Pre/Co- requisite (if any): CE209 (Transportation Engineering-I)

Detailed Syllabus

Unit 1: Fundamentals of traffic engineering:
Characteristics of traffic engineering elements- vehicle, driver, road; Fundamentals of traffic flow- speed, density, flow and their relationship.

Unit 2: Traffic flow characteristics
Uninterrupted traffic flow- data collection, different models related to traffic flow; Interrupted traffic flow- shock wave, flow at signalized and un-signalized intersections; Delay and queue analysis.

Unit 3: Traffic facilities

Unit 4: Transportation planning process:
Goals, objectives; Transportation needs; Generation, evaluation of alternatives and their implementation.

Unit 5: Travel demand analysis:
Introduction, nature and analysis of travel demand, Data collection, Four stage transportation models, Trip generation, trip distribution, modal split and traffic assignment.

SR. NO. | EXPERIMENT NAME
1      | Spot speed study using speed Gun.
2      | Speed – density linear relationship using Speed Gun.
3      | Two Phase signal design using video data at an intersection.
4      | Trip Generation analysis, using regression method.
5      | Parking study characteristics.
6      | Modal Choice using binary logit model using data of O-D survey.

Learning Outcome
At the end of the course, the student will be able to:
CO1. Apply the advanced concepts of traffic engineering making them able to design various traffic facilities.
CO2. Analyze techniques of travel demand and transportation planning.
CO3. Analyze traffic flow characteristics
CO4. Understand road intersection and planning

TEXT BOOKS

REFERENCES

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Objective:
The objectives of this course is to learn basics concepts of recognize the geological consideration needed in rock mechanics and determine and analyze physical properties, compressive strength, tensile strength, shear strength of rock.

Course Pre/Co-requisite (if any): CE208 (Engineering geology)

Detailed Syllabus

Unit 1: Geotechnical behavior of Earth Material
Definition, importance and scope of the subject. Analysis of stress and strain at a point; Mohr's circle of stress and strain, characterization of rock joints and jointed rock masses, Intact (crystalline) rock, stratified rock, weak rock (weathered rock and soft sediments), chemically weak rock (carbonates).

Unit 2: Behavior of Soil

Unit 3 Structural Geology for Site Engineering

Unit-4 Physical and mechanical properties of rocks
Compressive, tensile, shear and triaxial strength of rock; Behaviour of rock under stress/strain and creep in rocks rheological models. Theories of rock failure: Coulmb-Navier Criteria, Griffiths criteria, Mohr's criteria. Stress concentration around an opening. Rock bursts and bumps. Subsidence - causes, prediction, monitoring and prevention case histories in Indian scenario. Determination of in-situ stresses

Unit- 5: Geotechnical Applications
Instrumentation and monitoring of stability of structure in rocks. Stabilization of weak and fractured ground - grouting and shotcreting. Numerical modeling for Geotechnical applications

Learning Outcome
At the end of the course, the student can:
CO1. Critically review rock mechanics principles and methods and their applications to engineering practices.
CO2. Measure the physical characteristics of rock masses, including the engineering description of rocks, discontinuities and rock mass; the strength of rock substance, defects and rock mass; laboratory testing of rock, data presentation.
CO3. Analyze stresses under gravitational and imposed loads for rock engineering applications.
CO4. Predict the response of rock masses to loading (and unloading) and analyze rock slope stability and foundations on rock
CO5. Classify rock masses for engineering applications, such as tunnel design and construction.
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

TEXT BOOKS

REFERENCES
1. Practical Rock Mechanics by Steve Hencher
2. Engineered Rock Structures in Mining and Civil Construction by Raghu N. Singh and Ajoy K. Ghose

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

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<tr>
<th>Subject Code</th>
<th>Subject Title</th>
<th>Water and Land management</th>
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<tbody>
<tr>
<td>CE348</td>
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<tr>
<td>LTP</td>
<td>Credit</td>
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<td>Subject Category</td>
<td>DE</td>
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<td>Year</td>
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</table>

**Course Objective:**
The objectives of this course are to study the problems in irrigation system in our country and different types of irrigation methods. Also to understand the norms and method of land leveling for irrigation and know about drought management and water management.

**Course Pre/Co-requisite (if any) :** CE342 (Environmental Risk Assessment and Disaster Management)

**Detailed Syllabus**

**Unit 1: Problems of irrigation systems in India & Soil, Water Plant Relationship**

*Introduction,* Problems of irrigation systems in India, Soil and Land Irrigability, classification, Basic concepts of diagnostic analysis. Evapotranspiration, crop coefficient, effective rainfall, crop water demand and availability, irrigation efficiencies.

**Unit 2: Irrigation scheduling & Micro level Planning:**

Irrigation scheduling, Stressed irrigation, drought and water management policy during drought. Micro level Planning for any canal/tube well system, Evaluation of chak planning and design.

**Unit 3 Water application methods & Operation and maintenance of irrigation system:**

Water application methods, Border irrigation, basin irrigation, furrow irrigation, sprinkler and drip irrigation. Operation and maintenance of irrigation system, rotational water distribution systems- arabandi. Evaluation of irrigation project's performance and improvement.

**Unit 4 Evaluation and status of land development:**


**Unit 5: Water Management for Irrigation:**

Irrigation behaviour and decision making, Attitudes and their influence on irrigation management, night irrigation, participatory irrigation management, irrigation organizations.

**Learning Outcome**

At the end of the course, the student can:

- CO1. Understand Basic concepts of water and land management for irrigation.
- CO2. Learn Different methods of Irrigation.
- CO4. Compute the Reservoir capacity by various methods and principles of reservoir operation.

**TEXT BOOKS**

3. FAO Irrigation and Drainage Paper no. 24 & 58, Rome, Italy.

**REFERENCES**

1. Diagnostic Analysis of Minor irrigation scheme, Publication no. 11, WALMI, Aurangabad (Maharashtra).
2. Application of soil survey in Irrigation Water Management, Publication no. 21, WALMI, Aurangabad (Maharashtra).

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Objective:
The objectives of this course is to understand the basic types of irrigation, irrigation standards and crop water assessment, to study the different aspects of design of unlined and lined channel and to provide knowledge on various hydraulic structures such as Weir, Barrage, Canal head and cross regulators, canal falls and structures involved in cross drainage works.

Course Pre/Co-requisite (if any): CE201 (Fluid Mechanics)

Detailed Syllabus

Unit 1: Principles of water Management

Introduction, definition, necessity of irrigation, physical properties of soils, soils classification, Indian soils, soil water relationship. Frequency of irrigation.

Water requirement of crop. Duty, delta and Base period. Quality of water for irrigation. Irrigation efficiencies.

Unit 2: Method of irrigation

Surface irrigation methods: furrow irrigation method.

Unit 3 Irrigation channels

Classification, component of canal system. Design of channels on alluvial soils Kennedy and Lacey theory.

Design of Lined channels

Unit-4 Reservoirs:

Types of reservoir, selection of site for reservoir, investigation of reservoir and dam site, Definition of general term.


Unit-5: Head Works and Canal Structures

Layout, components, canal regulators: function and types of regulators. Canal drops component and types of canal drop.

Cross drainage works: classification, canal outlets. Hydraulic design for a notch type of drop.

Learning Outcome

At the end of the course, the student can:

CO1. Basic requirements of irrigation and water requirements of the crops.
CO2. Various Methods of Irrigation and their advantages, disadvantages.
CO3. Distribution systems for canal irrigation and the basics of design of unlined and lined irrigation canals.
CO4. Compute the Reservoir capacity by various methods and principles of reservoir operation.
Course Structure & Syllabus of B.Tech – Civil Engineering
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CO5. Design of various hydraulic structures such as Weir, Barrage, Canal head and cross regulators, canal falls and structures involved in cross drainage works.

TEXT BOOKS


REFERENCES


Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Objective:
The course aim is to identify basic deficiencies of various soil deposits, to decide various ways and means of improving the soil and implementing techniques of improvement.

Course Pre/Co-requisite (if any) : CE211 (Soil mechanics)

Detailed Syllabus

Unit 1: Introduction to Engineering Ground Modification
4 L
Need and objectives, Identification of soil types, In situ and laboratory tests to characterize problematic soils; Mechanical, Hydraulic, Physico-chemical, Electrical, Thermal methods, etc. and their applications.

Unit 2: Mechanical Modification
5 L

Unit 3: Hydraulic Modification
7 L
Objectives and techniques, traditional dewatering methods and their choice, Design of dewatering system, Electro-osmosis, Filtration, Drainage and seepage control with Geosynthetics, Preloading and vertical drains, Electro-kinetic dewatering.

Unit 4: Physical and Chemical Modification
5 L
Modification by admixtures, Shotcreting and Guniting Technology, Modification at depth by grouting, Crack Grouting and compaction grouting, Jet grouting, Thermal Modification, Ground freezing.

Unit 5: Modification by Inclusions and Confinement
5 L
Soil reinforcement, reinforcement with strip, bar, mesh, sheet and grid reinforced soil. In-situ ground reinforcement, ground anchors, rock bolting and soil nailing.

Learning Outcome
At the end of the course, the student can:
CO1. Solve the field problems related to problematic soils and solve the problems using the above ground improvement techniques.
CO2. Design drainage, dewatering for the field problems.
CO3. Design and construct reinforced earth retaining structures.
CO4: Design of Soil reinforcement techniques

TEXT BOOKS
2. Mosley – Ground Improvement

REFERENCES
3. Xianthakos, Abreimson and Bruce - Ground Control and Improvement

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Title</th>
<th>Air and Water Pollution</th>
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<tbody>
<tr>
<td>CE352</td>
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</table>

Course Objective:

The objective of this course is to learn the knowledge for various air and water pollutants, dispersion of the pollutants, mitigations measures, quality improvement and various standards.

Course Pre/Co- requisite (if any) : CE209 (Water Supply Engineering)

Detailed Syllabus

Unit 1: Introduction
Introduction and scope, air pollutant and types, classification, Dispersion and interaction of pollutants, Air pollutant chemistry and interactions at various atmospheric levels, Aerosols and its characteristics, noise pollution

Unit 2: Measurement of Air Quality and control of air pollution
Overview of Air quality, Mass balance approaches, Box model approaches, Gaussian plume model, regression model. Air quality dispersion-modeling approaches, Emission inventory, Air pollution monitoring and analysis, Different measurement methods, Key meteorological data, Plume shape, Air quality indices, Control technologies.

Unit 3: Overview of Water Pollution
Physico-chemical properties of water, molecular structure, common sources of water pollution, surface, ground, Ocean water pollution, water pollutant chemistry, pollutant transport, tracer kinetics, Eutrophication.

Unit 4: Water Pollution measurement and Treatment
Physical, chemical, biological quality parameters, quality indices for surface and ground water, interpretation of quality indices, numerical modeling approaches, treatment-primary, secondary and tertiary. Oxidation pond.

Unit-5: Impact of air and water quality, regulations, standards
Air and water pollution versus health risk and global climate change, Ecological risk, Air and water quality standards, National and international regulations and legislations. Reclamation of water bodies, National and International regulatory bodies, Mitigation strategies.

Learning Outcome
At the end of the course, the student can:
CO1. Identify various types of air pollutants, interactions and chemistry
CO2. Have the complete knowledge about pollutant source, transport mechanism, monitoring and control technologies.
CO3. Gain the idea about pollutant monitoring organizations, environmental laws, implementation mechanisms
CO4. Gain the idea about pollutant monitoring organizations, environmental laws, implementation mechanisms

TEXT BOOKS

REFERENCES
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

<table>
<thead>
<tr>
<th>Subject Code</th>
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<td>III</td>
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</table>

Course Outline: Aptitude and Soft Skills IV is the final step of programme and the module is designed to enhance the analytical and interpersonal skills of students to make them ready to face various placements, interviews. It will also help them learn various personality development techniques by enhancing their GD and PI skills. Mock Placement Drive will test and improve students by Feedback Sharing & Error Correction.

Course Objective:
1. Align themselves with the placement requirements and their needs
2. Learn analytical and employability skills
3. Prepare students for job placements so that they could clear the selection process successfully and give them strategies and skills to crack GD as well as PI to get selected with decent job offers

Course Pre/Co-requisite (if any):
1. Understanding grammar, number system and basic arithmetic, analytical reasoning concepts, covered in Aptitude and Soft Skills III
2. Professional profile building and Self introduction

Detailed Syllabus

UNIT 1: QUANTITATIVE APTITUDE 11 HOURS

Partnership 02 hours
Introduction & types; Speed, Distance and Time: Average Velocity; Race tracks - Straight and Circular; Trains; Boats and Streams.

