## I Year - I Semester

<table>
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<th>Course code</th>
<th>Category</th>
<th>Course Title</th>
<th>Hours per week</th>
<th>Internal Marks</th>
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<td>CV1101</td>
<td>BS</td>
<td>Mathematics – I</td>
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Total Credits 19.5

## I Year - II Semester

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Total Credits 19.5
CV2109 SC Computer Aided Drafting 1 2 50 50 100 2
CV2110 MC Professional Ethics & Universal Human Values 0 0 0 100 100 0
CV2111 MC NCC/NSS 0 2 - - - 0

Total Credits 21.5

II Year - II Semester
CV2201 ES Water Supply Engineering 4 0 30 70 100 3
CV2202 BS/PCFluid Mechanics-II 4 0 30 70 100 3
CV2203 PC Hydrology and Water Resources Engineering 4 0 30 70 100 3
CV2204 PC Geotechnical Engineering-I 4 0 30 70 100 3
CV2205 PC Concrete Technology 4 0 30 70 100 3
CV2206 PC Geotechnical Engineering-I Lab 0 3 50 50 100 1.5
CV2207 PC Building Materials Lab 0 3 50 50 100 1.5
CV2208 SC Building Planning and Computer Aided Drawing 1 2 50 50 100 2
CV2209 MC Environmental Science 0 0 0 100 100 0

Total Credits 20

Internship - I

B.Tech I Year - I Semester
CV-1101 : MATHEMATICS-I

Course Objectives:
* To transmit the knowledge of Partial differentiation.
* To know of getting partial derivatives of functions of two variables and finding errors and approximations.
* To double and triple integrals, volumes of solids and area of curved surfaces.
* To expand a periodical function as Fourier series and half-range Fourier series.

Course Outcomes:
The students will be able to
* Evaluate maxima and minima of function of two variables.
* Evaluate maxima and minima, errors and approximations.
* Evaluate double and triple integrals, volumes of solids and area of curved surfaces.
* Expand a periodical function as Fourier series and half-range Fourier series.

* Have a fundamental understanding of Fourier series and be able to give Fourier expansions of a given function.

SYLLABUS

Partial Differentiation: Introduction - Functions of two or more variables
- Partial derivatives - Homogeneous functions – Euler’s theorem - Total derivative - Change of variables – Jacobins. Mean value Theorems (without proofs)

Applications of Partial Differentiation: Geometrical interpretation - Tangent plane and Normal to a surface - Taylor’s theorem for functions of two variables - Errors and approximations - Total differential. Maxima and Minima of functions of two variables - Lagrange’s method of undetermined multipliers - Differentiation under the integral - Leibnitz’s rule.


Text Books:

Reference Books:
CV-1102 : PHYSICS

Course Objectives:
* To impart knowledge in basic concept of physics of Thermodynamics relevant to engineering applications.
* To grasp the concepts of physics for electromagnetism and its application to engineering. Learn production of Ultrasonics and their applications in engineering.
* To Develop understanding of interference, diffraction and polarization: connect it to a few engineering applications.
* To Learn basics of lasers and optical fibers and their use in some applications.
* To Understand concepts and principles in quantum mechanics and Nanopahse Materials. Relate them to some applications.

Course Outcomes:
The students will be able to
* Understand the fundamentals of Thermodynamics and Laws of thermodynamics. Understand the working of Carnot cycle and concept of entropy.
* Gain Knowledge on the basic concepts of electric and magnetic fields. Understand the concept of the nature of magnetic materials. Gain knowledge on electromagnetic induction and its applications.
* Understand the Theory of Superposition of waves. Understand the formation of Newton's rings and the working of Michelson's interferometer. Remember the basics of diffraction, Evaluate the path difference. Analysis of Fraunhofer Diffraction due to a single slit.
* Understand the interaction of matter with radiation, Characteristics of Lasers, Principle, working schemes of Laser and Principle of Optical Fiber. Realize their role in optical fiber communication.
* Understand the intuitive ideas of the Quantum physics and understand dual nature of matter. Compute Eigen values, Eigen functions, momentum of Atomic and subatomic particles using Time independent one Dimensional Schrodinger's wave equation. Understand the fundamentals and synthesis processes of Nanophase materials.

SYLLABUS


Electromagnetism: Concept of electric flux, Gauss’s law - some applications, Magnetic field - Magnetic force on current, torque on current loop, The Biot-Savart’s Law, B near a long wire, B for a circular Current loop, Ampere’s law, B for a solenoid, Hall effect, Faraday’s law of induction, Lenz’s law, Induced magnetic fields, Displacement current, Maxwell’s equations (no derivation), Magnetic materials: Classification of magnetic materials and properties.

Ultrasonics: Introduction, Production of Ultrasonics – Piezoelectric and Magnetostrictic methods, acoustic grating, applications of ultrasonics.


Diffraction: Introduction, Differences between interference and diffraction, Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at a single slit (Qualitative and quantitative treatment).

Polarisation: Polarisation by reflection, refraction and double refraction in uniaxial crystals, Nicol prism, Quarter and Half wave plate, circular and elliptical polarization.


Nanophase Materials: Introduction, properties, Top-down and bottom up approaches, Synthesis - Ball milling, Chemical vapour deposition method, sol-gel methods, Applications of nano materials.

Text Books:
2. A textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar - S. Chand

Reference Books:
1. Modern Engineering Physics by A.S. Vadudeva
2. University Physics by Young and Freedman
CV-1103 : ENGINEERING GRAPHICS

Course Objectives:
* Understand the basics of Engineering Graphics and BIS conventions.
* Develop the graphical skills for communication of concepts, ideas and design of engineering products through technical drawings
* Demonstrate and practice the various profiles/curves used in engineering practice through standard procedures.
* Demonstrate and practice the orthographic projections of points, lines, planes, solids and section of solids
* Demonstrate and practice the development of surfaces of simple solids
Familiarize the basic concept of isometric views clearly.

Course Outcomes:
The students will be able to
* Develop simple engineering drawings by considering BIS standards.
* Draw different engineering curves with standard Procedures.
* Comprehend the basics of orthographic projections and deduce orthographic projections of points, lines, planes and solids at different orientations in real life environment.
* Visualize clearly the sections of solids.
* Apply the concepts of development of surfaces while designing/analyzing any product.
* Recognize the significance of isometric drawing to relate 2D environment with 3D environment.

SYLLABUS

Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions, and Scales.

Curves: Conic sections: General construction of ellipse, parabola and hyperbola. Construction of involutes of circle and polygons only. Normal and tangent to curves.

Projections of Points: Principal or Reference Planes, Projections of a point situated in any one of the four quadrants.

Projections of Straight Lines: Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane.

Projections of Straight Line inclined to both the Reference Planes: Projections of Planes: Projection of Perpendicular planes: Perpendicular to both reference planes, perpendicular to one reference plane and parallel to other reference plane and perpendicular to one reference plane and inclined to other reference plane. Projection of Oblique planes. Introduction to Auxiliary Planes.

Projections of Solids: Types of solids: Polyhedra and Solids of revolution. Projections of solids in simple positions: Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane and Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to other and axes inclined to both the reference planes.

Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids (Prism, Pyramid, Cylinder and Cone) in simple position only.

Development of Surfaces: Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone.

Isometric Views: Isometric projection, Isometric scale and Isometric view. Isometric view of Prisms, Pyramids, cylinder, cone, and their combinations.

Text Books:

Reference Books:

CV1104 : CIVIL ENGINEERING MATERIALS

Course Objectives:
* Student can enlisting the various materials of different types of stones, cement, bricks, timber, lime products, tar, bitumen, metal, sand, paints, admixtures, etc... used in building construction
* Student will have the capability of understanding the different processes of brick and cement manufacturing, and their types and uses.

Course Outcomes:
* Student will have the capability of testing of building construction materials like cement, bricks, aggregate, etc to find various properties of them.
* Student will have the capability of preservation of building construction materials like cement, bricks, aggregate, etc.... from the external agencies. weather, etc
* Students will understand the design concepts of different types of windows, Doors and stair cases etc
SYLLABUS

Masonry: Different Types of Stone Masonry – Plan, Elevation, Sections of Stone Masonry Works – Brick Masonry – Different Types of Bonds – Plan, Elevation and Section of Brick Bonds up to Two-Brick Wall Thickness – Partition walls – Different Types of Block Masonry – Hollow Concrete Blocks – FALG Blocks, Hollow Clay Blocks.


Asbestos, Asphalt Bitumen and Tar: Availability and uses of Asbestos, Properties of Asbestos, Various Types of Asbestos, Difference Between Asphalt and Bitumen, Types, Uses and Properties of Asphalt and Bitumen, Composition of Coal Tar, Wood Tar, Mineral Tar and Naphtha.