Time and Work 02 hours
Basic concepts (relationship between men, days and work); Understanding group efficiency; Alternate work; Negative work; Wages; Pipes and Cisterns.

Permutation and Combination 02 hours
Basic Principles of Counting (Addition and Multiplication); Arrangements around- Circular, Square and Rectangular tables and in straight lines, circular permutation, selection, distribution.

Probability 02 hours
Introduction, various types of events; Classical definition of probability; Random and Discrete variables; Bayes’ Theorem and question types.

Data Interpretation 03 hours
Introduction; Different ways of representing data- Narration based, pictorial, pie chart, Bar graph, line charts; various questions based upon them.

UNIT 2: VERBAL APTITUDE 09 HOURS

Cloze test 02 hours
Intricacies of cloze test, correct use of specific adjectives, concept of sentence improvement, writing concept, auxiliaries and modals.
Course Structure & Syllabus of B.Tech – Civil Engineering
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Words
Concept of consistency, precision, concision in terms of reading and writing, advance word choice with respect to placement papers, SAP (Subject-Audience-Purpose) approach.

Clauses
Subordinate Clauses- The noun clause, the adjective clause, the adverb clause, Analysis of simple and complex sentences, prepositional phrases, transformation of sentences.

Vocabulary
Revisiting vocabulary- high, medium and low frequency words, organization of ideas an thoughts in order to understand the text- The Pyramid Principle.

Questions
Various test taking skills in accordance with the placement papers.

UNIT 3: LOGICAL REASONING 11 HOURS

Deductive Logic
Premises and conclusion structure, Quality of deductive argument, Categorical arguments, Syllogism, Conditional Arguments- If..then, only if..then, If and only if , Either or.

Puzzles
Grouping and selection, Double line up, Binary logic- truth teller-lie teller, Team formation and miscellaneous puzzles.

Set Theory and Critical Reasoning-II 03 hours Union and Intersection of sets, Use of venn diagrams in problem solving with two, three, four set, concept of maxima-minima through Venn diagram.

Critical reasoning II: Statement and Inference, cause and Effects, Statement and Arguments- Strengthen or Weaken the argument, Statement Assertion and Reason.

Non-Verbal Reasoning
Mirror-image, Water-image, Spotting out the embedded figures, Completion of incomplete pattern, Figure matrix, Paper folding, Paper cutting, Grouping of identical figures, Counting figures, Non verbal series / analogies / odd man out.

Data Sufficiency
Data Sufficiency based on logical reasoning field like Coding-Decoding / Puzzle Test / Blood Relations / Mathematical calculations / clock / calendar / etc.

UNIT 4: SOFT SKILLS 08 HOURS

Group Discussion
Importance, Do’s & Don’ts, Personality Traits, Tips and Strategies, Types of Group Discussions.
Suggested Exercises, Games & Activities: Mock Group Discussions (on basic topics), with feedback sharing and error analysis.

Personal Interview
Importance, Do’s & Don’ts, Personality Interview, Tips and Strategies, Etiquette Rules.
Suggested Exercises, Games & Activities: Mock Personal Interviews (contd.) with feedback sharing and error analysis.

Learning Outcomes:

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Structure & Syllabus of B.Tech – Civil Engineering
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By the end of this semester, students will:
1. Be prepared for the upcoming placements and they will also be ready for other competitive exams.
2. Improve their GD and PI Skills and be able to have firsthand experience of a Placement drive and gain sufficient confidence to perform well.

Text book [TB]:

Reference books [RB]:

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Objective: To learn the estimation of RCC, masonry and road structures and to study different terms related to contracts and tenders.

Course Pre/Co- requisite (if any) : NA

Detailed Syllabus

Unit 1: Introduction & Estimation of Buildings
Introduction - Importance of estimation in Civil Engineering, Different types of Estimates.
Estimation methods: Methods in Estimation, Methods of taking out quantities and cost by Centre line method and long wall and short wall method.

Unit 2: Estimation of R.C.C. Structures
Estimation of simple RCC structures - Estimates of components RCC works in beams, column footings and roof slabs
Estimation of complex RCC structures - Estimation of septic tank, manhole and RCC slab culverts.

Unit 3 Specifications and Rate Analysis
Specifications of items: Definition of specifications, objectives of writing specification, essentials of specification of various items of working in buildings
Rate Analysis of quantities estimated: Importance working out quantities and rates for the following standard items of works-earth works in different types of soils, cement concrete of different mixes, Brick masonry, Painting and steel works, wooden works for doors, windows

Unit-4 Estimation of Earth Work and Road Projects:
Earthwork: Methods for computation of Earthwork-cross sections-mid sections formula, trapezoidal and average end area or mean sectional formula
Road Projects: Estimation of Road Works -WBM, Bituminous mixes and cement concrete roads.

Unit- 5 Contracts and Tender
Contracts: Types of contract, essential of contracts agreement and document- legal aspects, penal provisions on breach of contract

COURSE OUTCOME:
At the end of the course, the student can :
CO1. Identify the various methods of estimation of quantities.
CO2. Apply the concepts to estimate the quantities required in RCC structures.
CO3. Comprehend the concepts of various construction specifications and their rates.
CO4. Compute the quantities of materials required in road construction.
CO5. Understand the role of contracts and tenders in civil engineering construction industry.

TEXT BOOKS

REFERENCES
   Nanavati, J., “Professional Practice for Civil engineers”.

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Structure & Syllabus of B.Tech – Civil Engineering

Applicable for Batch: 2018-2022

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Course Objective: The course is designed to gain the knowledge of basic concepts in proportioning and design of bridges in terms of aesthetics, geographical location

Course Pre/Co-requisite (if any): NA

Detailed Syllabus

Unit 1: Introduction
Definition, Components of bridge, Historical Developments, Site Selection for bridges, classification of bridges, Survey and data collection for a bridge site selection, Hydraulic design, Design Discharge, Linear waterway, Economical span.

Unit 2: Specifications of Road Bridges
Indian road Congress Bridge code, carriageway, clearance, forces on bridge, review of IRC loadings, applications of loads on bridge such as dead load, impact load, live load etc.

Unit 3: R.C.C. Slab Culvert:
RCC Slab culvert, dead load BM and SF, BM and SF for IRC class AA tracked vehicle, BM and SF for IRC class AA wheeled vehicle, BM and SF for IRC Class A loading, structural design of slab culvert.

Unit 4: T-Beam Bridge
Proportioning of components, analysis of slab using IRC class AA tracked vehicle, structural design of slab, analysis of cross girder for dead load and IRC class AA tracked vehicle, structural design of cross girder, analysis of main girder using COURBON’S method, calculation of dead load and SF, calculation of live load BM and SF using IRC class AA tracked vehicle, structural design of main girder.

Unit 5: Substructure, Foundations, Bearings, Joints and Appurtenances
Definition of pier and abutment, design and drawing of pier and abutments, scour at abutments and pier, types of foundations, pile, well and pneumatic caissons, importance of bridge bearings, sketches of different types of bearings.

COURSE OUTCOME:
At the end of the course, the student can:
CO1. Study different types of bridges,
CO2. Estimate forces acting on bridges
CO3. Design bridge.
CO4. Design foundations and bearings

TEXT BOOKS

REFERENCES
2 “IRC 6-1966 Standard Specifications and code of practice for Road Bridges Section II loads and stresses”, The Indian Road Congress, New Delhi.

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Objective: The objectives of this course is to introduce students to different types of pavement failures and to make students able to evaluate functional and structural condition off an existing pavement.

Course Pre/Co- requisite (if any) : CE341 (Advanced Highway Engineering)

Detailed Syllabus

Unit 1: Analysis of Pavement Structures:
4 L

Unit 2: Types of pavement distress:
4 L
Introduction, major forms of distress in bituminous and concrete pavement. Distress survey.

Unit 3: Functional and structural evaluation of pavements:
7 L

Unit-4 Pavement strengthening:
5 L
Surface repairs. Overlay design and construction- need of overlays, overlay design methods for flexible and rigid pavements. Recycling of flexible and rigid pavements

Unit- 5: Pavement Systems:
6 L
Components, structure, data requirements, Project level and Network level needs, Pavement performance prediction – concepts, Pavement performance prediction – concepts, modelling techniques– AASTHO, CRRI and HDM models, Budget forecasting for maintenance and rehabilitation, Ranking and optimization methodologies, life cycle costing.

Course Outcome: At the end of the course, the student can:
CO1. Identify principles of pavement design to be used for solving real life engineering problems.
CO2. Apply highway engineering concepts for selection of material
CO3. Compute various distresses occurring in case of different pavements
CO4. Understand various pavement systems

TEXT BOOKS

REFERENCES

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Structure & Syllabus of B.Tech – Civil Engineering
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Course Objective: The objectives of this course are to learn the role of groundwater and its importance over surface water. The students will also learn the Artificial Groundwater recharge processes like surface recharge and subsurface recharge processes.

Course Pre/Co-requisite (if any): CE208 (Engineering Geology)

Detailed Syllabus

Unit 1: Introduction
Groundwater occurrence and its role in hydrologic cycle, various usage of ground water, Groundwater bearing formations, Aquifer classification, Flow and storage characteristics of various types of aquifers, Indian Scenario.

Unit 2: Ground Water Flow in Cartesian Coordinates
Differential Equations governing groundwater flow in Cartesian coordinates, Analytical solutions for confined, leaky and unconfined aquifers, Numerical solutions, Stream-aquifer interflows

Unit 3 Ground Water Flow in Polar Coordinates

Unit 4: Wells and Ground Water Recharge
Construction of wells, Various drilling techniques, Estimation of recharge, Flow in unsaturated zone, Artificial recharge, Induced recharge, Roof water harvesting

Unit 5: Contamination of Ground Water
Contamination of ground water, Quality parameters and standards, River bank infiltration, Sea water intrusion and its monitoring techniques.

Course Outcome:
At the end of the course, the student can:
CO1. Learn the fundamentals of the Groundwater or ‘the hidden asset’.
CO2. Estimate the ability of Protection needs of groundwater and groundwater dependent receptor needs.
CO4. Develop the quantitative skills for solving basic Groundwater related problems.
CO5. Carry out the following: interpret cross-sections, calculate the thickness of the unsaturated zone, and the rate of groundwater flow.

TEXT BOOKS

REFERENCES

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

<table>
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<th>Subject Code</th>
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</table>

Course Objective: The course objective is to introduce students to the concept of geographical information systems and enable them to understand types of GIS data, different data models and concept database management.

Course Pre/Co-requisite (if any): CE345 (Photogrammetry and remote Sensing)

Detailed Syllabus

Unit 1: Fundamentals of GPS
Components of GPS, GPS receivers, reference coordinate systems, datums, ellipsoids, WGS 84 system, signal propagation through atmosphere- their modelling and estimation, satellite orbit.

Unit 2: GPS Signals and Data
Navigational data, GPS data collection methods: static positioning, kinematic positioning, pseudo kinematic and stop & go, observation planning and strategy.

Unit 3 Introduction to GIS
Geographical concepts and terminology, Utility of GIS, various packages and their features, essential components of a GIS. Data acquisition through scanners and digitizers, methods of digitization.

Unit 4 Introduction to remote sensing
Rater and Vector data, data storage, verification and editing. Rectification and registration, interpolation of data, Database structure: hierarchical data, network systems, relational database. Data manipulation and analysis, spatial and mathematical operations on data, area analysis, query-based analysis.

Unit 5: Applications of GPS & GIS
Applications of GPS & GIS for engineering problems and in planning and management of various natural resources.

<table>
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<tr>
<th>SR.NO.</th>
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<tr>
<td>1.</td>
<td>Georeferencing of a scanned map</td>
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<td>Digitization of Points and Lines</td>
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<td>Attribute Data Entry and Manipulation</td>
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<td>Cleaning, Building and Transformation</td>
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<td>6.</td>
<td>Data Analysis – Overlay, Buffer</td>
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<td>7.</td>
<td>Map Generation with Patterns and Legends</td>
</tr>
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</table>

COURSE OUTCOME:
At the end of the course, the student can:

CO1: Digitize scanned maps and create informative thematic maps in GIS.

CO2: Perform data manipulation and analysis

CO3. Comprehend and realize the potential of GIS to address various engineering problems.

CO4. Learn GPS

TEXT BOOKS

REFERENCES

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Objective: To learn network techniques in construction planning and management and to learn control and safety procedures in construction

Course Pre/Co-requisite (if any): NA

Detailed Syllabus

Unit 1: Network Techniques
Introduction to network techniques, Use of Computer aided CPM and PERT for planning, Scheduling and control of construction works, Bar charts, Error in networks, Types of nodes and node numbering systems

Unit 2: PERT
Time Estimates, probability distribution, time computations, slack, network analysis, critical path

Unit 3 CPM
CPM processes, network, activity time estimates, float, network analysis, critical path

Unit-4 Control and Safety in Construction

Unit-5 Construction Equipment and Methods
Equipment for earthworks, Concrete construction, Aggregate production, Concrete production, Handling and placement, Mixers, Vibrators and temperature control

COURSE OUTCOME:
At the end of the course, the student can:
CO1. Identify the various network techniques for planning and scheduling any project
CO2. Learn the concepts involved in PERT network analysis techniques
CO3. Learn the concepts involved in CPM network analysis techniques
CO4. Understand the importance of safety in construction projects
CO5. Identify the various machines involved in construction projects.

TEXT BOOKS

REFERENCES
Course Objective: The course aim is to gain the knowledge regarding river water quality, pollutant transport and to learn about the chemistry of water pollutant and pollutant management

Course Pre/Co-requisite (if any): CE204 (Water Supply Engineering)

Detailed Syllabus

Unit 1  6 L
River water quality description, river ecology. Sources of pollution, point and non-point sources of pollution, characteristics of pollutants.

Unit 2  9 L
Pollutant transport and mixing in water environment, rivers, lakes and estuaries. River water quality simulation models

Unit 3  9 L
River stage and pollution load relationship, interaction between ground water and surface water pollution. Theory of jets and plumes, location of outfalls, separation zones and pollutant logging,

Unit 4  7 L
Hydrological character of river and pollution management. River water quality monitoring, methodologies, standards. River pollution management, Regional and local approaches.

Unit 5  8 L
River pollution management preventive and curative methods, natural energy concepts of river pollution management. Environmental regulations for river pollution control.

Course Outcome: The students will learn
CO1. River pollution characteristics
CO2. Pollution transport dynamics
CO3. River pollution management
CO3. Hydrological Characteristics of river

TEXT BOOKS
George T, ‘Water quality modeling for rivers and streams’, springer, 2013, first

REFERENCES
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

<table>
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<tr>
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<td>SOIL DYNAMICS AND MACHINE FOUNDATION</td>
<td>210</td>
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</table>

**Course Objective:** The course aim is the design and analysis for machine foundations come along with this course to consider the dynamic properties of both soil and foundation as combined mass. Behaviour of various geotechnical structures such as shallow and deep foundations, retaining structures due to various types of time-dependent dynamic loading are discussed here along with the reference to design code provisions.

**Course Pre/Co-requisite (if any):** CE211 (Soil mechanics)

**Detailed Syllabus**

**Unit 1: Introduction**

**Unit 2: Theories of Vibration Analysis**

**Unit 3: Dynamic principle of soil**
Determination of E, G and Poisons ratio from field and laboratory tests, recommendations of Indian codes- Stress waves in bounded elastic medium- Use of wave theory in the determination of elastic properties, Elastic coefficients of soils and their determination- damping factor from free and forced vibration tests.– Block vibration test – Determination of Damping factor.

**Unit 4: Types of machine foundation**
General requirements design – criteria for machine foundations, permissible amplitudes and bearing pressure Design data, design criteria, IS code provisions for the design foundations of reciprocating machines.

**Unit 5: Vibration isolation**
Transmissibility, Principles of isolation- Methods of isolation- Vibration isolators- Types and their characterizes Special Topics: Liquefaction of soils, CSR, CRR, Factor of safety against liquefaction – Dynamic bearing capacity, Earth retaining structures under dynamic loads.

**COURSE OUTCOME:**
On successful completion of these course, the student able to
- CO1: Use theory of vibrations to find the behavior of soil under dynamic loading.
- CO2: Design machine foundations under different loads and soil conditions.
- CO3: Understand the liquefaction phenomena. Conduct various laboratory and filed tests to determine the dynamic soil prosperities and its interpretation.
- CO4: Design vibration isolators under any vibratory machines.

**TEXT BOOKS**
‘Vibrations of Soils and Foundations’ by Richart Hall and Woods

**REFERENCES**
‘Foundations of Machines- Analysis and Design’ by Prakash and Puri.
‘Analysis and design of Foundations for Vibrations’ by P J Moore
‘Fundamentals of Soil Dynamics’ by B M Das
‘Dynamics of bases and Foundations’ by D D Barkar

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Objective:

The course enables students to learn about different hydraulic structures like dams, spillways etc.

Course Pre/Co-requisite (if any): CE201 (Fluid Mechanics)

Detailed Syllabus

Unit 1: Introduction
Hydraulic structures for water resources projects.

Unit 2: Embankment and Gravity Dams
Embankment Dam: Types, design considerations, seepage analysis and control, stability analysis, construction techniques.
Gravity Dam: Forces acting on failure of a gravity dam, stress analysis, elementary profile, design of gravity dam, other functional features of a gravity dam

Unit 3: Spillways
Types and their design, spillway gates, Cavitation, Aerators and energy dissipation (terminal structures)

Unit-4: Channel transition
Design principles for subcritical and supercritical flows.

Unit- 5: Hydropower plant
Terms relating to hydropower, basic design aspects of different unit of hydropower plant

COURSE OUTCOME:

CO1: The student will learn classification and design of dams
CO2: The student will learn classification and design of spillways
CO3: The Student will have knowledge of hydropower plants and its parts
CO4: The Student will have knowledge of channel transition

TEXT BOOKS

REFERENCES
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

<table>
<thead>
<tr>
<th>Subject Code</th>
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UNIT-I: Introduction (7 L)

UNIT-II: Software Quality Metrics (8 L)

UNIT-III: Software Quality Management and Models (8 L)

UNIT-IV: Software Quality Assurance (8 L)

UNIT-V: Software Verification, Validation & Testing: (8 L)

Text Book:

Reference Book:
1. Stephen H. Kan, Metrics and Models in Software Quality Engineering, Addison-Wesley Professional

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

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<td>Basics of Data Science</td>
<td>DE/OE Year 4th Semester VII</td>
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Course Objective:

1. The objective of the course is to make the students understand the different techniques for efficient mining of the data.
2. To introduce students to the concepts, processes and practice of Inference Rules at different abstraction levels of Data.
3. To provide an understanding of the Data management perspective regarding the use of business intelligence (BI), Data Mining systems and Advanced Applications.

Detailed Syllabus

UNIT 1

Data Science : Introduction to Data Science, Overview, Motivation, Data Mining-Definition & Functionalities.

Data Warehousing: Overview, Definition, Delivery Process, Difference between Database System and Data Warehouse, Multi-Dimensional Data Model, Data Cubes, Stars, Snow Flakes, Fact Constellations, Concept hierarchy, Process Architecture, 3 Tier Architecture, Data Marting.

(12 L)

UNIT 2

Data Pre-Processing: Data Cleaning: Missing Values, Noisy Data,(Binning, Clustering, Regression, Inconsistent Data, Data Integration and Transformation.

Data Reduction: Data Cube Aggregation, Dimensionality reduction, Data Compression, Numerosity Reduction, Clustering, Discretization and Concept hierarchy generation.

Data objects and attribute types, Measuring Data Similarity and Dissimilarity, Cosine Similarity.

(7 L)

UNIT 3

Concept Description: Definition, Data Generalization, Analysis of attribute relevance, Mining Class comparisons, Statistical measures in large Databases. Measuring Central Tendency, Box Plots, Measuring Dispersion of Data, Apriori Algorithm, Mining Multilevel Association rules from Transaction Databases, FP-growth algorithm.

(7 L)

UNIT 4

Classification: What is Classification, Issues regarding Classification, Attribute selection measures, Information Gain, Gain Ratio, Gini Index, Decision tree, Naïve Bayesian Classification, Metrics for evaluating classifier performance, Confusion matrix.

(6 L)

UNIT 5


(8 L)

Learning Outcome

The course provides the students the ability to:
1 - Undertake systematic investigation/research related to the Data mining Concepts
2- Understand advanced Database systems and technologies for today’s dynamic business environment.
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

Text book [TB]:
1. Jiawei Han, Micheline Kamber, "Data Mining Concepts & Techniques" Elsevier.

Reference books [RB]:
1. M.H.Dunham, "Data Mining : Introductory and Advanced Topics" Pearson Education
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

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</table>

Course Objective:
1. To make students learn about basic understanding of the multimedia objects and tools for object generation
2. To teach students audio and video file formats used now days as a part of IT generation.
3. To make students learn clear understanding of multimedia projects.
4. To make students learn different compression techniques.

Detailed Syllabus

UNIT 1

Introduction: Introduction to Multimedia, Multimedia Information, Multimedia Objects, Multimedia in business and work, Stages of Multimedia Projects, presentation tools, tools for object generations, video, sound, image capturing, authoring tools, card and page based authoring tools

UNIT 2

Multimedia Building Blocks: Text, Sound MIDI, Digital Audio, audio file formats, MIDI under windows environment Audio & Video Capture.

UNIT 3

Data Compression: Introduction to data compression, Compression ratio, loss less & lossy compression, Huffman Coding, Shannon Fano Algorithm, Huffman Algorithms, Adaptive Coding, Arithmetic Coding, Finite Context Modelling, Dictionary based Compression, Sliding Window Compression, LZ77, LZ78, LZW compression.

UNIT 4

Image, Audio and Video Compression: Digital Audio concepts, Sampling Variables, Loss less compression of sound, loss compression & silence compression, lossy graphic compression, image file format, animations Images standards, JPEG Compression, Zigzag Coding, Multimedia Database. Content based retrieval for text and images, Video Compression, MPEG standards, MHEG Standard Video Streaming on net.

UNIT 5

Advanced forms of interaction in Multimedia: Video Conferencing, Elements of (immersive/non-immersive) Virtual Reality, Augmented Reality, Tele presence, Mobile technologies.


Learning Outcome
At the end of the course, Learning Outcomes Having successfully completed this course, the student will demonstrate:
1. Students will understand various multimedia tools available.
2. Students will be able to learn with Multimedia projects
3. Students can differentiate between lossy and lossless compression.
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

Text Book [TB]:
1. Tay Vaughan “Multimedia, Making IT Work” Osborne McGraw Hill, 7\textsuperscript{th} edition
2. Khalid sayood “Introduction to data compression” Morgan Kaufmann Publishers, 3\textsuperscript{rd} edition

Reference Book [RB]:
1. Buford “Multimedia Systems” Addison Wesley, 4\textsuperscript{th} edition
2. Mark Nelson “Data Compression Book” BPB, 3\textsuperscript{rd} edition
3. Steinreitz “Multimedia System” Addison Wesley, 5\textsuperscript{th} edition

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Objectives of the Course: The students will learn

- Consumer Electronics and its application
- Concept of audio and video related system.
- Concepts of recording and power supplies.

UNIT-I
Audio Systems: Microphones, Loudspeakers, Speaker baffle and enclosure, Acoustics, Mono, Stereo, Quad, Amplifying Systems, Equalisers and Mixers, Electronic Music Synthesisers, Commercial Sound, Theater Sound System

UNIT-II
Video Systems and Displays: Monochrome TV, Colour TV standards and systems, TFT, Plasma, HDTV, Digital TV, Video Telephone and Video Conferencing

UNIT III:
Domestic Appliances: Washing machines, Microwave ovens, Air-conditioners and Refrigerators, In car computers Office Systems: FAX, Xerox, Telephone Switching System, Mobile Radio System

UNIT IV:
Recording and Reproduction Systems: Disc recording and reproduction, Magnetic recording and reproduction, Video tape recording and reproduction, Video disc recording and playback, Distortion and Noise reduction in Audio and Video System

UNIT-V
Power Supplies and other systems: SMPS, UPS and Preventive Maintenance, Set Top Boxes, Remote controls, Bar codes, ATM

Text Books:

OUTCOMES OF THE COURSE:
The course provides an understanding of:

- Electronic systems related to consumer applications.
- Principle of working of various home appliances.
- Skills to use modern consumer electronics systems used in day to day life.
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

<table>
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<th>Subject Code</th>
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</table>

Objectives of the Course: To teach the fundamental concepts of various electronic devices, circuits and their application. To develop ability among students for problem formulation, system design and solving skills.