Roofing: Mangalore Tiled Roof, RCC Roof, Madras Terrace, Hollow Tiled Roof, Asbestos Cement, Fibre Glass, Aluminium, G.I. Sheet Roofings.

Trusses: King Post and Queen Post Trusses – Steel Roof Truss for 12 m Span with details.


Stair Cases: Stair Cases or Stairway Design (Architectural Design or Planning only) various types such as, Straight Flight, Dog-legged, Quarter Landing, Open Spiral, Spiral Stairs etc.

Text Books

Reference Books

CV-1105 ENGINEERING MECHANICS

Course Objectives:
* To provide students with practise in applying their knowledge of mathematics, science, and engineering, as well as to broaden this knowledge into the vast field of “rigid body Mechanics.”
* To prepare students for advanced courses such as Mechanics of Solids and Structural Analysis.
* To educate about distributed force systems, the centroid/center of gravity, how to locate centroids, moment of inertia, and how to find moment of inertia of composite figures and bodies.
* To know frame types and analyse forces in truss members using the method of joints and the method of sections.
* To understand the kinetics and kinematics of rigid bodies and use the work-energy technique to solve simple problems.
* To discuss the implementation of work-energy and impulse-momentum to dynamic systems.

Course Outcomes:
The student will be able to:
* Understand the Effect of forces and its components, the principle of Moments on wide variety of practical situations that are encountered by Engineers.
* Analyse forces in statically determinate structures using scalar and vector analytical techniques.
* Identify the significance of the centroid/center of gravity and locate the centroids of composite figures and bodies.
* Recognize the moment of inertia and the method for determining the moment of inertia of areas and bodies.
* Understand the dynamics of rigid bodies and how to solve simple problems using the work-energy approach and the virtual work method.

SYLLABUS


**Equilibrium:** Free body diagrams – Equations of equilibrium for a concurrent coplanar force system – Equilibrium of Bodies acted on by two or three forces – Equilibrium of bodies acted on by non-concurrent coplanar force system – Equilibrium of bodies acted on by parallel, non-coplanar force system – Equilibrium of non-concurrent, non-coplanar non-parallel force system. Draw a free body diagram (FBD) and evaluate the equilibrium of different force systems.

Centroids and Centres of Gravity: Centre of gravity of parallel forces in a plane – Centre of gravity of parallel forces in space – centroids and centres of gravity of composite bodies – Theorems of Pappus – Distributed Loads on Beams.

**Moments of inertia:** Definition – Parallel axis theorem for areas – Second moments of areas by integration – Radius of gyration of areas – Moments of inertia of composite areas – Parallel axis and parallel plane theorems for masses – Moments of inertia of masses by integration – Radius of gyration of mass – Moments of inertia of composite masses.

**Friction:** Nature of friction – Laws of friction – Coefficient of friction – Angle of friction – Cone of friction – Problems involving frictional forces – Frictional forces on flexible bands and belts – Rolling friction.

**Method of Virtual Work:** Principle of virtual work – Equilibrium of ideal system – Stability of equilibrium.

**Kinematics:** Absolute Motion: Introduction – Recapitulation of basic terminology of mechanics – Newton’s Laws – Introduction to Kinematics of Absolute Motion – Rectilinear motion of a particle – Angular motion of a line – Curvilinear motion of a particle using rectangular components – Motion of projectiles – Curvilinear motion using Radial and Transverse Components – (Simple Problems only) – basics of simple harmonic motion (Simple problems) – Motion of rigid bodies.

**Kinematics:** Relative Motion: Introduction to kinematics of relative motion – Relative displacement – Relative velocity – Instantaneous centre – Relative acceleration.


Text Books

Reference Books

CV-1106 WORKSHOP LAB

**Course Objectives:**
* Get hands on experience with the working skills in Carpentry trade.
* Know how to work with Sheet Metal tools.
* Get familiar with the working skills of Metal Fitting operations.
* Get hands on experience with house hold electrical wiring.

**Course Outcomes:**
The student will be able
* To work with Wood Materials in real time applications.
* To build various parts with Sheet Metal in day-to-day life.
* To apply Metal Fitting skills in various applications.
* To apply this knowledge to basic house electrical wiring and repairs.

**SYLLABUS**

**Carpentry:** Any three jobs from – Half lap joint, Mortise and Tenon joint, Half – lap Dovetail joint, Corner Dovetail joint, Central Bridle joint.

**Sheet Metal:** Any three jobs from – Square tray, Taper tray(sides), Funnel, Elbow pipe joint.
Fitting: Any three jobs from – Square, Hexagon, Rectangular fit, Circular fit and Triangular fit.

House Wiring: Any three jobs from – Tube light wiring, Ceiling fan wiring, Stair-case wiring, Corridor wiring.

Reference Books:

CV-1107 PHYSICS LAB

Course Objectives:
* To enable the students to acquire skill, technique and utilization of the Instruments
* Draw the relevance between the theoretical knowledge and to imply it in a practical manner with respect to analyze various electronic circuits and its components.
* To impart the practical knowledge in basic concepts of Wave optics, Lasers and Fiber optics.
* To familiarize the handling of basic physical apparatus like Vernier calipers, screw gauge, spectrometers, travelling microscope, laser device, optical fibre, etc.

Course Outcomes:
The student will be able to
* Design and conduct experiments as well as to analyze and interpret
* Apply experimental skills to determine the physical quantities related to Heat, Electromagnetism and Optics
* Draw the relevance between theoretical knowledge and the means to imply it in a practical manner by performing various relative experiments.

LIST OF EXPERIMENTS
3. Study the Intensity Variation of the Magnetic Field along axis of Current Carrying Circular Coil.
5. Determination of Refractive Index of Ordinary ray m---, and Extraordinary m---, ray.
10. Lees Method - Coefficient of thermal Conductivity of a Bad Conductor.
12. Melde’s Apparatus – Frequency of electrically maintained Tuning Fork.
15. Laser - Diffraction.

CV-1108 ENGINEERING GEOLOGY LAB

Course Objectives:
* To enable the students to know different types of soils.
* To enable the students to know different properties of different soils.
* To enable the students to know the application of Remote Sensing and Geo Physical Methods.
* Understand weathering process and mass movement

Course Outcomes:
* Students can identify different types of rocks and their mineral composition.
* Students will study the physical properties of minerals by conducting laboratory tests.
* Students can study the models of folds, faults, joints and tunnels.
* Students can study the satellite data and evaluate the terrain through integrated approach.

SYLLABUS
1. General study of topo sheet
2. Physical properties of minerals
3. Physical properties of 3 types of rocks
4. Study of folds, faults and joints (Models)
5. Study of tunnels (models)
6. General observation of satellite data for abstraction of data
7. Integrated approach of Terrain evaluation.

Text Books
2. Engineering Geology by N.Chennakesavalu, Mc-Millan, Indian Ltd-2005
4. Engineering and General Geology by Parbin Singh, Katson Publishing House

B.Tech I Year - II Semester

CV-1201 MATHEMATICS – II

Course Objectives:
* The way of obtaining rank, Eigen values and eigen vectors of a matrix.
* To know the importance of Cayley-Hamilton theorem and getting canonical form from a given quadratic form.
* To solve the system of equations by using direct and indirect methods.
* To solve first order and higher order differential equations by various methods.
  * To obtain the Laplace transforms and inverse Laplace transforms for a given functions and their applications.

Course Outcomes:
* Find rank, Eigen values and Eigen vectors of a matrix and understand the importance of Cayley-Hamilton theorem.
  * Reduce quadratic form to canonical forms and solving linear systems by direct and indirect methods.
  * Demonstrate solutions to first order differential equations by various methods and solve basic applications problems related to electrical circuits, orthogonal trajectories and Newton’s law of cooling
  * Discriminate among the structure and procedure of solving higher order differential equations with constant and variable coefficients.
  * Understand Laplace transforms and its properties and finding the solution of ordinary differential equations.

SYLLABUS


Text Books:

Reference Books:
CV-1202 GREEN CHEMISTRY
SYLLABUS


Unit 2: Batteries : Primary batteries: The chemistry - Types: Zinc-carbon (Leclanché type), zinc alkaline (Duracell), zinc/air batteries; Lithium primary cells – liquid cathode, solid cathode and lithium-ferrous sulphide cells. Secondary batteries: Lead acid and VRLA (valve regulated (sealed) lead acid), nickel-cadmium, nickel-zinc, nickel-metal hydride batteries, lithium ion batteries, ultrathin lithium polymer cells. Advanced Batteries for electric vehicles, requirements of the battery – sodium-beta and redox batteries.

Unit 3: Fuel Cells : Fuel Cells: Description, working principle, anodic, cathodic and cell reactions, fabrication of electrodes and other components, applications, advantages, disadvantages and environmental aspects of the following types of fuel cells: Proton Exchange Membrane Fuel Cells, alkaline fuel cells, phosphoric acid, solid oxide, molten carbonate, direct methanol fuel cells- Membranes and Fuels.