UNIT-I
Semiconductor materials and properties Group-IV materials, Covalent bond, electron-hole concepts Basic concepts of energy bands in materials, concepts of forbidden gap Intrinsic and extrinsic semiconductors, donors and acceptors impurities 4L

UNIT-II
Junction diode and diode applications p-n junction, depletion layer, v- i characteristics, diode resistance, capacitance diode ratings (average current, repetitive peak current, non-repetitive current, peak-inverse voltage). 4L

Diode Applications Rectifiers (half wave and full wave), filter (C – filter), clipping circuits, clamping circuits, voltage multipliers 4L

UNIT-III
Breakdown diodes Breakdown mechanisms (zener and avalanche), breakdown characteristics, zener diode application as shunt regulator 4L

UNIT-IV
Bipolar Junction Transistor Basic construction, transistor action, CB, CE and CC configurations, input/output Characteristics, Transistor Amplifier Graphical analysis of CE amplifier, concept of voltage gain, current gain. 6L

UNIT-V
Field Effect Transistor
JFET: Basic construction, transistor action, concept of pinch off, maximum drain saturation current, input and transfer characteristics, characteristics equation CG, CS and CD configurations, MOSFFT: depletion and enhancement type MOSFET-construction, operation and characteristics. 6L

Reference Books:
OUTCOME OF THE COURSE:

- Students will be able to build, develop, model, and analyze the electronic circuits along with learning the device ratings and characteristics
- Students will be able to design and analyse electronic circuits

List of Experiments:

1. To study V-I characteristics of p-n junction diode.
2. To study V-I characteristics of zener diode.
3. To study half-wave rectifier and calculate ripple factor and efficiency.
4. To study full-wave rectifier and calculate ripple factor and efficiency.
5. To study clipper circuits.
6. To study clamper circuits.
7. To study the input and output characteristics of CB and CE transistor.
8. To study drain and transfer characteristics of JFET.

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

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<th>Subject Code</th>
<th>EE481</th>
<th>Subject Title</th>
<th>NEW AND RENEWABLE ENERGY SOURCES</th>
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Objectives of the Course

- To introduce fundamentals of various renewable energy sources.
- To introduce fundamentals of technologies used to harness usable energy from solar, wind, and ocean.
- To introduce fundamentals of technologies used to harness usable energy from ocean and Biomass energy sources.

Introduction: Energy resources and their classification, oil crisis of late 20th century and its impacts on energy planning, consumption trend of primary energy sources, world energy future, energy audit and energy conservation, energy storage. 8L

Solar Energy Conversion: Solar resources, passage through atmosphere, solar thermal energy conversion: solar energy collectors, solar thermal power plant, solar PV conversion: solar PV cell, V-I characteristics, MPPT, Solar PV power plant and applications. 8L

Biomass Energy Conversion: Usable forms of Bio Mass, Biomass energy resources, biomass energy conversion technologies, ethanol blended petrol and diesel, biogas plants. Energy farming. 8L

Wind Energy Conversion: Wind Power: Energy estimation, Power extraction, lift and drag forces, horizontal axis wind turbine, vertical axis wind turbine, wind energy conversion and control schemes, environmental aspects. 8L

Other Alternate Energy Sources/Technologies: Geothermal Energy: geothermal fields, types, geothermal energy generation systems, ocean tidal energy systems, fuel cell: basic operation and classification, principle of MHD generation, output voltage and power, environmental aspects. 8L

Text Books:

Reference Books

Outcome of the Course:

- Identify renewable energy sources.
- Understand the mechanism of solar, wind and ocean energy sources.
- Demonstrate the understanding of various technologies involved in power generation from renewable energy sources.
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

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<th>ME342</th>
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**Course Objective:** To enable the students know and understand the mechanical behavior of composite materials

**Course Pre/Co-requisite (if any):** Strength of Materials, Materials Engineering

**Detailed Syllabus**

**UNIT 1:**
Definition and applications of composite materials, classifications, Fibers- glass, carbon, ceramic and aramid fibers. Matrices- polymer, graphite, ceramic and metal matrices; characteristics of fibers and matrices. Fillers and whiskers. Advantages and limitations of composites

**UNIT 2:**
Mechanical behaviour of composite materials, surface treatment of fibers, thermosets matrix materials, Thermoplastics and other matrix materials, Manufacturing of thermoset composites, bag moulding, compression moulding, pultrusion, filament welding, other manufacturing processes

**UNIT 3:**

**UNIT 4:**
Analysis of laminated composites, symmetric laminates, angle ply laminates, cross ply laminates, laminate, evaluation of lamina properties, determination of stress and strain in laminate, maximum stress and strain criteria, von Mises Yield criterion for isotropic materials

**UNIT 5:**
Residual stresses during curing, prediction of laminate failure, thermal analysis of composite laminates. Analysis of laminated plates - equilibrium equations of motion, static bending analysis, buckling analysis, free vibrations, natural frequencies

**Learning Outcome**

At the end of the course the student can:
CO1: Have an overview of the mechanical behaviour and application of composite materials.
CO2: Get an overview of the methods of manufacturing composite materials
CO3: students will understand various mechanics of composite materials

**Text book [TB]:**

**Reference books [RB]:**

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
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**Course Objective:** To facilitate the understanding of total quality management principles and processes.

**Course Pre/Co-requisite (if any):** Manufacturing Process, Industrial Engineering and Management

**Detailed Syllabus**

**UNIT 1:**
Introduction, need for quality, evolution of quality; Definitions of quality, product quality and service quality; Basic concepts of TQM, TQM framework, contributions of Deming, Juran and Crosby. Barriers to TQM; Quality statements, customer focus, customer orientation & satisfaction, customer complaints, customer retention; costs to quality.

**UNIT 2:**
TQM principles; leadership, strategic quality planning; Quality councils- employee involvement, motivation; Empowerment; Team and Teamwork; Quality circles, recognition and reward, performance appraisal; Continuous process improvement; PDCE cycle, 5S, Kaizen; Supplier partnership, Partnering, Supplier rating & selection.

**UNIT 3:**
The seven traditional tools of quality; New management tools; Six sigma- concepts, methodology, applications to manufacturing, service sector including IT, Bench marking process; FMEA- stages, types.

**UNIT 4:**
TQM tools and techniques, control charts, process capability, concepts of six sigma, Quality Function Development (QFD), Taguchi quality loss function; TPM- concepts, improvement needs, performance measures.

**UNIT 5:**
Quality systems, need for ISO 9000, ISO 9001-9008; Quality system- elements, documentation, Quality auditing, QS 9000, ISO 14000- concepts, requirements and benefits; TQM implementation in manufacturing and service sectors.

**Learning Outcome**

At the end of the course the student can:
CO1: To facilitate the understanding of total quality management principles and processes.
CO2: Student will learn about ISO systems
CO3: Student will learn about various quality tools to improve products quality.

**Text book [TB]:**

**REFERENCES [RB]:**
1. **Course Summary**
   This course will introduce students to classification of fuel and their properties. In this course, students unable to understand coal preparation, coal storage process, coal gasification process. This course also covers various topics which includes Fischer Tropsch Synthesis, Gaseous and liquid fuels i.e. natural gas, producer gas, water gas, coal gas, biogas, LPG, kerosene, diesel. Students will also learn combustion mechanism for solid, liquid and gaseous fuel.

2. **Course Objectives**
   The students should be able to:
   1. Understand different types of fuel, basic terms in fuels and combustion
   2. Understand the coal preparation and conversion of coal into suitable products using gasification and Fishers Tropsch Synthesis process.
   3. Understand physical and chemical properties of different types of fuel and their storage techniques, combustion mechanism
   4. 

3. **Course Outcomes**
   A good knowledge of this course will enable students to:
   1. Understand origin of different of types of fuel and their properties and classification
   2. Understand the Coal preparation and storage techniques, Physical and chemical properties of coal, Briquetting and liquefaction of solid fuels
   3. Understand the conversion of coal into useful products using gasification techniques and Fischer Tropsch Synthesis
   4. Understand about gaseous and liquid fuels, their physical and chemical properties and Testing methods for these fuels
   5. Understand about combustion mechanism for different types of fuels and Furnace elements.

4. **Curriculum Content**
   **UNIT 1**

   **UNIT 2**

   **UNIT 3**
Course Structure & Syllabus of B.Tech – Civil Engineering
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UNIT 5

Text book [TB]:

Reference books [RB]:

5. Teaching and Learning Strategy
   All materials (ppts, assignments, labs, etc.) will be uploaded in Moodle. Refer to your course in Moodle for details.
Course Structure & Syllabus of B.Tech – Civil Engineering
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Subject Code | Subject Title | Health Safety and Environment in Industry
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PE482 | | |

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1. Course Summary
The course will introduce students to the need and scope of health, safety and environment in industry. The students will learn about the sources and causes of pollution, effects of the pollutants on livings and environment, and the safety and remedial measures that should be adopted to reduce the pollution.

2. Course Objectives
The students should be able to:
1. Understand the sources of pollutions.
2. Understand the effects of pollutions on health and environment.
3. Understand the remedial measures and safety precautions associated with each source of pollution.

3. Course Outcomes
On successful completion of the course, students have the understanding of the following:
1. Understand the scope of HSE in industry.
2. Understand the sources, effects and remedies of air pollution.
3. Understand the sources, effects and remedies of water pollution.
4. Understand the sources, effects and remedies of liquid and solid wastes.
5. Understand the sources, effects and remedies of noise pollution.

4. Curriculum Content

UNIT 1
Introduction: Man And Environment: Overview (Socio-Economic Structure & Occupational Exposures); Scope Of Environmental Engineering; Pollution Problems Due To Urbanization & Industrialization.

UNIT 2
Air Pollution : Causes Of Air Pollution; Types & Sources Of Air Pollutants; Climatic & Meteorological Effect On Air Pollution Concentration; Formation Of Smog And Fumigation; Analysis Of Air Pollutants Collection Of Gaseous Air Pollutants; Collection Of Particulate Pollutants; Analysis Of Air Pollutants Like : Sulphur Dioxide, Nitrogen Oxide, Carbon Monoxide, Oxidants &Ozone; Hydrocarbons; Particulate Matter; Control Of Particulate Emission- Control Of Gaseous Emission; Flue Gas Treatment Methods : Stacks Gravitational And Inertial Separation; Settling Chambers; Dynamic Separators; Cyclone; Filtration; Liquid Scrubbing; Spray Chambers; Packed Towers; Orifice And Venturi Scrubbers; Electrostatic Precipitators.

UNIT 3
Water Pollution & Its Control - Origin Of Waste Water – Types Of Water Pollutants And Their Effects ; Adverse Effects On: Human Health & Environment; Aquatic Life; Animal Life; Plant Life; Water Pollution Measurement Techniques; Water Pollution Control Equipments& Instruments; Indian Standards For Water Pollution Control.

UNIT 4
Liquid & Solid Wastes – Domestic & Industrial Wastes; Pesticides; Toxic: Inorganic & Organic Pollutants; Soil Deterioration; Ground Water Pollution; Concentration Of Infecting Agents In Soil; Solid Waste Disposal; Dumping Domestic & Industrial Solid Wastes; Advantages & Disadvantages; Incineration- Advantages & Disadvantages – Sanitary Land Field: Advantages & Disadvantages; Management Of Careful & Sanitary Disposal Of Solid Wastes.

UNIT 5
Stone Pollution & Control: Intensity; Duration; Types Of Industrial Noise; Ill Effects Of Noise; Noise Measuring & Control; Permissible Noise Limits.

Text book [TB]:
1. J. Turk & A. Turk, “Environmental Science Environmental Pollution”.

Reference books [RB]:

5. Teaching and Learning Strategy
All materials (ppts, assignments, labs, etc.) will be uploaded in Moodle. Refer to your course in Moodle for details.
OBJECTIVE: The objective of this subject is to give the basic knowledge of descriptive and mathematical part of statistics. Applications of various probability distribution in the field of insurance and finance. The course will focus on the different situations in the field of actuarial science which can be dealt with transformation of variables. The course will make able the students to understand the association between two random quantities and to find their mathematical measure.

Unit I

Unit II
Bivariate data: Definition, scatter diagram, simple, partial and multiple correlation, rank correlation. Simple linear regression.

Unit III
Principle of least squares and fitting of polynomials and exponential curves. Theory of attributes Independence and association of attributes, consistency of data, measures of association and contingency, Yule’s coefficient of colligation.

Unit IV
Testing of hypothesis: Z-test, t-test, F-test, Chi-square test for goodness of fit, Introduction to analysis of variance.

LEARNING OUTCOME: Students will able to:
- Analyze given statistical data.
- Have confidence to deal with real life situation, especially, in insurance and finance.
- Understand applications of standard probability distributions in every span of life.
- Find the association between two random quantities using mathematical theory.

Text Books:

Reference Books:
Course Structure & Syllabus of B.Tech – Civil Engineering
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<th>Code</th>
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<td>GRAPHICS &amp; PRODUCT DESIGN</td>
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Course Objective:
To introduce the various aspects of graphics design and important stages of product design and development.