Unit 5: Green Chemistry and Technology : Introduction and significance of green chemistry, Goals of green chemistry, 12 principles of green chemistry, toxicity of chemicals, material safety data sheet (MSDS), concept of zero pollution technologies, atom economy, functional toxicity vs non-functional toxicity, functional group approaches to green chemistry, Elimination of toxic functional group, optimization of frameworks for the design of greener synthetic pathways, Applications of green chemistry - Green solvents, green fuels and propellants, biocatalysis.

Text Books
3. Hand Book of Green Chemistry and Technology; by James Clarke and Duncan Macquarrie; Blakwell Publishing.

CV-1203 ENGLISH

Course Objectives:
* To make students understand the explicit and implicit meanings of a text/topic;
* To give exposure to new words and phrases, and aid to use them in different contexts;
* To apply relevant writing formats to draft essays, letters, emails and presentations; and
* To adapt oneself to a given situation and develop a functional approach to finding solutions: adaptability and problem solving.

Course Outcomes:
* Students will be able to analyse a given text and discover the various aspects related to language and literature;
* Learn the various language structures, parts of speech and figures of speech;
* Develop one’s reading and writing abilities for enhanced communication; and
* Learn to apply the topics in real-life situations for creative and critical use.

SYLLABUS

On the conduct of life: William Hazlitt

Life skills: Values and Ethics
If: Rudyard Kipling
The Brook: Alfred Tennyson

Life skills: Self-Improvement
How I Became a Public Speaker: George Bernard Shaw
The Death Trap: Saki
Life skills: Time Management
On saving Time: Seneca
ChinduYellama

Life skills: Innovation
Muhammad Yunus
Politics and the English Language: George Orwell

Life skills: Motivation
Dancer with a White Parasol: Ranjana Dave

Grammar: Prepositions – Articles – Noun-Pronoun Agreement, Subject-Verb Agreement – Misplaced Modifiers – Clichés, Redundancies.
**Vocabulary:** Introduction to Word Formation – Root Words from other Languages – Prefixes and Suffixes – Synonyms, Antonyms – Common Abbreviations

**Writing:** Clauses and Sentences – Punctuation – Principals of Good Writing – Essay Writing – Writing a Summary

**Writing:** Essay Writing

**Life skills:** Innovation

Muhammad Yunus

Text Books:

**CV-1204 COMPUTER PROGRAMMING AND NUMERICAL METHODS**

**Course Objectives:**
- The course is designed to provide complete knowledge of C language.
- To provide students with understanding of code organization and functional hierarchical decomposition with using complex data types.
- To provide knowledge to the Students to develop logsics which will help them to create programs, applications in C.
- This course aims to identify tasks in which the numerical techniques learned are applicable and apply them to write programs, and hence use computers effectively to solve the task.
- This course provides the fundamental knowledge which is useful in understanding the other programming languages.

**Course Outcomes:**
- The student will be able to
  - Identify basic elements of C programming structures like data types, expressions, control statements, various simple functions and Apply them in problem solving.
  - Apply various operations on derived data types like arrays and strings in problem solving.
  - Design and Implement of modular Programming and memory management using Functions, pointers.
  - Apply Structure, Unions and File handling techniques to Design and Solve different engineering programs with minimal complexity.
  - Apply Numerical methods to Solve the complex Engineering problems.

**SYLLABUS**

**Introduction to C:** Basic structure of C program, Constants, Variables and data types, Operaters and Expressions, Arithmetic Precedence and associativity, Type Conversions. Managing Input and Output Operations Formatted Input, Formatted Output.

**Decision Making, Branching, Looping, Arrays & Strings:** Decision making with if statement, Simple if statement, the if...else statement, Nesting of if...else statement, the else. If ladder, switch statement, the (?) operator, the GOTO statement., The while statement, the do statement, The for statement, Jumps in Loops ,One, Two-dimensional Arrays, Character Arrays. Declaration and initialization of Strings, reading and writing of strings, String handling functions, Table of strings.

**Functions:** Definition of Functions, Return Values and their Types, Function Calls, Function Declaration, Category of Functions: No Arguments and no Return Values, Arguments but no Return Values, Arguments with Return Values, No Argument but Returns a Value, Functions that Return Multiple Values. Nesting of functions, recursion, passing arrays to functions, passing strings to functions, the scope, visibility and lifetime of variables.

**Pointers:** Accessing the address of a variable, declaring pointer variables, initializing of pointer variables, accessing variables using pointers, chain of pointers, pointer expressions, pointers and arrays, pointers and character strings, array of pointes, pointers as function arguments, functions returning pointers, pointers to functions, pointers to structures - Program Applications

**Structure and Unions:** Defining a structure, declaring structure variables, accessing structure members, structure initialization, copying and comparing structure variables, arrays of structures, arrays within structures, structures within structures, structures and functions and unions, size of structures and bit-fields - Program applications.

**File handling:** Defining and opening a file, closing a file, Input/ Output operations on files. Error handling during I/O operations, random access to files and Command Line Arguments - Program Applications

**Numerical Methods:** Solutions of Algebraic and Transcendental Equations, Bisection Method, Newton Raphson Method. Newton’s forward and backward Interpolation, Lagrange’s Interpolation in unequal intervals. Numerical

Text Books:
2. Introduction to Numerical Methods, SS Sastry, Prentice Hall
Reference Books:
3. The C – Programming Language B.W. Kernighan, Dennis M. Ritchie, PHI.

CV-1205 SURVEYING AND GEOMATICS

Course Objectives:
* To impart knowledge about the different methods of surveying to determine the position and elevation of inaccessible points.
* To familiarise the students with chain and compass surveying and train them to determine the bearing of any required station by different methods.
* To impart knowledge about the concept of levelling and reduced level of any station and teach them the procedure to establish bench marks.
* To familiarize the students with total station and explain the usage of Total Station with respect to all the areas of surveying.
* To explain the concept of Global Positioning System and its applications.

Course Outcomes:
Students will be able to
* Determine the precise location of any required point with respect to horizontal and vertical control.
* Carry out different methods of levelling the profile levelling, reciprocal levelling etc. to determine the elevation of points with respect to bench mark.
* Understand the procedure to establish bench marks with respect to mean sea level.

* Handle the instrument theodolite to measure the horizontal and vertical angles and analyze to determine the inaccessible distances.
* Understand the concept of global positioning system and its applications in surveying.

SYLLABUS


Total Station Surveying: Electronic Theodolite, Electronic Distance Measurements, Total Station, Errors in Measurements, Advantages, Disadvantages, Applications; Contour Mapping, Determination of Height of Remote Point, Position of Hidden Point, Free Station, Area Measurement, Volume Measurement.

CV-1206 ENGLISH LANGUAGE LAB

Course Objectives:
* To make students recognize the sounds of English through Audio-Visual aids;
* To help students build their confidence and help them to overcome their inhibitions and self-consciousness while speaking in English;
* To familiarize the students with stress and intonation and enable them to speak English effectively; and
* To give learners exposure to and practice in speaking in both formal and informal contexts.

Course Outcomes:
* Students will be sensitized towards recognition of English sound patterns and the fluency in their speech will be enhanced;
* A study of the communicative items in the laboratory will help students become successful in the competitive world;
* Students will be able to participate in group activities like role plays, group discussions and debates; and
* Students will be able to express themselves fluently and accurately in social as well professional context.

SYLLABUS

Introduction to Phonetics: The Sounds of English (Speech sound – vowels and consonants) - Stress and Intonation - Accent and Rhyme.

Listening Skills: Listening for gist and specific information - listening for Note taking, summarizing and for opinions - Listening to the speeches of eminent personalities.

Speaking Skills: Self-introduction - Conversation Skills (Introducing and taking leave) - Giving and asking for information - Role Play - Just A Minute (JAM) session - Telephone etiquette.

Reading and Writing skills: Reading Comprehension – Précis Writing - E-Mail writing - Punctuation.

Presentation skills: Verbal and non-verbal communication - Body Language - Making a Presentation.

CV-1207 SURVEY FIELD WORK

Course Objectives:
* To impart knowledge about the art of determining the relative positions of points on, above or beneath the surface of the earth.
* To impart knowledge of the measurement of angles and distances and keeping of a record in field book.
* To familiarize the students with instruments like chain, compass, dumpy level, plane table and some special instruments.
* To impart knowledge about advanced instruments of surveying like total station and GPS.
* To familiarize about the theodolite and electronic theodolites that can read angles directly.

Course Outcomes:
At the end of the course the student will be able to:
* Determine the inaccessible horizontal and vertical distances from the observed bearings and calculated angles between the survey lines.
* Determine the relative positions of points on, above or beneath the surface of the earth by direct or indirect measurements of distance, direction and elevation.
* Find out the elevations of points with respect to a given datum and also to establish points at a given elevation.
* Handle the advanced survey instruments like total station and global positioning system.
* Use the theodolite as a tacheometer to determine the elevations and reduced levels of points.
LIST OF EXPERIMENTS:
1. Chain traversing: Plotting a chain traverse for a building.
2. Compass traversing: Measurement of bearings and determination of inaccessible distance using a compass.
3. Levelling: Determination of reduced levels of different points by Height of Instrument method and Rise & Fall method.
5. Point positioning using GPS
6. Total station exercises:
   i. Contour mapping using total station.
   ii. Height of remote point using total station.
   iii. Position of hidden point using total station
   iv. Area& volume measurement using total station.

CV-1208 : COMPUTER PROGRAMING AND NUMERICAL METHODS LAB

Course Objectives:
* To impart writing skill of C programming to the students and solving problems.
* To write and execute programs in C to solve problems such as Modularize the problems into small modules and then convert them into programs.,
* To write and execute programs in C to solve problems such as arrays, files, strings, structures and different numerical methods.
* This reference has been prepared for the beginners to help them understand the basic to advanced concepts related to Objective-C Programming languages.

Course Outcomes:
* Understand various computer components, Installation of software. C programming development environment, compiling, debugging, and linking and executing a program using the development environment.
* Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs.
* Construct programs that demonstrate effective use of C features including arrays, strings, structures, pointers and files.
* Apply and practice logical ability to solve the real world problems.
* Apply Numerical methods to Solve the complex Engineering problems

LIST OF PROGRAMS
1. Write a program to read x, y coordinates of 3 points and then calculate the area of a triangle formed by them and print the coordinates of the three points and the area of the triangle. What will be the output from your program if the three given points are in a straight line?
2. Write a program, which generates 100 random integers in the range of 1 to 100. Store them in an array and then print the arrays. Write 3 versions of the program using different loop constructs. (e.g. for, while, and do while).
3. Write a set of string manipulation functions e.g. for getting a substring from a given position, Copying one string to another, Reversing a string, adding one string to another.
4. Write a program which determines the largest and the smallest number that can be stored in different data types like short, int, long, float, and double. What happens when you add 1 to the largest possible integer number that can be stored?
5. Write a program, which generates 100 random real numbers in the range of 10.0 to 20.0, and sort them in descending order.
6. Write a function for transposing a square matrix in place (in place means that you are not allowed to have full temporary matrix).
7. First use an editor to create a file with some integer numbers. Now write a program, which reads these numbers and determines their mean and standard deviation.
8. Given two points on the surface of the sphere, write a program to determine the smallest arc length between them.
9. Implement bisection method to find the square root of a given number to a given accuracy.
10. Implement Newton Raphson method to det. a root of polynomial equation.
11. Given table of x and corresponding f(x) values, Write a program which will determine f(x) value at an intermediate x value by using Lagrange’s interpolation.
12. Write a function which will invert a matrix.
13. Implement Simpson’s rule for numerical integration.
14. Write a program to solve a set of linear algebraic equations.

B.Tech II Year - I Semester
CV2101 PYTHON PROGRAMMING

Course Objectives
1. To develop skills on procedural oriented and object oriented programming in Python
2. To understand and apply different data wrangling techniques using Python.
3. To perform data analysis using python libraries like NumPy, Pandas and exploratory data analysis using Matplotlib

Course Outcomes
At the end of the course, a student should be able to:
1. acquire programming knowledge on Basics of Python
2. acquire programming knowledge on Text and File Handling
3. develop Python programs to Mean, Median, Mode, Correlation
4. acquire programming knowledge on NumPy, Pandas Library
5. acquire programming knowledge on Graph Visualizations in Python and Data Analysis using Python

SYLLABUS
1. Introduction to Python: Rapid Introduction to Procedural Programming, Data Types: Identifiers and Keywords, Integral Types, Floating Point Types
   - Strings: Strings, Comparing Strings, Slicing and Striding Strings, String Operators and Methods, String formatting with str.format
   - Collections Data Types: Tuples, Lists, Sets, dictionaries, Iterating and copying collections
2. Python Control Structures, Functions and OOP: Control Structures and Functions: Conditional Branching, Looping, Exception Handling, Custom Functions
   - Python Library Modules: random, math, time, os, shutil, sys, glob, re, statistics, creating a custom module
   - Object Oriented Programming: Object Oriented Concepts and Terminology, Custom Classes, Attributes and Methods, Inheritance and Polymorphism, Using Properties to Control Access
   - File Handling: Writing and Reading Binary Data, Writing and Parsing Text Files
3. NumPy Arrays and Vectorized Computation: NumPy arrays, Array creation, Indexing and slicing, Fancy indexing, Numerical operations on arrays, Array functions, Data processing using arrays, Loading and saving data, Saving an array, Loading an array, Linear algebra with NumPy, NumPy random numbers
5. Data Analysis Application Examples: Data munging, Cleaning data, Filtering, Merging data, Reshaping data, Data aggregation, Grouping data
6. Data Visualization: The matplotlib API primer-Line properties, Figures and subplots, Exploring plot types-Scatter plots, Bar plots, Histogram plots, Legends and annotations, Plotting functions with Pandas

Text Books
2. Python: End-to-End Data Analysis Learning Path, Module 1: Getting Started with Python Data Analysis, Phuong Vo Thi Hong, Martin Czygan, Packt Publishing Ltd

Reference Books
2. Python for Data Analysis, Wes McKinney, O'Reilly Publications
3. How to Think Like a Computer Scientist: Learning with Python 3 Documentation 3rd Edition, Peter Wentworth, Jeffrey Elkner, Allen B. Downey, Chris Meyers

CV2102 MECHANICS OF SOLIDS

Course Objectives:
* The student can understand the concepts of stress and strain by analysis of solids.
* The student can understand the engineering properties of materials, force-deformation, and stress-strain relationships.
* The student can understand the determinate and indeterminate members, and beams, torque, shear forces, and bending moments.
* The student can understand the combined bending and direct stresses on column and strut members, axial load on open and closed coiled helical spring subjected to axial load.

Course Outcomes:
The student will be able to:
* Understand the basic concepts of stresses and strain along with their relations.
* Determine the shear force and bending moments of the simply supported, cantilever and over hanging beams under various loads.
* Assess the flexural normal and shear stresses of various cross sections.
* Analyse the stresses on oblique plane and torsional shear stress distribution of solid and hollow circular sections.
* Analyse the stresses on columns and struts using various theories.
* Analyse open and closed coiled helical springs subjected to axial load.

**SYLLABUS**


Effect of Transverse Force, Shear Force, Bending Moment and Axial Thrust Diagrams for (A) Cantilever (B) Simply Supported and (C) Over Hanging Beams for various patterns of Loading. Relation between (i) Intensity of Loading (ii) Shear Force and (iii) Bending Moment at a Section. Theory of Simple Bending: Flexural Normal Stress Distribution; Flexural Shear Stress Distribution for Various Shapes of Cross Section.

**Stresses on Oblique Plane** – Resultant Stress – Principal Stress and Maximum Shear Stress and Location of their Planes. Mohr’s Circle for Various Cases of Stresses: Theory of Pure Torsion for Solid and Hollow Circular Sections – Torsional Shear Stress Distribution, Effect of Combined Torsion, Bending and Axial Thrust – Equivalent B.M and T.M.


**Text Books**

**Reference Books**

**CV2103: FLUID MECHANICS - I**

**Course Objectives**
* To familiarize students with the fundamentals and basic concepts of fluid mechanics.
* To impart knowledge to the students about fluid statics and kinematics which are prerequisite to comprehend fluid dynamics and other more advanced aspects.
* To enable students to understand one-dimensional applications of energy equation and to impart the concepts of flow measuring devices.
* To develop insight in the application of momentum principle to closed conduits.
* To impart knowledge on fluid flow through pipes and pipe network analysis.

**Course Outcomes**
Students will be able to
* Understand the significant properties of fluids and pressure measurement, and analyze hydrostatic forces on plane and curved surfaces.
* Comprehend kinematics of fluid flow and further derive and apply continuity equation which is useful in analyzing more complex field problems such as seepage analysis.
* Understand the theory of flow measuring devices in pipes and open channel flows using Bernoulli’s equation.
* Compute forces on pipe bends using linear impulse momentum application and understand the basics of angular momentum principle which is essential to understand the concepts of hydraulic turbines.
* Perform analysis of pipes and hydraulic design of pipe networks.
SYLLABUS


Fluid Statics: Forces acting on a fluid element – Pascal’s law; Variation of Pressure in Static Fluid: Absolute, Gauge and Total Pressure; Pressure Measurement, Forces on Immersed Bodies in Static Fluids – Force on a Plane Surface and curved surfaces.