Unit 1: Introduction

Unit 2: Product Design Cycle
Stages of product development. Introduction to ergonomics

Unit 3: Design Process
Introduction to concept. Concept development. Role of sketching in concept development. Implementation stages of concept for product development

Unit 4: Technology & Market Assessment
Customer needs identification, Market research essentials. Advertising and marketing tools.

Unit 5: Design Tools
Introduction to various design tools.

LEARNING OUTCOME:
1. The student will be able to understand the importance of Graphics.
2. The students will be able to understand and demonstrate their ideas visually.
3. The students will be able to understand the various stages of product development.

Text Books:
1. The Elements of Graphic Design, Alex W. White
2. The Design of Everyday Things, Don Norman

Reference Books:
1. Product Design & Development, Karl T. Ulrich & Steven D. Eppinger

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<td>ME381</td>
<td>Entrepreneurship and Startup</td>
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COURSE OBJECTIVE:
To understand the basic concepts Entrepreneurship and start up. To understand role and importance of entrepreneurship for economic development. To develop personal creativity and entrepreneurial initiative or start up.

COURSE OUTCOME
At the end of the course the student can:
CO1: Analyse the business environment in order to identify start up opportunities
CO2: Identify the elements of success of entrepreneurial ventures
CO3: Consider the legal and financial conditions for starting a start up
CO4: Evaluate the effectiveness of different entrepreneurial strategies

Unit 1: 4Hrs.

Unit 2: 6Hrs.

Unit 3: 5Hrs.

Unit 4: 5Hrs.

Unit 5: 6Hrs.

TEXT BOOKS:

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
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REFERENCE:


EVALUATION BREAKUP:

- Case study – 25 Marks (Internal)
- Assignments – 10 Marks (Internal)
- Mid Term Evaluation of Project – 10 Marks (Internal)
- Startup Idea, Seminar - 15 Marks (External)
- End Term Evaluation of Project – 40 Marks (External)

*The End Term evaluation will consist of 25 to 30 minutes’ presentation followed by questionnaire by External Experts.

RESOURCE PERSONS FROM VARIOUS DEPARTMENTS:

- Mechanical Engineering
- MBA
- Computer Science Engineering.
- Information Technology.
- Industry Persons.
  1. Experts from Industry – As recommended by STPI
  2. Dr Umakant Panwar – Entrepreneur
  3. Mr Vivek Harinarian - Entrepreneur.

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
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**Course Objective:** The course is designed to incorporate earthquake effects in analysis of structures and to learn about seismicity and various parameters related to measurement of earthquake effects.

**Course Pre/Co-requisite (if any) : NA**

**Detailed Syllabus**

**Unit 1: Seismology**
Earth’s interior and plate tectonics, Global Seismic Belts, Seismic waves, Earthquake measurement parameters, Indian seismic zoning map, effect of soil on earthquake.

**Unit 2: Single degree of freedom systems**
Un-damped and Damped free vibration with viscous damping, Forced vibrations, Steady state, Vibration Isolation, Response of un-damped systems to time dependent force functions (Pulse/impulses), Duhamel’s Integral, Response spectrum, DVA spectrum and construction of design spectrum.

**Unit 3: Multi Degree of Freedom Systems**
Mode shapes, Orthogonality of modes, of frequency and mode shapes by Holzer method, Stodola Method, Rayleigh’s method.

**Unit 4: Earthquake Excitation**
Equivalent lateral force for Earthquake, Response spectrum method for analysis of structures and codal provisions, codal provisions for seismic isolation, Soil structure interaction.

**Unit 5: Earthquake Effects**
Ground failures, Local site effects, Effects on ground and structure, Land-slides, Cracks & collapse of structures.

**COURSE OUTCOME:**
At the end of the course, the student can:
- CO1. Apply the concepts of earthquake effects in analysis of structures.
- CO2. Solve Multi Degree of Freedom systems.
- CO4. Understand earthquake related effects on ground.

**TEXT BOOKS**

**REFERENCES**
Course Structure & Syllabus of B.Tech – Civil Engineering
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Course Objective: This subject aims at making the students to understand the relevance of various components of hydrologic cycle. Students will know about the spatial and temporal distribution of water availability.

Course Pre/Co-requisite (if any): NA

Detailed Syllabus

Unit 1: Precipitation
Introduction, hydrologic cycle, water-budget equation, history of hydrology, World water balance, applications in engineering, sources of data. Definition of Precipitation, forms and types of precipitation. Measurement of rainfall using Non recording (Simon’s) and Recording (Syphon) Rain Gauges. Computation of average rainfall over a Catchment area. Checking the consistency of rain fall data by double mass curve methods, computation of missing rainfall by different methods.

Unit 2: Water Losses

Unit 3: Runoff

Unit 4: Flood and Flood Routing:

Unit 5: Ground Water hydrology
Basic concept of ground water, definition, occurrence and distribution, Darcy laws – transmissibility of aquifers

COURSE OUTCOME:
At the end of the course, the student can:
CO1. Understand the interaction among various processes in the hydrologic cycle.
CO2. Estimate Evapotranspiration and infiltration.
CO3. Compute Rainfall runoff using Hydrograph, SCNS-CN and S-curve methods.
CO4. Study types and classes of hydrologic simulation models and design procedures for safe and effective passage of flood.
CO5. Understand the basic aquifer parameters and estimate groundwater resources for different hydro-geological boundary conditions.

TEXT BOOKS

REFERENCES

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Objective: The course objective is to understand the need for prestressed concrete structures and to understand pre-tensioning, post-tensioning, full and partial prestressing concepts. 

Course Pre/Co- requisite (if any) : CE312 (Design of Reinforced Concrete Structures)

Detailed Syllabus

Unit 1: Materials, Basic Principles of Pre-Stressing, Prestressing Systems: 4 L
Basic concepts of prestressing, High strength concrete and steel, Stress-strain characteristics and properties, Various prestressing systems, Pre-tensioning and Post-tensioning systems with anchorages, Advantages and limitations of prestressed concrete

Unit 2: Analysis of Sections for Flexure 6 L
Basic assumptions, Analysis of stresses in concrete due to pre-stress and loads for different types of cross section, Pressure line or thrust line, Cable profile, Concept of load balancing, Cracking moment

Unit 3: Losses of Pre-Stress & Deflections: 8 L
Nature of losses in pre-stress, various losses encountered in pre-tensioning and post tensioning methods, Deflection, Factors influencing deflection, Elastic deflection under transfer loads and due to different cable profile. Deflections limits as per IS-1343. Effects of creep on deflection, crack widths

Unit-4: Flexural and Shear Strength of Prestressed Concrete Sections 4 L
Types of flexural failure, IS code recommendations for flexure, Ultimate flexural strength of section. Shear and principal stresses, Ultimate shear resistance of prestressed concrete members, Shear reinforcement

Unit- 5: Transfer of Prestress in Pre tensioned Members and Anchorage Zone Stresses in Post Tensioned Members 4 L

COURSE OUTCOME:
At the end of the course, the student can:
CO1. Understand the prestressed concrete, prestressing concrete principles in addition to the difference of traditional concrete and pre stressed concrete.
CO2. Analyze a Pre-stressed Concrete section
CO3. Design and construct reinforced earth retaining structures.
CO4. Design pre-tensioned and post tensioned beams for flexure and shear

TEXT BOOKS

REFERENCES
1. Pre stressed concrete by N.RajaGopalan, Nerosa Publishing house
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

Subject Code: CE449
Subject Title: ENVIRONMENTAL MANAGEMENT & SUSTAINABLE DEVELOPMENT
Semester - VIII

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Course Objective: The objective of this course is to learn the knowledge of Environmental monitoring, environmental economics, making of and enforcing Environmental acts for the benefits of society and also about the realistic balance between environmental quality and resource utilizations.

Course Pre/Co- requisite (if any): CE342 (Environmental Risk Assessment and Disaster Management)

Detailed Syllabus

Unit 1: Introduction
Introduction: Introduction and scope, Inter-linkages of energy-environment and economy from engineering infrastructure perspective.

Unit 2: Environmental Resources, Monitoring and Management
Environmental Resources, Monitoring and Management: Concepts of environmental components and ecology, Systems approach and sustainability engineering, Interaction between energy and environmental resources, Environmental quality standards and indices (Indian and International), Environmental monitoring, Analysis, Statistics and data interpretation, Environmental management system.

Unit 3: Environmental Laws and Policy
Environmental Laws and Policy: Introduction to environmental laws and policies, Governance, understanding climate change, carbon crediting, carbon foot print etc., Introduction to trade and environment. International environmental laws, Right to Environment as Human Right, International Humanitarian Law and Environment, environment and conflicts management, Famous international protocols like Kyoto.

Unit 4: Environmental Impact Assessment

Unit 5: Sustainable Development
Sustainable Development: Sustainable development within the context of global economy, Technology and climate change, conservations of environmental resources.

COURSE OUTCOME:
At the end of the course, the student can:
CO1. Identify the environmental components, interactions, scientific utilization of environmental resources
CO2. Have the complete knowledge about the Environment economics, legislations acts, Environment Protocols
CO3. Gain the idea about Environmental Impact Assessment
CO4. Gain the idea about Environmental sustainable development

TEXT BOOKS

REFERENCES

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Objective: To understand theoretical concepts of water and sediment movements in rivers. To understand the concepts of fluvial hydraulics. To introduce the flow characteristics in an alluvial channel with erodible boundary. To have knowledge of various river training works

Course Pre/Co- requisite (if any) : CE349 (Water Resource Engineering)

Detailed Syllabus

Unit 1: River Functions
Introduction, Primary function of a river, River uses and measures, Rivers in India, Himalaya and Peninsular, Types and stages of rivers

Unit 2: Sediment transport & Incipient motion

Unit 3 River Mechanics
Meandering of Rivers, Braided rivers, Degradation and aggradations of river bed, Local Scour at Bridge Piers and other Hydraulic Structures

Unit-4 River Measurements & Models :
Measurements in Rivers (Stage measurements, Channel geometry, Discharge, Sediment samplers and suspended and bed load measurement).Physical river Models (fixed and movable bed models; sectional models, distorted Models).

Unit- 5: River Protection Works
River Protection and Training Works (Revetments, Dikes, Gabions, Spurs, Bank Protective measures and Bed control structures), Design of river training and flood protection structures, River restoration.

COURSE OUTCOME:
At the end of the course, the student can :
CO1. Understand the complex behavior of rivers.

CO2. Gain the skills to take up research activities in river engineering.

CO3. Analyze and design movable boundaries channel.


CO5. Design river training structures.

TEXT BOOKS
4 Garde RJ, "River Morphology", New Age Publisher, Revised IInd Edition 2011.

REFERENCES
2 Janson PL.Ph., Lyan Bendegam,Jvanden Berg, Mdevries A. Zanen ( Editors), Principles of River Engineering – The non tidal alluvial rivers – Pitman, 1979
Course Structure& Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

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

**Course Objective:** The course is designed to have knowledge about Hydropower potential of India, understand power requirements, load patterns, firm power and secondary power, types of power plants and its principal component works.

**Course Pre/Co- requisite (if any) :** CE349 (Water Resource Engineering)

**Detailed Syllabus**

**Unit 1: Introduction**
Prospects of hydropower, Sources of energy, Hydropower potential, Distribution and development. Basin wise development of hydropower, Constraints in hydropower development

**Unit 2: Stream Flow Data and Hydropower Potential**
Flow and Power duration curves, Estimation of flow duration curve on un gauged site, Primary and secondary power, Storage and pondage, Load factor, Capacity factor, Utilization factor, Plant Factor Pondage Factor.

**Unit 3 Types of Hydropower Plants**
Classification of hydropower plants, Base and peak load hydropower plants, Detail Study of Run-of- river plants Storage power plant and Pumped-storage power plants.

**Unit 4 Intake Structures and Conveyance System :**
Functions of intake structures, Its locations and types, Trash rack dimensions, Design, Spacing of bars, Methods of cleaning.
Penstocks types, Design and layout, Economical diameter of penstock, Hydraulic losses, Branches, Water Hammer Pressure and Surges in Power Channel and surge tank design.

**Unit- 5: Small Hydro Power Plant Development**
Benefits and potential of small hydropower plants, Components of small hydropower plants, Trench weir, Desilting tank and turbines

**COURSE OUTCOME:**
At the end of the course, the student can :
CO1. Compare various sources of energy for power development and have knowledge about the distribution of hydropower potential in India.
CO3. Have information about various types of hydropower plants and Power development schemes.
CO4. Design Water conductor system namely Penstock, Trash rack, Surge tanks etc,
CO5. Apply knowledge in the field of Small Hydro power development.

**TEXT BOOKS**

**REFERENCES**
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

<table>
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<tr>
<th>Subject Code</th>
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<td>CE453</td>
<td>PORT AND HARBOUR ENGINEERING</td>
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</table>

**Course Objective:** The objectives of this course is to make students aware about latest mode of transportation, development of this mode in India and to enable students to learn the concepts of harbor planning.

**Course Pre/Co-requisite (if any):** CE302 (Transportation Engineering II)

**Detailed Syllabus**

**Unit 1: National Waterways**

Inland water transportation in India, classification of waterways, economics of inland waterways transportation, national waterways

**Unit 2: Harbour Planning:**

Types of water transportation, water transportation in India, requirements of ports and harbours, classification of harbours, selection of site and planning of harbours, location of harbour, traffic estimation, master plan, ship characteristics, harbour design, turning basin, harbour entrances,

**Unit 3: Docks and Repair Facilities:**

Type of docks, its location and number, Site investigations – hydrographic survey, topographic survey, soil investigations, current observations, tidal observations, Design and construction of breakwaters, berthing structures - jetties, fenders, piers, wharves, dolphins, trestle, moles, Harbour docks, use of wet docks, design of wet docks, repair docks, lift docks, dry docks, keel and bilge blocking, construction of dry docks, gates for dry docks

**Unit 4 Port facilities:**

Port development, port planning, port building facilities, transit sheds, warehouses, cargo handling facilities, container handling terminal facilities, shipping terminals, inland port facilities. Inland waterways, Inland water transportation in India, classification of waterways, economics of inland waterways transportation, national waterways.

**Unit 5: Dredging and Coastal Protection:**

Classification, types of dredgers, choice of dredger, uses of dredged materials, coastal erosion and protection, sea wall, revetment, bulkhead, coastal zone and beach profile.

**COURSE OUTCOME:**

This course will help the students in learning of:

- CO1. Working of rapidly growing transport network,
- CO2. Designing of docks and harbors,
- CO4. Dredging and Coastal Protection

**TEXT BOOKS**


**REFERENCES**


Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

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Course Objective: The objectives of this course are to learn about the rock unit; thickness; lithology; and their contact relationships with other sediments or sedimentary rocks.

Course Pre/Co-requisite (if any): CE208 (Engineering Geology)

Detailed Syllabus

Unit 1: Physical Geology
Evolution of the earth; Exogenous and endogenous processes shaping the earth. Transportation and deposition; Geological work of running water, wind, glaciers, seas and ground water; Diastrophism; Earthquakes and volcanoes, Introduction to Plate Tectonics

Unit 2: Behavior of rock
Strength Behavior of Rocks, Stress and Strain in rocks. Concept of Rock deformation & Tectonics. Forms of igneous intrusions - dyke, sill and batholith. Effects of folds and fractures on strata/orebodies and their importance in exploration activities.

Unit 3 Structural Geology
Interpretation of topographic maps; Attitude of planar and linear structures; Effects of topography on outcrops. Unconformities, folds, faults and joints - their nomenclature, classification and recognition. Principles of stereographic projection.

Unit 4 Principles of Structural Analysis

List of Experiments

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Details of Experiments</th>
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<tbody>
<tr>
<td>1</td>
<td>Preparation of contour maps</td>
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<tr>
<td>2</td>
<td>Measurement of Dip and Strike</td>
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<td>3</td>
<td>Stereographic Projections of Plane</td>
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<td>4</td>
<td>Stereographic Projection of Line</td>
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<tr>
<td>5</td>
<td>Preparation of Structural Maps</td>
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<tr>
<td>6</td>
<td>Formation of Profile Section</td>
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<td>Three Point problem</td>
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</table>

COURSE OUTCOME:
At the end of the course, the student can:

CO1. Explain the origin and sources of the sediment and classify sediments and sedimentary rocks as well as geological structural features and their formation processes.

CO2. Understand the types of geological structural (joints, Faults, Folds), how it’s formed, how we can identify and describe them.

CO3. Measure and describe the outcrop and distribution of the rock unit; thickness; lithology; and their contact relationships with other sediments or sedimentary rocks.

CO4. Understand and describe the features formed in rocks when subject to stress, analyses the stain in these rocks and interpret the palaeostress field that affected the rock and caused the deformation.

Textbooks:
Structural geology- Fundamentals and modern Developments by S. K. Ghosh, Pregamon press Ltd UK 1993

References:
Structural Geology by Marland P Billings, Phi Learning, third edition, 2000

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

<table>
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<th>Subject Code</th>
<th>Subject Title</th>
<th>STATISTICAL APPROACH TO ENVIRONMENTAL DATA ANALYSIS</th>
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**Course Objective:** The objective of the course to know about the basics of statistical analysis of environmental datasets and apply this knowledge for numerical modeling and forecasting of datasets.

**Course Pre/Co-require (if any):** CE342 (Environmental risk Assessment and Disaster Management)

**Detailed Syllabus**

**Unit 1: Introduction**

Introduction: Introduction to environment and various parameters, various data sources, concept of one and multidimensional datasets, concept of data matrices, temporal and spatial datasets. Various types of grids, Cartesian, spherical, cylindrical, coordinate systems.

**Unit 2: Basics of data formats and plotting**

Basics of data formats and plotting: Introduction to various formats of datasets, Comma Separated Values, ASCII, NetCDF format, text values, plotting of time series, scatter plot, contouring, concept of shaded contouring.

**Unit 3: Regression analysis of environmental datasets**

Regression analysis of environmental datasets: Regression analysis, predictor-predictand relationship, residual error, confidence intervals, t score test, null hypothesis, degrees of freedom

**Unit 4: Analysis of long term datasets and identification of prominent features**

Analysis of long term datasets and identification of prominent features: Eigenvalues and Eigen function, Singular value decomposition, Root mean square error, Correlation, Standard deviation, variance, skill score analysis, index calculation.

**Unit 5: Data smoothing and interpolation**

Data smoothing and interpolation: Simple linear interpolation, error analysis, gridding concepts, objective analysis, Barnes and Cressman methods, concept of moving average.

**SR NO.** | **LIST OF PRACTICAL / ASSIGNMENTS**
---|---
1 | Introduction to MATLAB, basic application of MATLAB,
2 | representation of 1D, and multi-dimensional datasets,
3 | creating arrays, writing script file, executing script file
4 | Matrices and vectors, matrix and array operations
5 | Character strings, command line functions
6 | Plotting and formatting of multidimensional datasets
7 | Eigenvalues, Eigen vectors, Singular Value Decomposition
8 | Regression analysis, all statistical operations
9 | Objective analysis, gridding from scattered datasets
10 | Interpolation and moving average concepts

**COURSE OUTCOME:**

At the end of the course, the student can:

CO1. Identify the various types of environmental data, and data dimensions.
CO2. Have the complete knowledge statistical approaches to Environmental datasets
CO3. Gain the idea about data smoothing and interpolation
CO4. Gain the idea about data gridding

**TEXT BOOKS**


**REFERENCES**

Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Title</th>
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Course Objective:
The objective of this course is to make student capable of designing different parts of building structure

Course Pre/Co-requisite (if any): CE303 (Design of Reinforced concrete Elements)

Detailed Syllabus

Unit 1: Analysis of Structural Element
Elastic analysis of R.C. beams and frames. Analysis and design of flat slabs; equivalent frame method, direct design method, deflection calculations.

Unit 2: Analysis of beam
Analysis and design of deep beams. Design of grid floors and cylindrical shells.

Unit 3: Analysis of Shear wall
Analysis and Design of shear walls

Unit-4: Design of building
Design of industrial buildings, bracing, gantry girders and stepped columns.

Unit- 5: Design of Tower
Microwave towers, Chimney and transmission towers. Plastic design principle, High rise building

COURSE OUTCOME:
CO1: Student will be able to design the structural elements
CO2: Student will be able to do analysis of building
CO3: Student will be able to do analysis and design of shear wall
CO4: Student will be able to do analysis and design of Tower

TEXT BOOKS

REFERENCES

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

<table>
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<th>Subject Code</th>
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Course Objective: This course aims to understand the basics of Finite Element Method and its application related to engineering problems.

Course Pre/Co-requisite (if any): CE206 (Structural Analysis)

Detailed Syllabus

Unit 1: Introduction
Basic concepts, Background review, Theory of elasticity, matrix displacement formulation, energy concepts, equilibrium and energy methods of analyzing structure, Rayleigh- Ritz method, Galerkin’s method, simple application in structural analysis

Unit 2: Fundamentals of Finite element Method
Displacement function and natural coordinate’s construction of displacement function for 2D truss and beam element, application for FEM for the analysis of truss, continuous beam and simple frame problems.

Unit 3: Analysis of 2D continuum Problems
Element and shape function, Triangular, rectangular and quadrilateral element, different type of element, their characteristics and suitability for application, polynomial shape function, Lagrange’s and Hermitian polynomial, compatibility and convergence requirements of shape functions.

Unit 4: Theory of Isoparametric Element
Isoparametric, sub-parametric and super-parametric elements, characteristics of isoparametric quadrilateral elements.

Unit 5: Introduction to plate bending problems and techniques
Introduction to plate bending problems and techniques for nonlinear analysis, Structure of computer program for FEM analysis, description of different modules, pre and post processing.

COURSE OUTCOME:
At the end of this course student will:
CO1: have understanding of finite element method.
CO2: know the applicability of FEM in various problems.
CO3: know the working of analysis software.
CO4: know the concepts of plate bending problems and techniques

TEXT BOOKS

REFERENCES

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Objective

- To promote an integral and holistic growth of young minds
- Develop a broad understanding of Indian society and intercultural literacy through cultural immersion.
- Deepen your knowledge of Indian development, environmental, and cultural issues through coursework, local engagement, and independent projects.

Unit 1 Indian Culture: An Introduction

Characteristics of Indian culture, Significance of Geography on Indian Culture; Society in India through ages-Ancient period- Varna and Caste, family and marriage in India, position of women in ancient India, Contemporary period; caste system and communalism.

Unit 2 Indian Languages and Literature


Unit 3 Brief History of Indian Arts and Architecture


Unit 4 Spread of Indian Culture Abroad

Causes, Significance and Modes of Cultural Exchange - Through Traders, Teachers, Emissaries, Missionaries and Gypsies, Indian Culture in South East Asia India, Central Asia and Western World through ages

COURSE OUTCOME:

- Understand background of our religion, customs institutions, administration and so on.
- Understand the present existing social, political, religious and economic conditions of the people.
- Analyze relationship between the past and the present relevance of Indian tradition.
- Develop practical skills helpful in the study and understanding of historical events.

TEXT BOOKS

5. Christie, J.W., 1995, State formation In early Maritime Southeast Asia, BTLV
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

Humanities Electives II

<table>
<thead>
<tr>
<th>Subject Code</th>
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Course Objective
- Develop an understanding of Indian philosophical systems
- To empower for self-exploration

Unit 1 Introduction
Meaning of Philosophy, Origin of Philosophy in India, Major Indian philosophical systems: Sankhya: Metaphysics, Theory of causation, Prakrite, Purusha, Evolution, Yoga: Concept of Chitta, Types and Modification of Chitta, Eight-fold Yoga & Vedant: Notions of Maya & Brahma

Unit 2 Major Principles
Panchkosha, Triguna, Tridosh, Macrocosm-Microcosm

Unit 3 Major Contemporary Indian Philosophers

Unit 4 Activities & Projects
Identifying human prakriti, Using Trigun inventory, Understanding self

COURSE OUTCOME:
- Students will acquire understanding of concepts of Indian philosophy.
- Students will be enabled to analyze their self.
- The students will be able to relate some of the core concepts and theories of modern Indian philosophy to concepts and ideas in classical Indian philosophy.
- The students will be able to appreciate how philosophical approaches may be integrated more practically as a “way of life”.

TEXT BOOK

REFERENCE BOOKS
- The Yoga Sutras of Patanjali: (annoted commentary) (Divine Cool Breeze Realized Writers Book 15) by Shri Patanjali, Shri Mataji Nirmala Devi (Introduction), Charles Johson (Translation)
Course Structure & Syllabus of B.Tech – Civil Engineering

Applicable for Batch: 2018-2022

Humanities Electives II

<table>
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<tr>
<th>Subject Code</th>
<th>HS491</th>
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Course Objective
- The course attempts to analyze the structure and process of industrial organizations from the sociological perspective.
- The course enables students to have a general view of modern industry.

Unit 1
7Hrs.

Unit 2
7Hrs.
Industrial Disputes: Concept, Features and Kinds of disputes, Settling disputes, Mediation, Arbitration, Conciliation, Negotiation, The Indian Worker: Features of Indian worker, the contribution of social - Philosophy, family, caste and community in determining the attitude of workers

Unit 3
6Hrs.
Trade Union: Concept, Features, Functions and Types, History of Trade Union Movement in India Trade Unions and Challenges of Privatization and Globalization; Law and work, Decline of Trade Unions.

Unit 4
6Hrs.
Dynamics of Industrial Relations: Corporate Social Responsibility, Inclusion of Women in the Corporate Sector, Scope of Industrial Sociology in India; Impact on Employment, Impact on HRD, impact on wages and benefits, Modern Industry in India

COURSE OUTCOME:
- It will enable students to demonstrate the different human components that make up modern industry.
- The student will get exposed to a specialized area of sociology and its insights.
- Apply sociological concepts and theories to understand contemporary social issues and/or public debates about these issues
- Communicate sociological concepts and/or research in a manner that is appropriate for the intended audience (e.g., academic, lay audience)

TEXT BOOKS
4. Pascal Gilbert: Fundamental of Industrial Sociology; Orient-Longman.
5. E.V.Schneider – Industrial sociology

REFERENCE BOOKS
- Sheth, N R, 1979, Industrial Sociology in India, Jaipur Rawat.
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

Humanities Electives II

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Course Objective

- To provide the overview of sustainable and its needs to the students.
- To provide the importance and components of sustainable development to the students.
- To provide the association of social and economic development to the students.

Unit 1 Overview of Sustainable Development

History and emergence of the concept of Sustainable Development, Components of SD i.e. Economic, Social, Human, Institutional, Technological and Environmental development; Definitions, Sustainability in Ecosystem Services; natural resource degradation, greenhouse gases, factors affecting SD (i.e. Industrialization, urbanization, population growth, globalization, etc.)

Unit 2 Policies on Sustainable Development at International level

Government Policies for SD in India; Socio-economic policies for sustainable development in India, Sustainable development through trade, Carrying Capacity, global policies for sustainable development

Unit 3 Sustainable Development and International Contribution

SDGs and MDGs, Complexity of growth and equity, International Summits, Conventions, Agreements, Initiations of international organizations like WHO, UNDP, WTO, FAO and World Bank towards sustainable development

Unit 4 Measurement of Sustainable Development

Role of developed and developing countries in the sustainable development, Demographic dynamics and sustainability, integrated approach for resource protection and management; Index based estimation of SD i.e. Environmental Sustainable Development Index and sustainable development, and other index

Course Outcome:

- The students will be able to understand the importance of natural resource in economic development.
- The students contribute significant efforts towards sustainable development
- Develop a future-oriented perspective that highlights the significance of their decisions, choices and actions on the quality of life of present and future generations.
- Understand and are empowered to address the real causes and consequences of unsustainable behaviour within the context of an interdependent and globalised world.

TEXT BOOK


REFERENCE BOOKS

Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

<table>
<thead>
<tr>
<th>Subject Code</th>
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**Unit 1**
**Introduction:** Importance of user Interface–definition, importance of good design. Benefits of good design. A brief history of Screen design. The graphical user interface –popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user –Interface popularity, characteristics- Principles of user interface.

**Unit 2**
**Design process**–Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions.

**Unit 3**
**Screen Designing:** Design goals–Screen planning and purpose, organizing screen elements, ordering of screen data and content –screen navigation and flow ,Visually pleasing composition -amount of information -focus and emphasis ,presentation of information simply and meaningfully information retrieval on web - statistical graphics –Technological consideration in interface design.

**Unit 4**
**Windows** –New and Navigation schemes selection of window, selection of devices based and screen based controls.

**Components** – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.

**Unit 5**


**TEXT BOOKS:**

**REFERENCE:**
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

<table>
<thead>
<tr>
<th>Subject Code</th>
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Course Outline: To provide a detailed idea how the internet is connecting the entire world and helps to live a smart life with its technology.

Course Objective:

1. Vision and Introduction to IoT.
2. Understand IoT Market perspective.
5. Real World Design Constraints, Industrial Automation and Commercial Building Automation in IoT.

Course Pre/Co-requisite (if any): Wireless Sensor Networks

Detailed Syllabus

UNIT 1: M2M to IoT( 05 Lectures )
The Vision-Introduction, From M2M to IoT, M2M towards IoT-the global context, use case example, Differing Characteristics.

UNIT 2: M2M to IoT (A Market Perspective)( 10 Lectures )
IOT related open source software tools introduction; tools like IoTivity, IBM Blue Mix. Introduction to Contiki, Cooja, Raspberry Pi etc.

UNIT 3: M2M and IoT Technology Fundamentals( 05 Lectures )
Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service (XaaS), M2M and IoT Analytics, Knowledge Management.

UNIT 4: IoT Architecture-State of the Art( 12 Lectures )

UNIT 5: Industrial Automation( 08 Lectures )

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Learning Outcome

- Explain the definition and usage of the term 'The Internet of Things' in different contexts
- Understand where the IoT concept fits within the broader ICT industry and possible future trends
- Able to build and test a complete working IoT system

Pursue lifelong learning for professional advancement.

Text book [TB]:


Reference books [RB]:

Course Structure & Syllabus of B.Tech – Civil Engineering Applicable for Batch: 2018-2022

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Course Objective:
1. Understand the fundamentals of wireless networks.
2. Understand and evaluate emerging wireless technologies and standards
3. To explore mobile security issues
4. To explore the mobility concept.

Detailed Syllabus

UNIT 1

Introduction: Mobile computing with functions & devices, Networks, Middleware & gateways, Application & services, Developing mobile computing applications, Security & standards why it necessary, Architecture for mobile computing. (3 L)

UNIT 2

Emerging Technologies: Bluetooth, Rfid, WiMAX, Mobile IP, IPv6, GSM architecture, Call routing in GSM, Mobile computing over SMS, Value added service through SMS, GPRS architecture & operations, 3G & applications (10 L)

UNIT 3

Wireless Transmission:
Signal propagation- path loss of radio signals, additional signal propagation effects, Multipath propagation, Multiplexing- Space division, frequency division, time division, code division, Modulation- ASK, FSK, PSK, AFSK, APSK, Multi-carrier modulation Spread spectrum- Direct sequence & frequency hopping Mac- Hidden & exposed terminals, near- far terminal, SDMA, TDMA, FDMA, Fixed TDM, CSMA, PRMA, Multiple access with collision avoidance (12 L)

UNIT 4

Wireless LAN: IEEE 802.11 in details, HIPERLAN, Link manager protocol, L2CAP, security, SDP. (5 L)

UNIT 5

Mobility & Security in mobile computing: HTTP, Wireless application protocol- architecture, wireless datagram protocol, wireless transport layer security, wireless transaction & session protocol, WML, Push architecture, push/ pull services, i-mode & SyncML Information security, Security techniques & algorithms, public key infrastructure, (10 L)

Learning Outcome

At the end of the course, Learning Outcomes Having successfully completed this course, the student will demonstrate:
1: Apply the fundamental design paradigms and technologies to mobile computing applications.
2: Develop consumer and enterprise mobile applications using representative mobile devices and platforms using modern development methodologies.
3: Appraise the quality and performance of mobile applications.
4: Assess and implement security principles in mobile applications.
5: Evaluate wireless network topologies, wireless connectivity and characteristics, and the impact of wireless networks on security and Internet communications.
6: Select appropriate wireless technologies in commercial and enterprise applications.

Text book [TB]:

Reference books [RB]:
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

<table>
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<th>Subject Code</th>
<th>Subject Title</th>
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Objectives of the Course:
- To understand the concept of Computer Communication.
- To learn the basics of Data communication and Networks
- To develop and design the protocol systems for advance computer communication.

UNIT I: Introduction to Communication:
Communication system, Analog and Digital Communication, channel bandwidth. Ideal and Practical Filters, Concept of Signal Distortion over a Communication Channel, Energy Signal and Power Signal, Introduction to noise in Communication systems.

UNIT II: Introduction to Modulation techniques:
Concept of Amplitude Modulation, Concept of Frequency & Phase Modulation, Concept of ASK, FSK & PSK, Concepts of PCM.

UNIT III: Introduction to Data Communication Network & OSI Model:
Switching systems, network hardware and software, Layering, design issues for layering, reference models and their comparison, example of networks. Concepts of OSI model.

UNIT IV: Introduction to Data Communication Protocols and transmission media

Text Books:

Reference Books:

List of Experiments:
1. To generate amplitude modulated wave and determine the percentage modulation and Demodulate the modulated wave using envelope detector.
2. To generate AM-Double Side Band Suppressed Carrier (DSB-SC) signal.
3. To generate the SSB modulated and Demodulated wave.
4. To generate frequency modulated signal and determine the modulation index and bandwidth for various values of amplitude and frequency of modulating signal and to demodulate a FM signal
5. To study ASK modulation and Demodulation.
6. To study FSK modulation and Demodulation.
7. To study PSK modulation and Demodulation.
8. To Study TDM/PCM Transmitter /Receiver.

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
OUTCOMES OF THE COURSE:
The course provides an understanding of:

- Computer Communication and networks.
- Protocol design and their design issues.
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

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<th>Subject Code</th>
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Objectives of the Course: The students will learn
- Requirement of bio-medical and its application
- Concept of bio-potential electrodes and measurements related to them.
- Concepts of bio-transducers and measurements related to them.
- Concept of bio-medical instruments and their uses experimentally.

UNIT I: ANATOMY AND PHYSIOLOGY:
Basic Cell Functions, Origin of Bio-potentials, Electrical Activity of Cells, components of man Instrument system, types of bio-medical stems, design factors and limitations of biomedical instruments, terms and transducers to various physiological events. 8L

UNIT II: BIO-POTENTIAL ELECTRODE:
Types of bio-potential electrodes., Electrode-Electrolyte interface, half cell potential, Polarization- polarisable and non-polarisable electrodes, Ag/AgCl electrodes, Electrode circuit model; Electrode and Skin interface and motion artifact. Body surface recording electrodes for ECG. Electrodes standards. 8L

UNIT III: BIO-TRANSDECER:
Transduction Principles: Resistive Transducers Strain Gauge- types, construction, selection materials, Gauge factor, Bridge circuit, Temperature compensation. Strain Gauge type Blood pressure transducers. Inductive Transducers, Capacitive Transducer, Piezoelectric Transducer. 8

UNIT IV: BIOTELEMETRY AND ELECTRICAL SAFETY:
Bio-telemetry design, single channel bio telemetry transmitter and receiver system based on AM, FM and, pulse modulation. Significance of Electrical Danger, physiological effect of current, ground shock Hazards. 8L

Text Books:

Reference Books:
1. J.G. Webster, ‘Medical instrumentation application and design’, Houghton Mifflin Co., Boston USA.

OUTCOMES OF THE COURSE:
The course provides an understanding of:
- Bio-medical instruments and measurements.
- Principle of working of bio-medical transducers.
- Skills to use modern bio-medical tools and equipment for measurements related to human body.

LIST OF EXPERIMENTS
2. Pulse measurement
3. Heartbeat measurement

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Structure & Syllabus of B.Tech – Civil Engineering  
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4. Automatic BP measurement
5. Heart sound study using electronics stethoscope
6. ECG measurement

Following experiments to be done on the breadboard
7. Design of low noise and low frequency amplifier for biomedical application
8. Design of Instrumentation amplifier
9. Construction of chopper amplifier

Two Value Added Experiments to be added by Instructor.
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

<table>
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<th>Subject Code</th>
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Objectives of the Course

- To make students understand the construction, working principle and application of various transducers used for flow measurement, strain measurement, pressure and vacuum measurement,
- Force, torque and power measurement
- To develop an understanding about the different types of telemetry systems used and types of instruments required for display and recording of the data to be transmitted
- Understand about components, characteristics of various control processes used and their modes of operation.

Unit 1
Transducer – I: Definition, advantages of electrical transducers, classification, characteristics, factors affecting the choice of transducers, Potentiometers, Strain gauges, Resistance thermometer, Thermistors, Thermocouples, LVDT, RVDT

Unit 2

Telemetry: General telemetry system, land line & radio frequency telemetering system, transmission channels and media, receiver & transmitter. Data Acquisition System: Analog data acquisition system, Digital data acquisition system, Modern digital data acquisition system.

Display Devices and Recorders: Display devices, storage oscilloscope, spectrum analyser, strip chart & x-y recorders, magnetic tape & digital tape recorders.

Unit 5
Process Control: Principle, elements of process control system, process characteristics, proportional (P), integral (I), Derivative (D), PI, PD and PID control modes. Electronic, Pneumatic & digital controllers.

Text Books:

Reference Books
3.RajendraPrasad,”Electronic Measurement and Instrumentation Khanna Publisher

Outcome of the Course:

- Identify the appropriate instruments for measurement of different quantities.
- Ability to analyze, formulate and select suitable sensor for the given industrial applications
- Ability to analyze various control processes used and their modes of operation.
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

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<th>Subject Code</th>
<th>Subject Title</th>
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Course Objective: This course provides an overview on principles of ergonomics and human factors, their applications to the design and management of industrial systems, Engineering anthropometry, Human performance, human-technology interaction, work place and work station design and concept of value engineering. To address the underlying concepts, methods and application of Value Engineering

Course Pre/Co-requisite (if any):
Detailed Syllabus

UNIT 1: Introduction of Ergonomics
Background of ergonomics, historical evolution of ergonomics, definition of ergonomics, aspect of ergonomics, man machine interaction, and man machine closed loop system, man machine system (MMS)

Work physiology
Muscle structure, metabolisms, circulatory and respiratory systems, energy expenditure and workload

UNIT 2: work related MSDs risk and work postures assessment
Introduction, assessment of work postures using RULA Methods, work posture assessment using rapid entire body assessment tool (REBA)

Office Ergonomics-
Introductions, Issues in workstation design, seat design, engineering anthopometry and work design, A case study: an investigation on passenger seat design in sleeper class coaches in Indian trains.

UNIT 3: Physical stress- Introduction, vibration, occupational noise exposure, sound, source of noise and vibration, basic theory of noise measurement, Noise measuring meters, basic sound level meters, noise control, permissible limits of exposure with respect to occupational noise.

UNIT 4: Value Engineering Introduction: Definition, value engineering recommendations, programs, advantages, Evaluation of function, determining function, classifying function, evaluation of costs, evaluation of worth, determining worth, and evaluation of value.
Value Engineering Job Plan: Introduction, orientation, information phase, Function phase, creation phase, evaluation phase, Investigation phase, implementation phase, speculation phase, analysis phase.

Initiating Value Engineering Program: Introduction, training plan, career development for Value Engineering specialties.
Fast Diagramming: Cost models, life cycle costs.
Value Engineering level of Effort: Value Engineering team, Co-ordinator, designer, different services, definitions, construction management contracts, value engineering case studies

Learning Outcome

At the end of the course the student can:
CO1: Specify and design ergonomically appropriate industrial workstations for the industrial and office work environment.
CO2: Identify information-centered human factors relating to visual, illumination, controls, displays and symbols.
Course Structure& Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

CO3: Compare, contrast and assess human body-centered ergonomic designs for posture, material handling, repetitive motion factors, heat stress, noise and vibration.
CO4: Define the ergonomic factors intrinsic in evaluating accidents, human errors and safety related incidents.
CO5: Student will understand the concepts, methods and application of Value Engineering

Text book [TB]:

Reference books [RB]:

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Objective: This course aims at introducing the students to the basic concepts of engineering design and product development with focus on the front end processes. At the end of this course the student is expected to demonstrate an understanding of the overview of all the product development processes and knowledge of concept generation and selection tools.

Course Pre/Co- requisite (if any): Manufacturing Process, Industrial Engineering and Management

Detailed Syllabus

UNIT 1:
Significance of product design, Need for developing products, product design and development process, the importance of engineering design, sequential engineering design method, relevance of product lifecycle issues in design, the challenges of product development.

Product Planning and Project Selection: generic product development process, Identifying opportunities, evaluate and prioritize projects, allocation of resources, various phases of product development-planning for products.

UNIT 2:
Identifying Customer Needs voice of customer, customer populations, Interpret raw data in terms of customers need, hierarchy of human needs, need gathering methods, establish the relative importance of needs.

Product Specifications: Establish target specifications, setting final specifications

Concept Generation: Activities of concept generation, clarifying problem, search both internally and externally, explore the output

UNIT 3:
Industrial Design: Assessing need for industrial design, industrial design process, management, assessing quality of industrial design, human factors design, user friendly design

Concept Selection: Overview, concept screening and concept scoring, methods of selection, case studies.

UNIT 4:
Theory of inventive problem solving (TRIZ): Fundamentals, methods and techniques, General Theory of Innovation and TRIZ, Value engineering Applications in Product development and design, Model based technology for generating innovative ideas measurement of customers response.

Concept Testing: Elements of testing: qualitative and quantitative methods including survey.

UNIT 5:
Intellectual Property: Elements and outline, patenting procedures, claim procedure.

Design for Environment: Impact, regulations from government, ISO system, case studies.

Learning Outcome

At the end of the course the student can:

CO1: Product Design and Innovation course is intended to introduce overall awareness of the product design process.

CO2: This course will give an understanding of methods, tools and techniques applied in product design.

CO3: This course includes overview of innovation, product design process, user study, need/problem identification, development of design brief, understanding competitive benchmarking, aspects of human factors in product design, tools for creative concept generation, and prototyping/model making and evaluation techniques for user-product interaction.

CO4: This course will be explained with lectures including case studies and hands-on exercises. This will help students to generate creative ideas in to product design, considering human factors aspects.

Text book [TB]:
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022


REFERENCES [RB]:
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

Course Objective: To provide students an overview of global energy resources with focus on renewable energy sources and their importance in the context of limited supply of conventional energy resources & global warming.

Course Pre/Co-requisite (if any): Basic Thermodynamics, Heat Transfer

Detailed Syllabus

UNIT 1: ENERGY RESOURCES
Introduction: Energy & its importance in social & economic development; energy demand & supply, world energy status, energy scenario in India; energy & environment, greenhouse effect & global warming; role of renewable energy sources; a brief introduction to various renewable energy sources – hydro, solar, biomass, wind, geothermal & ocean energy – their availability & present status.

UNIT 2: SOLAR ENERGY
The sun as a source of energy, extraterrestrial & terrestrial solar radiation; solar radiation data & geometry, solar radiation on horizontal & inclined surfaces; solar thermal systems – various types of solar collectors & their applications in cooking, drying, water heating, distillation, space heating & cooling, refrigeration and power generation.
Solar photovoltaic systems, solar cell fundamentals, performance & characteristics, types of solar cells; solar cell, module, and array construction; solar PV applications.

UNIT 3: BIOMASS ENERGY
Origin of biomass, photosynthesis & generation of biomass, availability of biomass, usable forms of biomass – fuel wood, charcoal, fuel pellets, biodiesel, bioethanol, biogas and producer gas; biomass conversion technologies, thermochemical & biochemical methods, biomass gasification, classification & operational parameters of biogas plants, energy recovery from urban waste, sewage to energy conversion.

UNIT 4: WIND ENERGY
Origin & nature of winds; history of power from winds; global & local winds; estimation of wind energy at a site; maximum power extraction from wind – Betz criterion; capacity factor of wind power plants; types of wind turbines – horizontal and vertical axis wind turbines; wind energy storage; environmental & economic aspects; present status of wind energy systems.

UNIT 5: GEOTHERMAL & OCEAN ENERGY
Structure of earth’s interior; origin & distribution of geothermal energy, types of geothermal resources – exploration & development of hydrothermal, geo-pressured & hot dry rock resources; electrical power generation from geothermal energy; environmental & economic considerations.
Ocean energy; tidal, wave & ocean thermal energy, energy from tidal streams (marine currents); technology for harnessing tidal & wave energy; ocean thermal energy conversion technology.

Learning Outcome

At the end of the course the student will:
CO1: Understand about the interaction between energy, economy, environment, and social development.
CO2: Appreciate the importance of renewable energy sources & future energy systems based on them.
CO3: Possess the basic technical knowledge to develop energy systems based on solar, biomass, wind, geothermal & ocean energy.

Text book [TB]:
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022


References [RB]:

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

<table>
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<th>Subject Code</th>
<th>PE491</th>
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1. Course Summary
The course provides information about the students to learn the basic concept and Applications of Carbon capture and storage process. In this course, students will learn about carbon capture techniques and the concept of the contribution of fossil fuel to climate change. During this course students will examine the CO2 emission and Carbon dioxide recycling.

2. Course Objectives
The students should be able to:

   1. The objective of this course is make students familiar with the principles and applications of carbon capture and storage capture techniques and role of CCS.

3. Course Outcomes

   1. To acquaint the students substantially to the objectives and necessity of Carbon Sequestration and capture.
   2. To introduce the contribution of fossil fuel to climate change.
   3. To understand the concept of emission and recycling of CO2.
   4. To introduce the candidates to the concept of underground storage and other Carbon Capture and sequestration concepts.
   5. To understand the implementation of CCS technology and IPCC.

4. Curriculum Content

UNIT 1
Introduction: Scope, Objectives and Necessity of CCS.

UNIT 2
The contribution of fossil fuels emission to Climate change and global warming. Concept of Carbon Credit and carbon footprint.

UNIT 3
Carbon capture techniques: Carbon-di-oxide emission, Scrubbing of CO2, Carbon dioxide recycling.

UNIT 4
Carbon dioxide sequestration: Underground storage, Potential for Geologic Storage, Application in Oil and gas industry, Carbon dioxide flooding projects, Methane recovery projects.

UNIT 5
Strategy for implementing CCS technology: Modelling of Cost and Performance of CCS Plants. Role and function of IPCC.

Text book [TB]:

   1. Carbon Capture; Jennifer Wilcox; Springer
   2. Capturing Carbon – The new weapon in the War Against Climate Change; Mills, Robin M.; Columbia University Press

Reference books [RB]:

   1. Piping and pipeline engineering, George A. Antaki, Marcel Dekker Inc. New York.
   2. Fundamentals of pipeline engineering by J. Vincent Genod, Technip Editions

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
5. Teaching and Learning Strategy
All materials (ppts, assignments, labs, etc.) will be uploaded in Moodle. Refer to your course in Moodle for details.


Unit 3: Introduction to Transportation problems, various methods of Transportation problem, Variations in Transportation problem, introduction to Assignment problems, variations in Assignment problems. Sequential optimization, Representation of multistage decision process; Types of multi stage decision problems; Concept of sub optimization and the principle of optimality.

Unit 4: Optimization techniques, Memetic algorithm, Differential evolution, Evolutionary algorithms, Dynamic relaxation, Genetic algorithms, Hill climbing with random restart, Genetic Algorithm (GA), Artificial Bee Colony (ABC), Particle Swarm Optimization (PSO), Firefly algorithm, Fish School Search, Fly algorithm, Ant colony optimization algorithms

References:

Course Objective:
To create an overview and understanding of various art forms that exists from ancient to modern times.

Unit 1: INTRODUCTION
Understanding various art forms in society and in different cultures.

Unit 2: Sociological Perspective
Relationship between art, culture and society. Influence of art forms on people.

Unit 3: Appreciation-I: Painting/ Sculptures
Understanding and appreciating films/ documentaries from past to present times and between east and west.

Unit 4: Appreciation-II: Films/ Documentries
Understanding and appreciating painting and sculptures from past to present times and between east and west.

Unit 5: Appreciation-III: Indigenous/ Folk Art
Understanding and appreciating Indigenous/ Folk art from past to present times and between east and west.

LEARNING OUTCOME:
4. The student will be able to understand the various art forms.
5. The students will be able to understand and establish a relationship between art, culture and society.
6. The students will be able to appreciate the various art.

Text Books:
3. Creative Authenticity: 16 Principles to Clarify and Deepen Your Artistic Vision, Ian Roberts

Reference Books:
The Writer: A Concise Complete and Practical Text Book of Rhetoric. Designed to Aid in The Appreciation, George Lansing Raymond

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018
Course Structure & Syllabus of B.Tech – Civil Engineering
Applicable for Batch: 2018-2022

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<td>Nano scale science and technology</td>
<td>3 0 0</td>
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<td>DE/OE</td>
<td>4&lt;sup&gt;th&lt;/sup&gt;</td>
<td>VIII</td>
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Unit 1 (10L)
Introduction to nanotechnology, definition, history of nanotechnology, nanotechnology in relation to other branches of engineering, characteristic length scale of materials and their properties, classification of nano materials, dimensionality and size dependent phenomena, confinement in 0-D, 1-D, 2-D and 3-D, surface to volume ratio, fraction of surface atoms, surface energy.

Unit 2 (7L)
Nanomaterials synthesis techniques; top-down and bottom-up techniques, ball milling, PVD, CVD, self-assembly.

Unit 3 (8L)
Nanomaterials characterization; XRD, SEM, TEM, AFM, UV-VIS.

Unit 4 (8L)
Nanomaterials and their properties: carbon based nano materials, metal based nano materials, quantum dots, biological nano materials.

Unit 5 (7L)
Applications of nanotechnology in engineering, solar energy conversion, nanomedicine.

Text Books:
1. Poole, Jr. CP and Owens, FJ, “Introduction to Nanotechnology”, Wiley India. 2006.