Fluid Kinematics: Types of Flow, Streamline, Path line, Streak line; Stream Tube, Translation, Deformation and Rotation of a Fluid Element in Motion; Local, Convective and Total Accelerations; One, Two and Three Dimensional Analysis of Flows. Ideal Fluid Flow – Stream Function, Velocity Potential; Rotational & Irrotational Flows – Vorticity and Circulation; Laplace Equation in terms of Stream Function and Velocity Potential; Flow Nets. Principle of Conservation of Mass – Concepts of System and Control Volume; Continuity Equation in three dimensional Cartesian coordinates; Continuity Equation for flow through a Stream tube.


Flow through Pipes: Introduction to Pipe Flow and Laws of Friction – Reynolds Experiment; Steady Turbulent Flow through Pipes; Laws of Friction; Darcy-Weisbach Equation; Total Energy and Hydraulic Gradient – Energy and Hydraulic Gradient Lines; Minor Losses in Pipes; Pipes in Series and Parallel – Equivalent Length of Pipe; Flow Between Two Reservoirs; Siphon; Pipe Network Analysis by Hardy–Cross Method; Hydraulic Power Transmission through Pipes and Nozzles, Water Hammer (Only Concept).

Text Books

Reference Books
1. Engineering Fluid Mechanics by K.L.Kumar, S. Chand &Co.Ltd.
2. Engineering Hydraulics, H.Rouse, John Wiley & Sons Inc.

CV2104 : STRUCTURAL ANALYSIS - I

Course Objectives:
* Familiarise students to the various methods of determining deflections of beams
  * Improve student’s ability in understanding strain – energy due to Axial load, Shear force, Bending Moment and Torque.
  * Impart skills of analysing the fixed beams, three span continuous beams subjected to different types of loads.
  * Enable students understand the concept of moving loads and draw maximum Shear force and Bending moment diagrams for different types of loads.
  * Expose students to understand Lamme’s theory in analyzing thick cylinders and know the concept of theories of failure.

Course Outcomes:
  the student will be able to:
  * Understand behavior of beams and determine slope and deflections of a beams, trusses (having 9 members or less) using various methods.
  * Differentiate determinate and indeterminate structures and determine deflections of statically determinate structures.
  * Apply strain energy principle to determine the deflections of beams using various methods.
  * Understand the concept of moving loads and draw the maximum Shear force and Bending moment diagrams for different types of moving loads.
  * Gain knowledge on thick cylinders and compound cylinders. Learns basic concepts of theories of failure.

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SYLLABUS

Deflections of Beams: (i) Cantilever (ii) Simply Supported and (iii) Over Hanging Beams, using (a) Double Integration and (b) Macaulay’s Method.


Deflections of Statically Determine Structures: (A) Single Storey, Single Bay Rectangular Portal Frames using (i) Unit Load Method, (ii) Castigliano’s Theorem – 1, (B) Trusses (Having 9 Members or less) using (i) Unit Load Method and (ii) Castigliano’s Theorem-1.

Analysis of (A) Fixed Beams, (B) Three Span Continuous Beams using (i) Theorem of Three Moments, (ii) Slope Deflection Method and (iii) Moment Distribution Method


Text Books

Reference Books

CV2105 MANAGERIAL ECONOMICS
(Common for all Branches)

Course Objectives:
* To introduce micro as well as macro, financial concepts that can be used in business decision making
* To analyze various business situations with the help of different economic concepts.
* To assist in a better understanding of the application of modern principles and methods of microeconomics to real-world business issues in different contexts.
* To master the basic tools of microeconomics: supply and demand analysis; firms’ production and pricing decisions, market equilibrium, and market structure analysis.
* To enable the students to understand how organizations make important investment and financing decisions.

Course Outcomes:
The student will be able to
* Understand the concepts of cost, nature of production, and its relationship to Business operations.
* Apply marginal analysis to the “firm” under different market conditions.
* Use the tools of marginal analysis to explain the optimal allocation of resources within the firm.
* Analyze the causes and consequences of different market conditions.
* Integrate the concept of price and output decisions of firms under the various market structure.

SYLLABUS

Significance of Economics and Managerial Economics:

Managerial Economics: Definition, Nature and Scope of Managerial Economics, Differences between Economics and Managerial Economics, Main areas of Managerial Economics, Managerial Economics with other disciplines.


Elasticity of demand- Definition, Measurement of elasticity, Types of Elasticity ( Price, Income, Cross and Advertisement), Practical importance of Price elasticity of demand, Role of income elasticity in business decisions, Factors governing Price Elasticity of demand.


Theory of Production and Cost analysis: Production - Meaning, Production function and its assumptions, use of production function in decision mak-
ing; Cost analysis - Nature of cost, Classification of costs - Fixed vs. Variable costs, Marginal cost, Controllable vs. Non - Controllable costs, Opportunity cost, Incremental vs. Sunk costs, Explicit vs. Implicit costs, Replacement costs, Historical costs, Urgent vs. Postponable costs, Escapable vs. Unavoidable costs, Economies and Diseconomies of scale.

Market Structures: Definition of Market, Classification of markets; Salient features or conditions of different markets - Perfect Competition, Monopoly, Duopoly, Oligopoly, Importance of kinked demand curve; Monopolistic Competition.

Pricing and Business Cycles:

Pricing Analysis: Pricing – Significance; Different Pricing methods- Cost plus pricing, Target pricing, Marginal cost pricing, Going -rate pricing, Average cost pricing, Peak load pricing , Pricing of joint Products, Pricing over the life cycle of a Product, Skimming pricing Penetration pricing, Mark- up and Markdown pricing of retailers.

Business cycles: Definition, Characteristics, Phases, Causes and Consequences; Measures to solve problems arising from Business cycles.

Text Books:

Reference Books:

CV2106: MECHANICS OF SOLIDS LAB

Course Objectives:
* To impart knowledge about behaviour of materials under the action of loads.
* To explain about various kinds of loads that are going to act on materials.
* To understand about various kinds of stress and strain measuring machinery that is used in laboratory.
* To familiarize he students with various physical, mechanical properties of various engineering materials.
* To explain about various deformations of materials under the action of loads.

Course Outcomes:
The student will be able to:
* Understand strength and quality of materials through laboratory tests.
* Understand about properties of elastic materials.
* Find deformation of materials after the respective experiment.
* Apply the knowledge of mathematics to find the properties of materials.

LIST OF EXPERIMENTS
1. Tension test on Mild/HYSD bars
2. Compression test on wood (parallel and perpendicular to grains)
3. Tests on springs for the determination of rigidity modulus and spring constant.
4. Brinell’s and Rockwell hardness tests.
5. Charpy and Izod impact tests.
6. Double shear test on mild steel specimen.
7. Bending test: Load deflection test for the determination of young’s modulus on simply supported and cantilever beam for wood and steel.
8. Buckling of Wooden column

CV2107: FLUID MECHANICS-I LAB

Course Objectives:
* To impart knowledge in measuring pressure, discharge and velocity of fluid flow.
* To understand the flow measurement in tanks.
* To determine the metacentric height of a floating body.
* To determine the flow measurement in pipe flow.
* To measure the discharge in an open channel flow.
* To learn and practice writing technical reports.

Course Outcomes:
The student will be able to:
* Conduct experiments (in teams) in pipe flows and open-channel flows and interpreting data from model studies to prototype cases, as well as documenting them in engineering reports.
* Analyze a variety of practical fluid-flow devices and utilize fluid mechanics principles in design.
* Provide exposure to modern computational techniques in fluid mechanics.
LIST OF EXPERIMENTS:
1. Study of Small Orifice by Constant Head Method and Time of Emptying a Tank through a Small Orifice.
2. Study of Cylindrical Mouthpiece by Constant Head Method and Time of Emptying a Tank through a Cylindrical Mouthpiece.
3. Determination of Metacentric Height of Floating Body.
5. Study of Venturi meter.
7. Study of Flow Nozzle Meter.
8. Study of Sharp-crested Full Width and Contracted Weirs.
10. Study of Broad-crested Weir.

CV2108: PYTHON PROGRAMMING LAB

Course Objectives
1. familiarize students with key data structures in Python including lists and dictionaries and apply them in context of searching, sorting, text and file handling
2. introduce students to calculation of statistical measures using Python such as measures of central tendency, correlation
3. familiarize students with important Python data related libraries such as Numpy and Pandas and use them to manipulate arrays and dataframes
4. introduce students to data visualization in Python through creation of line plots, histograms, scatter plots, box plots and others
5. implementation of basic machine learning tasks in Python including pre-processing data, dimensionality reduction of data using PCA, clustering, classification and cross-validation.

Course Outcomes
After completion of the course the student should be able to:
1. implement searching, sorting and handle text and files using Python data structures such as lists and dictionaries
2. calculate statistical measures using Python such as measures of central tendency, correlation
3. use Python data related libraries such as Numpy and Pandas and create data visualizations
4. implement basic machine learning tasks pre-processing data, compressing data, clustering, classification and cross-validation.

Syllabus
1. Python Programs on lists & Dictionaries
2. Python Programs on Searching and sorting
3. Python Programs on Text Handling
4. Python Programs on File Handling
5. Python Programs for calculating Mean, Mode, Median, Variance, Standard Deviation
6. Python Programs for Karl Pearson Coefficient of Correlation, Rank Correlation
7. Python Programs on NumPy Arrays, Linear algebra with NumPy
8. Python Programs for creation and manipulation of DataFrames using Pandas Library
9. Write a Python program for the following.
   * Simple Line Plots,
   * Adjusting the Plot: Line Colors and Styles, Axes Limits, Labeling Plots,
   * Simple Scatter Plots,
   * Histograms,
   * Customizing Plot Legends,
   * Choosing Elements for the Legend,
   * Boxplot
   * Multiple Legends,
   * Customizing Colorbars,
   * Multiple Subplots,
   * Text and Annotation,
   * Customizing Ticks
10. Python Programs for Data preprocessing: Handling missing values, handling categorical data, bringing features to same scale, selecting meaningful features
11. Python Program for Compressing data via dimensionality reduction: PCA
12. Python Programs for Data Clustering
13. Python Programs for Classification
14. Python Programs for Model Evaluation: K-fold cross validation

Reference Books
2. Chris Albon, "Machine Learning with Python Cookbook-practical solutions from preprocessing to deep learning", O'REILLY Publisher, 2018
4. Phuong Vo.T.H., Martin Czygan, Getting Started with Python Data Analysis, Packt Publishing Ltd
5. Armando Fandango, Python Data Analysis, Packt Publishing Ltd
6. Magnus Vilhelm Persson and Luiz Felipe Martins, Mastering Python Data Analysis, Packt Publishing Ltd
7. Sebastian Raschka & Vahid Mirjalili, “Python Machine Learning”, Packt Publisher, 2017

**CV2109 : COMPUTER-AIDED DRAFTING**

Course Objectives:
* Use computer aided drafting tools to produce 2D and 3D working drawings.
* Develop 2D civil engineering drawings of simple building elements and 3D drawings of simple objects.
* Familiarize with creating layers, formatting text styles and dimension styles.
* Create a new drawing and edit an existing drawing.
* Draw different 3D elements and edit them with 3D space.

Course Outcomes:
The student will be able to:
* Know basic commands used in computer drafting.
* Acquire skills to draw 2D and 3D drawings.
* Use geometric tools such as lines, circles, polylines, and rectangles in AutoCAD to create and modify geometry.
* Use dimension and annotation tools such as dimensions, tolerances, hatch, and text in AutoCAD to annotate drawings.
* Draw different 3D elements along with editing.

**SYLLABUS**

Introduction: Introduction to computer drafting tools, Coordinate system, Setting up a drawing starting from scratch, Setting up a drawing using a Wizard, Using and creating a template file, Opening an existing drawing, saving a drawing file, Screen layout, Pull-down menus, Screen icons, Command line, Status bar, Dialogue boxes.

**2D Drawing:** Point, Line, Ray, Construction Line, Multiline and Polylines, Rectangles, Arc, Circle and Ellipse, Polygon, Spline, etc.
**2D Editing:** Trim, Extend, Lengthen, Break, Move, Copy, Scale, Stretch, Mirror, Rotate, Fillet, Chamfer, Array, Hatch and gradient, Object snap, Direct distance entry, Polar tracking, Object snap tracking, Dynamic input, Properties, etc.

**Layers and Text creation:** Creating Layers, Text (multi-line & single line) and Formatting Text Styles Dimension Command Formatting Dimension Style and Multi-leader Style, Drawing Settings and Aids, Saving and Plotting

**3D Drawing:** Introduction, 3D Coordinate system, UCS, 3D Orbit, Box, Wedge, Cone, Sphere, Cylinder, Torus, Helix, Loft, Revolve.

**Editing with 3D Space:** Union, Subtract, Intersect, Extrude faces, Move faces, Rotate faces, Offset faces, Taper faces, Delete faces, Copy faces

**CV2110 : PROFESSIONAL ETHICS AND UNIVERSAL HUMAN VALUES**

Course Objectives:
* To recognize the moral values that should guide the Engineering profession.
* To resolve moral issues concerning one’s profession.
* To develop and exhibit a set of moral beliefs and attitudes that engineers should inculcate.
* To inculcate social values and morality in one’s life.
* To develop awareness about Professional/Engineering Ethics and Human Values.

Learning Outcomes:
Students will be able to:
* Apply the conceptual understanding of ethics and values into everyday practice.
* Understand the importance of moral awareness and reasoning in life.
* Acquire professional and moral etiquette that an engineer requires.
* Develop the acumen for self-awareness and self-development.
* Develop cultural tolerance and integrity.
* Tackle real-life challenges with empathy.

**CONTENTS**

Unit - I: HUMAN VALUES : Values - Respect - Caring - Sharing - Honesty-Courage - Self confidence - Communal Harmony Morals - Virtues
Unit –II PROFESSIONAL VALUES: Integrity - Discipline - Valuing time - Cooperation - Commitment - Code of conduct - Challenges in the workplace

Unit – III PROFESSIONAL ETHICS: Overview - Engineering ethics - Moral issues - Profession - Models of professional roles - Responsibility


Unit – V GLOBAL ISSUES: Globalization - Environmental ethics - Computer ethics - Code of ethics - Multinational corporations - Engineers as advisors in Planning and Policy making

Suggested Textbook:

CV2111 NCC/NSS
B.Tech &B.Tech. +M.Tech II Year - II Semester

**CV2201 WATER SUPPLY ENGINEERING**

**Course Objectives:**

* Outline planning and the design of water supply systems for a community/town/city.
* Provide knowledge of water quality requirements for domestic usage.
* Understanding the importance of protection of water source quality and enlightening the efforts involved in converting raw water into clean potable water.
* Selection of valves fixture stored in water distribution systems.
* Impart knowledge on design of water distribution network.
* Visit at least one Water Treatment Plant and supply system.

**Course Outcomes:**

The student will be able to

* Plan and design the water and distribution networks and sewerage systems.
* Identify the water source and select the proper intake structure.
* Design & estimation of the water supply system of an apartment.
* Select the appropriate appurtenances in the water supply.
* Selection of suitable treatment flow for raw water treatments.

**SYLLABUS**

**Introduction:** Importance and Necessity of Protected Water Supply systems, Waterborne diseases, Planning of public water supply system, components of public water supply systems. Per capita demand and factors influencing it, types of water demands and their variations, factors affecting water demand, Design Period, Factors affecting the Design period, estimation of water demand for a town or city, Population Forecasting.

**Sources of Water:** Various surface and subsurface sources are considered for water supply and their comparison- Capacity of storage reservoirs, Types of subsurface water bearing formations, Yields from wells and infiltration galleries. Conveyance of Water from the source to the point of interest: Gravity and Pressure conduits, Types of Pipes, Pipe Materials, selection of pipe materials, Pipe joints.

**Quality and Analysis of Water:** Characteristics of water and their measurement or estimation or analysis: Physical, Chemical and Biological characteristics. Water quality criteria for different uses: Rural, Municipal, Industrial and Agricultural uses. Drinking water quality standards: IS and WHO guidelines.


**Distribution of Water: Requirements**- Methods of Distribution system, Layouts of Distribution networks, Pressures in the distribution layouts, Analysis of Distribution networks: Hardy Cross and equivalent pipe methods – Appurtenances of water distribution system–Laying and testing of pipe lines. Ideal water supply system.

**Text Books**

Reference Books

CV2202 FLUID MECHANICS-II

Course Objectives:
* To classify the types of flows in open channel and also design most economical open channel sections and learns about critical flows.
* To study about non-uniform flows in open channels and also to learn about the characteristics of hydraulic jump in rectangular channels.
* To impart knowledge on impact of jets, working principle, selection and designing of impulse and reaction turbines.
* To explain governing of turbines and performance characteristics of pumps and turbines working under different conditions.
* To explain various components and working principles of centrifugal pump and reciprocating pumps. Also, to teach the criteria of selection of the pumps.

Course Outcomes:
Students will be able to
* To calculate discharge carrying capacity of open channel sections and design of most economical channel sections.
* To calculate water surface profiles in open channels, hydraulic jump analysis.
* Select appropriate hydraulic turbines for given conditions and study their performance characteristics.
* Understand the operation of pumps and study their characteristics.

SYLLABUS

Open Channel Flows: Basic Concepts – Introduction, Classification of Open Channels – Classification of Flow; Geometric Elements of a Channel Section; Velocity Distribution in a Channel Section; Wide Open Channel; Measurement of Velocity; Velocity Distribution Coefficients; Pressure Distribution in a Channel Section – Effect of Slope on Pressure Distribution; Basic Equations – Chezy’s Equation, Manning’s Equation.

Uniform Flow Computation; Most Economical Channel Sections – Rectangular, Trapezoidal, Circular and Triangular Channel Sections; Critical Flow – Computation of Critical Flow, Section Factor for Critical Flow.

Application of Energy Principle in Open channels – Definition of Specific Energy, Specific Energy Diagram, Critical depth, Critical Velocity, Conjugate or Alternate Depths, Sub-critical, Critical and Super-critical Flows, Froude Number, Relationship between Critical depth and Specific Energy for Rectangular, Trapezoidal Sections; Application of Momentum Principle in open channels – Specific Force; Canal Transitions – Change of Depth in Channels with Change in Cross-section and Hump in the Bed; Control Sections; Venturi Flume and Parshall Flume.


Rapidly Varied Flow – Hydraulic Jump, Types of Jumps, Hydraulic Jump in Horizontal Rectangular Channels.

Impact of Jets: Force Exerted by Fluid Jet on Stationary and Moving Flat and Curved Vanes, Torque and Work Done by Series of Moving Vanes.


Hydraulic Machines – Centrifugal Pumps; Functions of a Pump – Selection Criterion – Rotodynamic and Positive Displacement Pumps – Comparison between Centrifugal & Reciprocating Pumps; Components & Working principles of Centrifugal Pumps; Classification of Centrifugal Pumps; Working Head and Number of Stages, Single & Double Suction. Work done by Centrifugal Pumps – Pressure Change in a Pump, Manometric and Static Head – Velocity triangles – Minimum Starting Speed of pump – Multi-stage Pumps; Pumps in Parallel and Series; Cavitation – Limitation of Suction Lift, NPSH and its importance in Selection of Pumps. Performance Characteristics of Pumps – Similarity Relations and Specific speed of Pumps – Dimensionless characteristics – Constant Efficiency Curves of Centrifugal Pumps.

Text Books

Reference Books
2. Engineering Fluid Mechanics by K.L.Kumar, S. Chand & Co.Ltd.

CV2203 HYDROLOGY AND WATER RESOURCES ENGINEERING

Course Objectives:
* To build knowledge in hydrology and hydraulics and understanding of water resources systems.
* To develop skills in the groundwater flow, type of aquifer, and yield from the well.
* To provide the knowledge of the design of reservoir operation, sedimentation, and flood routing techniques.
* To develop skills in modeling flood flows and flood routing.
* To study the effect, causes, and remedial measures of waterlogging and canal systems.

Course Outcomes:
The students will be able to
* Demonstrate the concepts of the hydrograph, S-hydrograph, Unit hydrograph, and IUH
* Analysis of groundwater flow hydraulics along with rainwater harvesting methods.
* Demonstrate the basic types of irrigation, irrigation standards, and crop water assessment.
* Identify various types of reservoirs and their design aspects along with flood routing techniques.
* Design aspects of canal systems and waterlogging remedies.

SYLLABUS


Methods of Construction of Open Well – Yield of an Open Well – Methods of Construction of Tube Wells, Well Shrouding and Well Development, Spacing of Tube Wells, Design of Tube Well; Pumping Requirements.

Reservoir Planning and Flood Routing: Types of Reservoir – Investigations for Reservoir Planning, Selection of Site for a Reservoir, Zones of Storage in a Reservoir; Purpose of Reservoir, Design Studies, Reservoir Regulation, Reservoir Yield, Mass Curve and Demand Curve, Determination of Reservoir Capacity, Yield From a Reservoir of given Capacity; Reservoir Losses – Measures To Reduce Evaporation Loss in Reservoirs, Control of Reservoir Sedimentation. Flood Routing – Hydrologic Reservoir Routing by Pulse Method of Routing, Channel Routing by Muskingum Method.

Irrigation: Definition of Irrigation, Types of Irrigation Systems – Direct and Indirect, Lift and Inundation Irrigation Systems, Methods of Irrigation – Surface and Sprinkler Methods, Trickle or Drip Irrigation, Soil Moisture Constants, Depth of Water Held By Soil In Different Zones, Water Extraction – Quality of Irrigation Water, Irrigation Efficiencies – Soil Moisture – Irrigation Relationship – Estimating Depth and Frequency of Irrigation on the Basis of Soil Moisture Re-
gime Concept; Water Requirements of Crops, Duty, Delta and Base Period – Their Relationship, Crops – Seasons, Factors Affecting Duty and Methods of Improving Duty, Consumptive Use of Water – Determination of Evapotranspiration – Blaney-Criddle and Penman Equations and Hargreaves Method (concepts only); Assessment of Irrigation Water Charges.

**Canal Systems:** Classification of Irrigation Canals – Canal Alignment, Design of Unlined Canals, Regime Theories – Kennedy’s and Lacey’s Theories, Critical Tractive Force Method, Design Problems – Balancing Depth; Regulation of Channel System – Canal Outlets, Requirements of a Good Outlet – Types of Outlets; Water Logging – Causes and Control – Land Drainage; Canal Lining – Methods, Design of Lined Canals, Canal Navigation – Requirements, Methods to make Navigability Feasible.

**Text Books**

**Reference Books**
- Impacts of Climate Change and Climate Variability on Hydrological Regimes by Jan C. van Dam, Cambridge University Press.
- Ground Water by H.M.Raghunath, New Age International.

**CV 2204 GEOTECHNICAL ENGINEERING I**

**Course Objectives:**
- To impart knowledge in analysing the composition of the soil matrix and proportioning in developing fundamental relations.
- To understand concepts like plasticity, compressibility, Shear strength, compaction, settlement, etc.
- To identify and classify soils based on their properties.
- To develop skills in the identification of soil characterization when it interacts with water.
- To estimate the magnitude and time rate of settlement due to consolidation.

**Course Outcomes:**
- The student will be able to
  * Analyse soil and identify its nomenclature which helps in deriving its behaviour at various in situ conditions.
  * Apply basic concepts of soil to compute settlements and the bearing capacity of soils.
  * Prediction of seepage characterization under various hydraulic structures.
  * Apply the knowledge of compaction during the construction of roads, embankments, canals etc. on weak soils.
  * Solve practical problems related to consolidation settlement and the time rate of settlement.

**SYLLABUS**

**Introduction:** Soil Formation, Minerals in Clays and Sand, Soil Structure, Physical properties of Soil: Void Ratio, Porosity, Degree of Saturation, Water Content, Unit Weights, Specific Gravity, Weight - Volume Relationships, Relative Density, Consistency Limits and Consistency Indices, Activity.

**Mechanical Analysis and Soil Classification:** Sieve Analysis, Stoke’s Law, Hydrometer and Pipette Analysis, Textural Classification, Classification based on size, Unified Soil Classification and Indian Standard Soil classification systems, Field Identification of Soils.

**Soil Hydraulics:** Types of Soil Water, Capillary Rise and Surface Tension, Darcy’s Law and its Limitations, Constant Head and Variable Head Permeability Tests, Factors effecting coefficient of permeability, Permeability of Stratified Soils. Total, Neutral and Effective Stresses, Effective stress principle, Upward flow conditions, Quick Sand Conditions, Critical Hydraulic Gradient.

**Stress Distribution in Soils:** Boussinesq’s Theory for Determination of vertical stress, Assumptions and validity, Extension to line, strip, Rectangular and Circular loaded areas, Pressure Bulb and Influence Diagrams, Newmark’s Influence Chart- Construction and Use, Westergaard’s Theory, 2:1 Load Dispersion Method, Contact Pressure Distribution beneath Footings.

**Compaction:** Mechanism of Compaction, Factors Effecting Compaction, Laboratory Compaction Tests, Effect of Compaction on Soil Properties, Field Compaction: Compaction Equipment and Evaluation of Field Compaction.

**Consolidation:** Basic Definitions: Compression Index, Coefficient of Compressibility and Coefficient of volume decrease: Spring Analogy for Primary Consolidation: Initial compression, Primary compression and secondary compression, Generation of Effective Stress- Void Ratio relationship from consolidation test: Height of Solids Method and change in Void Ratio method: Determination of Preconsolidation Pressure, Normally consolidated, Over consoli-
dated and under consolidated clays, Terzaghi’s One Dimensional Consolidation Theory - Assumptions, Derivation of differential equation and Solution, Laboratory Determination of coefficient of consolidation by time fitting methods.

**Shear Strength of Soils:** Stress at Point, Mohr circle of stress, Mohr-Coulomb Failure Theory, Shear Parameters, Laboratory Shear Tests- Shear Box, Triaxial and Unconfined Compression Tests, Laboratory and Field Vane Shear Tests, Sensitivity of Clays, Types of Shear Tests based on Drainage Conditions, Total stress analysis and effective stress analysis, Shear Strength of Sands, Critical Void Ratio and Dilatancy, Liquefaction of Soils, Factors affecting Shear Strength of Clays and Sands.

Text Books:

Reference Books:

**CV2205 : CONCRETE TECHNOLOGY**

**Course Outcomes:**
- The student will be able to:
  * Understand the effect of chemical and mineral admixtures on the properties of concrete.
  * Understand the creep, relaxation and shrinkage of concrete.
  * Understand the relation between durability and permeability of concrete.
  * Design the concrete mix as per IS, BS and ACI standards.
  * Understand in detail about the properties and application of special concretes.

**SYLLABUS**

**Chemical and Mineral Admixtures:** Water Reducers, Air Entrainers, Set Controllers, Special Admixtures – Structure, Properties and effects on Concrete Properties. Introduction to Supplementary Cementing Materials and Pozzolans – Fly ash, Blast Furnace Slag, Silica Fume, and Metakaolin– their Production, Properties, and Effects on Concrete Properties; Other Mineral Additives –Reactive and Inert.

**Dimensional Stability and Durability:** Creep and Relaxation –Parameters Affecting; Shrinkage of Concrete –Types and Significance. Parameters affecting Shrinkage: Measurement of Creep and Shrinkage.

**Durability of Concrete:** Introduction to Durability; Relation between Durability and Permeability – Chemical Attack of Concrete; Corrosion of Steel Rebars; other Durability Issues.

**Mix Design:** Review of Methods and Philosophies of IS, BS and ACI Methods, Mix Design for Special Purposes. Acceptance Criteria for Compressive Strength of Concrete

**Special Concretes:** Properties and Applications of High Strength –High Performance Concrete, Reactive Powder Concrete, Lightweight, Heavyweight and Mass concrete; Fibre reinforced Concrete; Self-compacting Concrete; Shotcrete.

Text Books
1. Concrete Technology Theory and Practice by M.S.Shetty, S.Chand& Company Ltd, New Delhi.

Reference Books
CV2206: GEOTECHNICAL ENGINEERING – I LAB

Course Objectives:
* To develop skills to identify and classify different types of soils
* To impart knowledge about different methods of determination of insitu density of soils
* To study the necessity of sedimentation analysis for classifying fine grained soils
* To assess the drainage capacity of different soils
* To understand laboratory methods used for determining density of soil.

Course Outcomes:
The student will be able to
* Perform suitable tests for assessing grain size distribution and classify the soil accordingly
* Select appropriate method for determining field density of soil for a given soil
* Determine specific gravity of coarse and fine grained soils
* Evaluate Permeability of given soil
* Estimate compaction characteristics of soil

LIST OF EXPERIMENTS
1. Atterberg limits
2. Grain density by Core Cutter and Sand replacement method
3. Grain size analysis
4. Hydrometer/pipette analysis
5. Specific gravity by pycnometer/density bottle method
6. Permeability of soil – Constant and variable head tests
7. IS light compaction

DEMONSTRATION EXPERIMENTS:
1. Consolidation test.
2. Quicksand model and others if any.

CV2207: BUILDING MATERIALS LAB

Course Objectives:
* To impart knowledge about various tests used at construction sites.
* To understand the concepts of physical properties of tiles, different bricks, and paver blocks.
* To familiarize the basic properties of fresh and hardened concrete.

* To develop skills to design mix proportions of concrete to arrive at the required strength of concrete with a specific ratio of its ingredients.

Course Outcomes:
The student will be able to
* Understand the concept of the physical properties of concrete ingredients.
* Understand the concepts of physical properties of tiles, different bricks, and paver blocks.
* Conduct various tests on cement, fine aggregate, and coarse aggregate.
* Analyse the properties of fresh and hardened concrete.
* Design mix proportions of concrete.

LIST OF EXPERIMENTS
1. Determination of Specific Gravity and Unit Weight of Cement
2. Determination of Specific Gravity and Unit Weight of Coarse and Fine Aggregates
3. Determination of Normal Consistency of Cement
4. Determination of Initial and Final Setting Time
5. Determination of Fineness of Cement.
6. Determination of Compressive Strength of Cement (for different grades of cement).
7. Determination of flexural strength and water absorption for different tiles.
8. Determination of compressive strength and water absorption for burnt clay and fly ash bricks.
9. Determination of crushing strength and water absorption for different paver blocks.
11. Sieve Analysis of Coarse and Fine Aggregates and Classification as per IS 383.
12. Workability Tests on Green Concrete by using: Slump Cone, Compaction Factor Apparatus, Flow Table, Vee-Bee Consistometer.
13. Tests on Hardened Concrete.
   a. Determination of Compressive Strength
   b. Determination of Split tensile strength
   c. Determination of Modulus of rupture.
14. Design of Concrete Mix by using IS Code Method (for classwork only)

**CV2208 : BUILDING PLANNING AND COMPUTER AIDED DRAWING**

**Course Objectives:**
- To familiarize building components, principles, methods, software, and codes of practices for planning and design of the building.
- To impart knowledge about the elements of climate to the design and construction of buildings.
- Prepare constructional detailed representation drawing of a building.
- Analyze the planning laws and recommendations involved in planning, and building drawings concepts of buildings.
- Design plan and elevation of different types of building with their functional and furniture requirements.

**Course Outcomes:**
- The students will be able to
  - Analyse the various types of residential buildings.
  - Assess different climatic elements to decide the orientation of the building for ventilation.
  - Draw the complete drawing of plan of a residential building.
  - Draw the plan, elevation, and sectional view of the building with functional requirements.
  - Draw the plan using computer drafting tools.

**SYLLABUS**

**Residential Building:** Different types of Residential Buildings


Principles of Planning

**Preliminary Drawing:** (a) Conventional Signs of Materials, Various equipment used in a Residential Building (copying exercise) (b) Plan, Section, and Elevation of a Small House (one room and Verandah) (copying exercise) (c) Plan, Section and Elevation of Two Bed Room House (copying exercise) (d) Plan Section and Elevation of Three Bed Room House in Hot and Humid Zone. (copying exercise). Design of individual Rooms with Particular Attention to Functional and Furniture requirements. Building Regulations and Bye-laws of Residential Buildings;

Drawing the plan, Elevation of Houses with given Functional Requirements and Climatic Data. (emphasis may be given to Hot and Humid zones.)

**AUTOCAD** Drawing of Residential Building.

Text Books
2. Building planning Drawing and Scheduling by Gurucharansingh and Jagadish Singh, Standard Publishers Distributors

Reference Books

**CV2209 : ENVIRONMENTAL SCIENCE**

(Common for all Branches)

**Course Objectives**
- Familiarize the fundamental aspects of environment and the environmental management
  - Provide information of some of the important international conventions which will be useful during the future endeavors after graduation.
  - Make realize the importance of natural resources management for the sustenance of the life and the society.
  - Appraise the impact of pollution getting generated through the anthropogenic activities on the environment.
  - Provide the concept of sustainable development, energy and environmental management.
  - Impart knowledge on the new generation waste like e-waste and plastic waste.

**Course Outcomes**
- At the end of the course the student will be able to:
  - Knowledge on the fundamental aspects of environment and the environmental management
  - The knowledge on the salient features of the important international conventions
  - Understanding of the importance of natural resources management for the sustenance of the life and the society.
SYLLABUS


Natural Resources Management: Importance of natural resources management - Land as resource, Land degradation, Soil erosion and desertification, Effects of usage of fertilizer, herbicides and pesticide - watershed management.

Forest resources: Use and over-exploitation, Mining and dams – their effects on forest ecosystems and the living beings.

Water resources: Exploitation of surface and groundwater, Floods, droughts, Dams: benefits and costs.

Mineral Resources: Impact of mining on the environment and possible environmental management options in mining and processing of the minerals. Sustainable resource management (land, water, and energy), and resilient design under the changing environment.

Environmental Pollution: Local and Global Issues. Causes, effects and control measures. Engineering aspects of environmental pollution control systems.


Energy and Environment: Environmental Benefits and challenges, Availability and need of conventional energy resources, major environmental problems related to the conventional energy resources, future possibilities of energy need and availability. Solar Energy: Process of photovoltaic energy conversion, solar energy conversion technologies and devices, their principles, working and applications, disposal of solar panel after their usage. Biomass Energy: Concept of biomass energy utilization, types of biomass energy, conversion processes, Wind Energy, energy conversion technologies, their principles, equipment and suitability in the context of India.

Management of plastic waste and E-waste: Sources, generation and characteristics of various e- and plastic wastes generated from various industrial and commercial activities; Waste management practices including onsite handling, storage, collection and transfer. E-waste and plastic waste processing alternatives. E-Waste management rules and Plastic waste management rules, 2016 and their subsequent amendments.

Text Books:

Reference Books: