COURSE STRUCTURE AND DETAILED SYLLABUS

# UNDER CBCS FOR

**B.Tech (CIVIL ENGINEERING)**

**I YEAR - I and II Semesters**

# (Applicable for the batches admitted from AY: 2022-23)

(A-22)



**DEPARTMENT OF CIVIL ENGINEERING SREENIDHI INSTITUTE OF SCIENCE AND TECHNOLOGY**

## (AUTONOMOUS)

**Yamnampet, Ghatkesar, Hyderabad – 501 301 (*Accredited by NAAC with A+ Grade*)**

# Approved by AICTE, New Delhi and Affiliated to JNTUH Hyderabad

**Website:** [**www.sreenidhi.edu.in**](http://www.sreenidhi.edu.in/)

# VISION

Be the Pioneer to mould the Students into Planners, Designers and Entrepreneurs by making them as Stewards of Natural Environment and Infrastructural Facilities by adopting Innovative Practices of Civil Engineering

# MISSION

1. Promote the students by imparting the quality education to meet the needs of industry & higher education
2. Inculcate the culture of innovation and entrepreneurship skills among students
3. Achieve academic/research excellence through the services of the department faculty

# PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

I. Graduates will have a strong foundation in fundamentals of mathematics, natural and environmental sciences, and basic engineering skills with abilities of problem analysis, design and development of optimal solutions to engineering problems.

II. Graduates can apply the knowledge of theory, tools of investigation, and use of modern tools to solve complex problems and become professionally competent and globally employable engineers to assess health, safety, legal, societal, and environmental and sustainable issues maintaining ethical principles.

III. Graduates will have ability to work effectively as an individual, a team member, a leader or an entrepreneur with awareness of gender sensitiveness apart from having good communication, project and finance management skills.

IV. Encouraging the graduates to pursue higher studies in internationally reputed institutes or research and development activities thus making them life-long learners.

# PROGRAMME OUTCOMES (PO)

The Programme Outcomes (POs) of the B.Tech (Civil Engineering) programme are listed below:

Engineering Graduates will be able to:

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and specialization of Civil Engineering to the solution of complex engineering problems.
2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. Conduct investigations of complex problems: Use research-based knowledge and research methods in the area of Civil Engineering including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools useful for Civil Engineering and related areas including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. Communication: Communicate effectively on complex Civil Engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member

and leader in a team, to finalize technical and financial aspects of a project and to manage in multidisciplinary environments.

1. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological changes through individual/group assignments such as technical seminars, lab projects, group projects, mini and main projects in the area of Civil Engineering or in multi disciplinary areas.

# PROGRAMME SPECIFIC OUTCOMES (PSO)

1. Develop a strong foundation of basic sciences and its applications for Civil Engineering Problems, apply the concepts of analysis and investigation using modern tools to design and solve Civil Engineering problems. [CORE]
2. Possess professional skills to investigate, analyze, and design practical solutions to Civil Engineering problems such as basic structures design, basic water conveyance and treatment systems design, basic transportation systems design, and basic survey maps and building drawings development, etc. [Practical]
3. Comprehend and apply technological advancements for real life engineering problems using modern instruments and modern analytical and software tools to analyze, plan, design, and implement solutions. [Tools]
4. Possess skills to communicate, be a team member, demonstrate professional ethics and exhibit concern for societal and environmental wellbeing for sustainable professional development. [ENV, Team, Society and Lifelong learning, professional]

## SREENIDHI INSTITUTE OF SCIENCE AND TECHNOLOGY

**(AUTONOMOUS)**

## B.Tech (CIVIL ENGINEERING)

**I-YEAR COURSE STRUCTURE & SYLLABUS (A22 Regulations)**

## (Applicable from AY 2022-23 Batch)

### I YEAR I SEMESTER

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S.**  **No** | **Course Code** | **Subject** | **L** | **T** | **P** | **C** | **Max Marks** | |
| **CIE** | **SEE** |
| 1 | 9HC06 | Applied Physics | 2 | 1 | 0 | 3 | 40 | 60 |
| 2 | 9FC01 | Problem solving using C | 3 | 0 | 0 | 3 | 40 | 60 |
| 3 | 9HC11 | Matrix Algebra and  Calculus | 2 | 1 | 0 | 3 | 40 | 60 |
| 4 | 9HC01 | Essential English Language  Skills | 2 | 0 | 0 | 2 | 40 | 60 |
| 5 | 9HC61 | Oral Communication Lab – I | 0 | 0 | 2 | 1 | 40 | 60 |
| 6 | 9HC65 | Applied Physics Lab | 0 | 0 | 3 | 1.5 | 40 | 60 |
| 7 | 9FC61 | Problem Solving using C  Lab | 0 | 0 | 3 | 1.5 | 40 | 60 |
| 8 | 9BC01 | Engineering Graphics | 1 | 0 | 4 | 3 | 40 | 60 |
| 9 | 9HC18 | Induction Program | 2-weeks in the beginning of the semester | | | | Satisfactory/ Not Satisfactory | |
|  |  | **Total** | **10** | **2** | **12** | **18** | **320** | **480** |

**I YEAR II SEMESTER**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S.**  **No** | **Course code** | **Subject** | **L** | **T** | **P** | **C** | **Max Marks** | |
| **CIE** | **SEE** |
| 1 | 9HC04 | Engineering Chemistry | 2 | 1 | 0 | 3 | 40 | 60 |
| 2 | 9EC01 | Data Structures | 3 | 0 | 0 | 3 | 40 | 60 |
| 3 | 9HC12 | Advanced Calculus | 2 | 1 | 0 | 3 | 40 | 60 |
| 4 | 9K201 | Engineering Mechanics  (for civil engineering) | 2 | 1 | 0 | 3 | 40 | 60 |
| 5 | 9HC64 | Engineering Chemistry  Lab | 0 | 0 | 3 | 1.5 | 40 | 60 |
| 6 | 9EC61 | Data Structures using C  Lab | 0 | 0 | 3 | 1.5 | 40 | 60 |
| 7 | 9HC62 | Oral Communication Lab -  II | 0 | 0 | 3 | 1.5 | 40 | 60 |
| 8 | 9BC61 | Workshop/Manufacturing  Processes Lab | 0 | 1 | 3 | 2.5 | 40 | 60 |
|  |  | **Total** | **9** | **4** | **12** | **19** | **320** | **480** |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| **II YEAR I SEMESTER** | | | | | | | | |
| **S. No** | **Subject**  **Code** | **Subject** | **L** | **T** | **P/D** | **C** | **Max Marks** | |
|  |  |  |  |  |  |  | **CIE** | **SEE** |
| 1 | 9HC13 | Complex Variables and Statistics | 2 | 1 | 0 | 3 | 40 | 60 |
| 2 | 9K301 | Strength of Materials – I | 2 | 1 | 0 | 3 | 40 | 60 |
| 2 | 9K302 | Fluid Mechanics | 2 | 1 | 0 | 3 | 40 | 60 |
| 4 | 9K303 | Surveying | 3 | 0 | 0 | 3 | 40 | 60 |
| 5 | 9K304 | Building Materials and Construction Planning | 3 | 0 | 0 | 3 | 40 | 60 |
| 6 | 9HC63 | Soft Skills Lab | 0 | 1 | 2 | 2 | 40 | 60 |
| 7 | 9K371 | Strength of Materials Laboratory | 0 | 0 | 3 | 1.5 | 40 | 60 |
| 8 | 9K372 | Survey Laboratory | 0 | 0 | 3 | 1.5 | 40 | 60 |
| 9 | 9K373 | Computer Aided Drafting of Building Laboratory | 0 | 0 | 3 | 1.5 | 40 | 60 |
| **Total** | | | | | | **21.5** | **360** | **540** |
| **II YEAR II SEMESTER** | | | | | | | | |
| **S. No** | **Subject**  **Code** | **Subject** | **L** | **T** | **P/D** | **C** | **Max Marks** | |
|  |  |  |  |  |  |  | **CIE** | **SEE** |
| 1 | 9K405 | Strength of Materials – II | 2 | 1 | 0 | 3 | 40 | 60 |
| 2 | 9K406 | Structural Analysis-I | 2 | 1 | 0 | 3 | 40 | 60 |
| 3 | 9K407 | Hydraulics and Hydraulic Machinery | 2 | 1 | 0 | 3 | 40 | 60 |
| 4 | 9K408 | Concrete Technology | 3 | 0 | 0 | 3 | 40 | 60 |
| 5 | 9K409 | Engineering Geology | 3 | 0 | 0 | 2 | 40 | 60 |
| 6 | 9AC48 | Basics of Electrical and Electronics Engineering | 3 | 0 | 0 | 3 | 40 | 60 |
| 7 | 9HC05 | Environmental Science | 3 | 0 | 0 | 0 | P/F | |
| 8 | 9K474 | Fluid Mechanics and Hydraulic Machinery Laboratory | 0 | 0 | 3 | 1.5 | 40 | 60 |
| 9 | 9K475 | Engineering Geology Laboratory | 0 | 0 | 3 | 1.5 | 40 | 60 |
| 10 | 9AC95 | Basic Electrical and Electronics Engineering Lab | 0 | 0 | 3 | 1.5 | 40 | 60 |
| 11 | 9K476 | Technical Seminar | 0 | 1 | 0 | 1 | 100 | - |
| **Total** | | | | | | **22.5** | **460** | **540** |

### 9HC06: APPLIED PHYSICS

(Common to Civil Engg and Mech Engg)

### I Year I Sem

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P** | **C** |
| **2** | **1** | **0** | **3** |

**Course Objectives**

* + To understand basic fundamentals of crystallography, crystal structures and their properties.
  + To understand the various defects of a crystal.
  + To know the various types of vibrations, radius of gyration, moment of inertia and Ultrasonics and their importance.
  + To make the students to widen the conceptual understanding of the fundamental principles of interference and diffraction.
  + To understand the basic concepts of normal light, Laser and its applications and to know about the fundamentals of radioactivity and its applications.
  + To discuss about the nano-technology, preparation techniques and characterization (XRD & TEM), CNTs.

### Unit:1

**Fundamentals of Crystal structures and Miller Indices** (9 Periods)

Unit Cell, Space Lattice, Lattice Parameters, Crystal Systems, Bravais Lattices, Atomic Radius, Co-ordination Number and Atomic packing factor.Calculation of Atomic Packing Factor of SC, BCC, FCC and HCP structures.Crystal directions and Planes, Miller Indices and Inter Planar Spacing of Simple Cubic Crystal Systems.

### Unit:2

**Crystal Imperfections**

Point Defects: Vacancies, Interstitials and substitutional. Frenkel and Schottky Defects and Calculations of their concentrations.Qualitative treatment of line defects. Representation of Burger vector, burger circuit and it's significance.

### Unit:3

**Vibrations and Ultrasonics Vibrations:**

Free vibrations and setting up of a differential equation and its solutions. Damped, forced vibrations and resonance (qualitative). Calculation of moment of inertia of a circular disc. Applications: Compound Pendulum and Torsional Pendulum.

### Ultrasonics:

Production of ultrasonics by Magnetostriction method and piezoelectric method, Applications of Ultrasonics.

### Unit:4 Wave optics

**Interference**: Superposition of waves, Young’s double slit experiment and calculation of resultant Intensity and wave pattern discussion. Interference in thin films due to reflection of light-Newton’s rings, Calculation of refractive Index of a liquid using Newton's rings.

**Diffraction:** Plane diffraction grating and resolving power of a grating. Calculation of wavelength of a spectral line by using diffraction grating.

**Unit:5**

**Lasers and Nuclear Energy Lasers:**

Characteristics of LASER, Spontaneous and Stimulated Emission of Radiation, Einstein’s Coefficients and their significance. Meta-stable State, Pumping, Population Inversion and optical resonator. Ruby Laser, Helium-Neon Laser, Semiconductor Diode Laser, Applications of Lasers.

**Nuclear Energy:** Mass Defect, binding energy, Nuclear fission, Nuclear fusion. Radioactive disintegration: , β, γ particles and their properties.

**Unit:6**

**Nano materials and their fabrication:**

Origin of Nanotechnology, Nano Scale, Surface to Volume Ratio, Quantum Confinement Effect, Bottom-up Fabrication: Sol-gel method, Chemical Vapor Deposition technique (CVD). Top-down Fabrication: Ball Milling, Characterization of Nano materials (XRD & TEM), Carbon Nano Tubes (CNTs), Applications of Nano Materials.

**Text Books:**

**1.** Engineering Physics by M.N. Avadhanulu, P.G. Kshirsagar and TVS Arun Murthy. S. Chand publications.

**Reference Books:**

1. Charles Kittel, Introduction to Solid State Physics.
2. Dekker - Solid State Physics
3. Halliday and Resnick, Physics
4. Engineering Mechanics by S.S. Bhavikatti& J.G. Rajasekharappa.
5. Theory of Vibrations with Applications – WT Thomson
6. S.O. Pillai, Solid State Physics
7. A. Ghatak – Optics

**Course Outcomes**

After completing the course the students are able to

* + Get the knowledge to classify the crystal structures, their parameters and draw the various crystal planes using Miller indices.
  + Understand and analyze the various crystal defects-its types.
  + Understand about the vibrations, radius of gyration, moment of inertia and ultrasonic.
  + Analyze the wave nature of light, superposition principle, differentiation between interference, diffraction and their applications
  + Explain about the types of emissions, laser principle, working of different types of lasers and their applications. To understand the nuclear fission and fusion, radioactivity emission of alpha, beta and gamma rays.
  + To understand the nano& bulk concepts, surface to volume ratio, quantum confinement, CNTs and preparation methods. Analysis techniques like XRD & TEM.

### 9FC01: PROBLEM SOLVING USING C

(Common to all branches)

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P** | **C** |
| **3** | **0** | **0** | **3** |

### I Year I semester

#### Course Objectives:

1. To acquire problem solving skills
2. To be able to develop flowcharts
3. To understand structured programming concepts
4. To be able to write programs in C Language

#### Course Outcomes:

After completion of the course, the student will be able to:

1. Formulate simple algorithms for arithmetic, logical problems and to translate thealgorithms to programs(in C language)
2. Execute and test the programs and correct syntax and logical errors, to implementconditional branching, iteration and recursion
3. Distinguish a problem into functions and synthesize a complete program using divideand conquer approach.
4. Understand arrays, pointers and structures to formulate algorithms and programs.
5. Analyse programming to solve matrix addition and multiplication problems andsearching and sorting problems.
6. Understand programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.

### UNIT I

**Problem solving Techniques –** Algorithms, pseudo code, flowcharts with examples **Introduction to Computer Programming Languages** – Machine Languages, Symbolic Languages, High-Level Languages,

**Introduction to C language –** Characteristics of C language, Structure of a C Program. Syntax and semantics.

Data Types, Variables – declarations and initialization, formatting input and output.

### UNIT – II

**C Tokens:** Identifiers, Keywords, Constants, variables and operators

**Expressions** – Arithmetic expressions, Precedence and Associativity, evaluating expressions, **Decision control structures** – if, Two-way selection – if else, nested if, dangling else, Multi- way selection – else if ladder and switch.

**Repetitive control structures** – Pre-test and post-test loops – initialization and updation, while, do while and for loop and nested loops.

**Unconditional statements:** break, continue and goto statements with examples.

### UNIT III

**Arrays** – Definition and declaration, initialization, accessing elements of in arrays, storing values in arrays,

* 1. arrays, 2-D arrays, character arrays and multidimensional arrays.

**Function and arrays:** passing individual elements to arrays, passing 1-D array, 2-D array to function.

**Applications:** Linear search, matrix addition, subtraction, multiplication and transpose

### UNIT – IV

**Functions** – User – defined functions - Function definition, arguments, return value, prototype, arguments and parameters, inter-function communication. Standard functions – Math functions. Scope – local, global.

**Parameter passing –** Call by value and call by reference.

**Recursive functions –** Definition, examples, advantages and disadvantages.

**Macros** – Definition, examples, comparison with functions.

**Storage Classes –** auto, extern, static and Register

### UNIT V

**Introduction to Pointers** – pointer constants, pointer values, pointer variables, accessing variables through pointers, pointer declaration and definition, declaration versus redirection, initialization of pointer variables, Pointer for inter function communication, pointer to pointers, pointer to function.

**Arrays and pointers –** Pointer arithmetic and arrays, array of pointers

**Strings** – Declaration, Initialization, Input and Output functions, strings and pointer, string handling functions.

### UNIT VI

**Files** – Concept of a file, streams, text and binary files, stream file processing, system created steams, Standard library I/O functions, file open and close, formatting I/O functions, character I/O functions, Binary I/O, command line arguments, file status functions

,positioning functions.

Applications: Basic operations on files.

### Text Books:

* + 1. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
    2. Let Us C by [Yashavant Kanetkar](https://www.amazon.in/s/ref%3Ddp_byline_sr_book_1?ie=UTF8&field-author=Yashavant%2BKanetkar&search-alias=stripbooks)

### Reference Books:

1. Programming in C (2nd Edition) by Ashok N Kamthane
2. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language Prentice Hall of India

### 9HC11: MATRIX ALGEBRA AND CALCULUS

(Common to all branches)

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P** | **C** |
| **2** | **1** | **0** | **3** |

### I year I Semester

**Pre Requisites**: Mathematics Knowledge at Pre-University Level

### Course Objectives:

* 1. Basic operation of matrices and about the linear system and some analytical methods for solution.
  2. Concept of Eigen value and Eigen vector and their properties and applications.
  3. Quadratic form and its properties.
  4. Mean value theorems and their applications to the given functions, series expansions of a function.
  5. Various analytical methods to solve first order first degree and also the equations not of first degree ordinary differential equations.
  6. Methods to solve higher order ordinary differential equations.

### Course Outcomes:

After the course completion the students will be able to

1. Check the consistency or inconsistency of a linear system and can solve the problems.
2. Find the Eigen values and Eigen vectors and can solve the problems associated with these concepts.
3. Find the nature, index and signature of the quadratic form.
4. Verify the applicability of mean value theorems and also can express the given standard function in series form using Taylor’s and Maclaurin series.
5. Find the solutions of first order first degree differential equations and solve the problems on Newton’s law of cooling, Natural growth and decay.
6. Solve higher order ordinary differential equations with constant coefficients using some standard methods.

### UNIT-I

**System of Linear Equations:** Elementary row/column operations -Echelon form, Rank of a matrix, Inverse of a matrix by Gauss Jordan method, Non-Homogenous and Homogenous system of linear equations- consistency or inconsistency of a system, Gauss Elimination method, Rank method and problems, Symmetric, Skew-symmetric and Orthogonal matrices.

### UNIT-II

**Eigen values and Eigen vectors:** Definitions and Properties (without proofs). Evaluation of Eigen values and Eigenvectors for a given matrix, Cayley-Hamilton Theorem (without proof) and its applications in finding higher powers & inverse of a matrix, Diagonalization of a matrix, Hermitian, Skew-Hermitian and Unitarymatrices.

### UNIT-III

**Quadratic forms:** Quadratic forms, Nature, rank, index and signature of a quadratic form. Reduction of quadratic form to canonical form

### UNIT-IV

**Single Variable Calculus:** Rolle’s Theorem, Lagrange’s and Cauchy’s mean value theorems (without proof); Taylor’s and Maclaurin’s series (without proof) and their application for series expansions of standard functions.

### UNIT-V

**First order ODE:** Exact differential equations, equations reduced to exact, Linear and Bernoulli’s equations, Newton’s law of cooling, Law of natural Growth/Decay.

### UNIT-VI

**Higher order ODE:** Higher order linear differential equations with constant coefficients- Complementary function, Particular Integral, Method of variation of parameters.

### Text Books:

1. R K Jain and S R K Iyengar Advanced Engineering Mathematics, Narosa Publications.
2. B.S. Grewal, Elementary Engineering Mathematics, Khanna Publishers
3. Alan Jeffery, Advanced Engineering Mathematics, Academic Press
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint,2010.
5. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006.

### 9HC01: ESSENTIAL ENGLISH LANGUAGE SKILLS

(Common to all branches)

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P** | **C** |
| **2** | **0** | **0** | **2** |

### I Year I semester

**Course Objectives:**

### To enable students to:

* Recognize and distinguish between different parts of speech
* Learn the correct usage of articles in sentences
* Write sentences using tenses
* Identify when each punctuation marks is needed and its correct usage
* Recognize the difference between direct and indirect speech and form statements in them Understand the appropriate use of active and passive voice in certain context

### Course Learning Outcomes:

After completion of the course, the student will be able to:

* Demonstrate competence with suitable accuracy in vocabulary, and language fluency.
* State the definition of nouns, verbs, adjectives, and adverbs.
* Identify the differences of each tense and use the tenses accurately.
* Identify specialized reading strategies for specific types of texts

Produce written work that is substantive, organized, and grammatically accurate

UNIT I **Vocabulary-1**

* 1. Root words
  2. Synonyms and Antonyms
  3. Homonyms, Homophones and Homographs
  4. One word substitutes UNIT II **Vocabulary-2**
  5. Idioms and Phrases
  6. Confusables

UNIT III **Grammar-1**

* 1. The Parts of Speech
  2. Use of Articles
  3. Omission of Articles

UNIT – IV **Grammar-2**

* 1. Tenses
  2. Prepositions
  3. Concord

UNIT – V **Reading & Writing**

* 1. Techniques of Reading, Reading Comprehension
  2. Kinds of Sentences
  3. Punctuation

UNIT – VI **Writing-2**

* 1. Voice – Active voice and Passive Voice
  2. Speech-Direct & Reported Speech
  3. Common errors in English

Suggested Reading & References:

1. Word Power Made Easy by Norman Lewis
2. English Grammar In Use: A Self Study Reference And Practice Book Intermediate Learners Book by Raymond Murphy
3. The Logic of English Words by Logophilia Education
4. English Vocabulary In Use Elementary Book With Ans And Cd-Rom by Felicity Odell (Second Edition)
5. Effective Technical Communicatioin by M. Ashraf Rizvi
6. Intermediate grammar usage and composition; M.L.Tickoo, A.E.Subramanian, P.R.Subramanyam; OBS
7. An Interactive Grammar to Modern English by Shivendra K. Verma and Hemalathaagarajan,Frank Bros. & Co.

### I year I semester

**9HC61: ORAL COMMUNICATION LAB –I**

(Common to all branches)

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P** | **C** |
| **0** | **0** | **2** | **1** |

### Course Objectives:

**To enable students to:**

* Comprehend the basic tactics to communicate effectively and set a road map to achieve their communication goals.
* Know the importance of pronunciation in effective communication and work on mitigating the MTI in their spoken English;
* Communicate in proper tense with conviction and also frame and pose questions aptly. Describe people, objects and situations, using appropriate vocabulary, phrases and sequencing of ideas.
* Use the right English language expressions in varying real life contexts. Develop skill of narration through listening and coordination of ideas.

### Course Learning Outcomes:

After completion of the course, the student will be able to:

* Describe people, objects and situations using simple sentences.
* Use appropriate tenses and expressions in different contexts of conversations.
* Identify major areas of concern in their oral communication and address them.

Create a SMART plan to enhance their communication skills in English

### Unit 1: Communication Skills

Communication basics, essential elements of effective communication, barriers to Communication, setting SMART communication goals.

### Activities:

* Ice-breaking activities
* Personal Communication SWOT Analysis Communication Case Studies: The Terrible &The Terrific **Unit 2: Pronunciation Matters**

Importance of pronunciation, neutralizing mother tongue interference (MTI).

### Activities:

* Odd Word Out
* Minimal Pairs Masti Shadow reading

### Unit 3: Use apt expressions in diverse situations

Self-introduction, Greetings, apologizing, complimenting, inviting, complaining etc.

### Activity:

Role play in different contexts using the appropriate expressions

### Unit 4:Mind your Tenses

Describing present and past habits, states, and events. Talking about actions in progress, elating past to the present, talking about the future.Framing questions. (confirmation/informationuestions)

### Activities:

* Speaking activity on daily routine, how students spent their recent vacation, speaking about their childhood, speaking about future plans.
* Dumb Charades (Present/Past continuous - Present/ Past perfect) Guessing game (10/20 yes or no questions)

**Unit 5: Hone your Describing skills** Describing people, objects, and situations **Activities:**

* Picture descriptions.
* Guessing games - listening to the descriptions.
* Narrating memorable incidents from life.
* Describe your ideal world Once upon a time……

### Unit 6: The Art of Storytelling

Story telling for career success, the basics of story telling

### Activities:

* Building stories - chain activity.
* Story prompts activity. Narrate the story. (all the hints are given except linking words and tenses)

Suggested Reading & References:

* An Interactive Grammar of Modern English” by Shivendra K Verma and HemalathaNagarajan, Frank Bros. & Co.
* “Skill Sutras” by JayashreeMohanraj, Prism Books Pvt. Ltd.
* “Better English pronunciation” by J.D. Connor.
* “Effective Communication” John Adair, Pan Macmillan Ltd.
* “Body Language”, by Allan Pease, Sudha Publications.
* “Communicative English”, by Hariprasad M. and Prakasam V, Neel Kamal Publications.

### I year I Sem

**9HC65: APPLIED PHYSICS LAB**

(Common to Civil Engg and Mech Engg)

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P** | **C** |
| **0** | **0** | **3** | **1.5** |

**Course Objectives**

* + Explain about the acceleration due to gravity and radius of gyration and periodic vibrations.
  + To understand the rigidity modulus and periodic vibrations.
  + Explaining about the electrical resonance by using the LCR circuit.
  + To know the time constant of RC circuit.
  + To understand the transverse laws of vibrations of stretched strings.
  + To explain the electrically vibrating tuning fork by using Melde’s experiments.
  + Explain the formation of Newton’s rings based on interference pattern.
  + Discussion of diffraction pattern using the grating.
  + To study the LED characteristics and its forward resistance.
  + To understand the dispersive power of prism.
  + To explain about magnetic induction, Biot-Savart Law.

**List of Experiments**

* 1. **Compound Pendulum:**

-Determination of acceleration due to gravity and radius of gyration using compound pendulum.

### Torsional Pendulum:

-Determination of rigidity modulus of a given material of wire using Torsional pendulum.

### LCR Circuit:

-Study of series and parallel resonance of a LCR circuit.

### RC Circuit:

-Determination of time constant of a RC-circuit.

### Sonometer:

Verification of laws of transverse vibrations of a stretched string.

### Melde’s Experiment:

-Determination of frequency of an electrically vibrating tuning fork using Melde’s experiment.

### Newton’s Rings:

-Determination of wavelength of a monochromatic light source by using Newton’s rings experiment.

### Diffraction Grating:

-Determination of wavelength of a given laser source of light by using diffraction grating in normal incidence method.

### Light Emitting Diode (LED):

-Studying the characteristics and calculating the forward resistance of a LED.

### Dispersive Power:

-Calculation of dispersive power of a given material of prism by using spectrometer.

### Stewart-Gee’s Experiment:

-Determination of magnetic induction flux density along the axis of a current carrying circular coil using Stewart and Gee’s experiment.

**NOTE**: Any **TEN** of the above experiments are to be conducted.

**Course Outcomes**

After completing the experiment, students are able to

* + Analyze the concept of radius of gyration and periodic vibrations,modulus-types, stress, strain and Hook’s law.
  + Analyze the LCR circuit combination, parallel, series, electrical resonance, fundamentals of R & C and time constant.
  + Demonstrate the resonance concept, transverse laws of stretched strings, Sonometer, types of waves.
  + Understand the concepts of interference, conditions, formation of Newton’s rings- reason.
  + Recognize the difference between the interference and diffraction, grating, laser characteristics, LED and forward resistance.
  + Know about the light properties, dispersion, prism, minimum deviation,fundamentals of magnetic induction, Ampere’s law, Oersted’s law and the Biot-Savart law.

### 9FC61: PROBLEM SOLVING USING C LAB

(Common to all branches)

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P** | **C** |
| **0** | **0** | **3** | **1.5** |

### I Year I Semester

**Course Objectives:**

1. To be able to understand the fundamentals of programming in C Language
2. To be able to write, compile and debug programs in C
3. To be able to formulate problems and implement in C.
4. To be able to effectively choose programming components.
5. To solve computing problems in real-world.

**Course Outcomes:**

After completion of this course student will learn

1. Enumerate the algorithms for simple problems
2. Classify the given algorithms to a working and correct program
3. Correct the syntax errors as reported by the compilers
4. Identify and correct logical errors encountered at run time
5. Write iterative as well as recursive programs
6. Represent data in arrays, strings and structures and manipulate them through a program
7. Declare pointers of different types and use them in defining self referential structures.
8. Create, read and write to and from simple text files.

### [The laboratory should be preceded or followed by a tutorial to explain the approach or algorithm to be implemented for the problem given.]

1. **Unit I (Cycle 1)**
   1. Write an algorithm for converting a given Celsius temperature to its equivalent Fahrenheit temperature and draw a flowchart.
   2. Write an algorithm to find the largest of three given numbers and draw a flowchart.
   3. Write an algorithm and draw a flowchart for finding the roots and nature of roots of a quadratic equation, given its coefficients.
   4. Write an algorithm and flowchart for finding the first n Fibonacci numbers, give n.

### Unit II (Cycle 2)

* 1. Write an algorithm, flowchart, and C program for:
  2. Finding the area and circumference of a circle of given radius.
  3. Finding the volume of a sphere of given radius.
  4. Finding the lateral surface area of a right circular cone of given base radius and height.
  5. Finding selling price of an item, given its cost price and profit percent.
  6. Finding the interest on a given principal for a given period of time at a given rate of per year.
  7. Write a C program to display all the sizes of data types in C.
  8. Write a C program to display a given decimal integer into an equivalent octal number and hexadecimal number using %o and %x in printf function.

### Unit II (Cycle 3)

* 1. Write a C program to find the roots and nature of the roots of a quadratic equation, given its coefficients.
  2. Write a C program for finding the largest of three given numbers.
  3. A salesman gets a commission of 5% on the sales he makes if his sales is below Rs.5000/- and a commission of 8% on the sales that exceeds Rs.5000/- together with Rs.250/-. Write an algorithm or a flowchart and develop C program for computing the commission of the salesman, given his sales.
  4. Write a C Program to demonstrate Marcos.

### Unit II (Cycle 4)

* 1. Write three C programs to print a multiplication table for a given number using while, do-while, and for loops.
  2. Write a C program to compute the sum of:
  3. 1+x+x2+x3+ +xn, given x and n.

4. 1! + 2! + 3! + + n!, given n.

5. 1 – x2/2! + x4/4! – x6/6! + x8/8! – x10/10! + … to n terms where the nth term becomes less than 0.0001.

### Unit II (Cycle 5)

* 1. Write a C program in the menu driven style to perform the operations +, -, \*, /, % between two given integers.
  2. Write a C program to find the largest and the least of some numbers given by the user.
  3. Write a C program to find the sum of the digits of a positive integer.

### Unit III (Cycle 6)

* 1. Write a program to store the numbers given by the user in an array, and then to find the mean, deviations of the given values from the mean, and variance.
  2. Write a C program to initially store user given numbers in an array, display them and then to insert a given number at a given location and to delete a number at a given location.
  3. Write a program to store user given numbers in an array and find the locations of minimum and maximum values in the array and swap them and display the resulting array.

### Unit III (Cycle 7)

* 1. Write a C program to implement the operations of matrices – addition, subtraction, multiplication.
  2. Write a program to find whether a given matrix is symmetric, lower triangular, upper triangular, diagonal, scalar, or unit matrix.

### Unit IV (Cycle 8)

* 1. Write C functions for the following:
     1. A function that takes an integer n as argument and returns 1 if it is a prime number and 0 otherwise.
     2. A function that takes a real number x and a positive integer n as arguments and returns xn.
     3. A function that takes a positive integer n as an argument and returns the nth Fibonacci number.
  2. Using recursion write C functions for the following:
     1. Factorial of a non-negative integer n.
     2. Number of combinations of n things taken r at a time.
     3. Greatest Common Divisor of two integers.
     4. Least Common Multiple of two integers.

### Unit IV (Cycle 9)

1. Write a menu driven style program to compute the above functions (cycle 6) on the choice of the function given by the user.
2. Define macros for the following and use them to find sum of the squares of the minimum and maximum of two given numbers.
   1. Larger of two numbers.
   2. Smaller of two numbers.
   3. Sum of the squares of two numbers.
3. Write a program to generate Pascal’s triangle.
4. Write a program to count the number of letters, words, and lines in a given text.

### Unit V (Cycle 10)

* 1. Write a function to swap two numbers.
  2. Write a function to compute area and circumference of a circle, having area and Circumference as pointer arguments and radius as an ordinary argument.

### Unit VI (Cycle 11)

* 1. Write a program to:

Create a file by the name given by the user or by command line argument and add the text given by the user to that file.

* + 1. Open the file created above and display the contents of the file.
    2. Copy a file into some other file, file names given by the user or by command line arguments.
    3. Append a user mentioned file to another file.
    4. Reverse the first n characters of a file.

### Cycle 12:

Case study on Electricity Billing, Restaurant Billing System.

### I Year I semester

**Pre Requisites**: Nill

# 9BC01: ENGINEERING GRAPHICS

(Common to all branches of Engg)

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| **L** | **T** | **P** | **C** |
| **1** | **0** | **4** | **3** |

### Course objectives:

1: To teach students the basic principles of Engineering graphics and instruments used and construct curves.

2: To introduce the concept of projections in drawing and its applications for simple drawing entities ie points and lines.

3: To impart the knowledge of various types of planes and solids and their projections in different position wrt principle planes

4: To teach the concept of sections of solids and their developments.

5: To develop a clear understanding of the basic principles involved in three dimensional Engineering drawings.

6: To teach conversion from three dimensional drawing to two dimensional drawing and introduce the concepts of CAD.

### Course outcomes

After completing this course, the student will able to:

1. Get familiar to use the instruments to solve the engineering problem and draw various type of curves used in engineering
2. Understand Orthographic projections and draw projections of simple drawing entities such as points Lines.
3. Draw projections of different types of regular Planes, solids in various positions wrt principal planes of projection.
4. Draw Sections of various Solids including Cylinders, cones, prisms and pyramids and draw the developments of these solids and their sections.
5. Construct Isometric Scale, Isometric Projections and Views.
6. Convert Isometric to orthographic views and understand basic sketching using computer aided design (CAD) software.

### UNIT – I

**Introduction to Engineering Drawing**: Drawing Instruments and their uses, types of lines, Lettering, Dimensioning-Terms & notations, placing of dimensions, general rules of dimensioning, **Scales**(concepts).**:**RF,Reducing, Enlarging and Full Scales

**Curves**: Conic Sections including Rectangular Hyperbola - General method, Cycloid and Involutes of circle.

### UNIT – II

**Orthographic Projection:** Principles of Projection – Methods of projection, First angle and third angle projections.

**Projections :**Projections of Points, Projections of straight lines –line inclined to one plane and line inclined to both reference planes.

### UNIT –III

**Projections of regular Planes:** types of planes, plane inclined to one reference plane, Oblique planes

**Projections of regular Solids:** types of solids, Projections of: Prisms, Cylinders, Pyramids, Cones – simple position and axis inclined to one plane only

### UNIT –IV

**Sections and sectional views of Solids:** Sections and Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid – Auxiliary views.

**Development of Surfaces:** Methods of development, Development of lateral Surfaces of Right Regular Solids – Prisms, Cylinders, Pyramids, Cones and their sections.

### UNIT – V

**Isometric Projection:** Introduction, Isometric axes, lines and planes, Isometric Scale – Isometric drawing or View – Isometric drawing of planes and simple solids such as prisms, pyramids, cylinder, cone.

### UNIT –VI

Conversion of isometric views to orthographic views of simple objects.

**Introduction to CAD :** Benefits of CAD, Graphic input and output devices - Function performed by CAD Software, AUTOCAD-Drawing Entities, Editing commands.

### Text Book:

Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House (In First-angle Projection Method)

### Reference Books:

1. Shah, M.B. &Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
2. Agrawal B. &Agrawal C. M. (2012), Engineering Graphics, TMH Publication
3. AUTOCAD Software Theory and User Manuals

### I year II Semester Course Objectives:

**9HC04: ENGINEERING CHEMISTRY**

(Common to all branches of Engg)

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| **L** | **T** | **P** | **C** |
| **2** | **1** | **0** | **3** |

* 1. To understand microscopic chemistry in terms of atomic and molecular orbital’s
  2. To learn the preparation and applications of commercial polymers and lubricant materials
  3. To learn the industrial problems caused by water and municipal water treatment
  4. To acquire knowledge about different types of batteries and their working mechanism
  5. To develop the concepts and types of corrosion, control methods and protectivecoatings
  6. To learn the chemical reactions that are used in the synthesis of drug molecules

#### Course Outcomes:

After completion of the course, the student will be able to:

1. Understand and analyze microscopic chemistry in terms of atomic orbital’s, molecularorbital’s and intermolecular forces.
2. Identify and differentiate polymers, thermoplastic, thermosetting plastics and variouslubricants.
3. Recognize and select the domestic and industrial problems caused by hard water andalso learn about the municipal water treatment using various methods.
4. Understand and interpret the important fundamental concepts of electrochemistry andsolve the problems related to batteries.
5. Differentiate the types of corrosion and methods used to prevent the corrosion, surface coating techniques
6. Understand the synthesis of drug molecules and learn fundamentals of analyticaltechniques like electronic, vibrational and rotational spectroscopy**.**

### UNIT - I

**Atomic and molecular structure (6L)**

Molecular orbitals of diatomic molecules and plots of the multicenter orbitals, Equations for atomic and molecular orbitals, Energy level diagrams of diatomic (F2, Cl2 CO, NO). Pi- molecular orbitals of butadiene and benzene and aromaticity, Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties, Band structure of solids and the role of doping on band structures.

### UNIT – II

**Plastics and Lubricants (8L)**

**Plastics: Polymerization-**Addition and Condensation polymerization, Plastics – Thermosetting and Thermoplastics, preparation, properties and **engineering applications of plastics:** PVC, Teflon, Bakelite,Fibers: Nylon 6, 6 and Dacron.

Rubbers – natural and artificial rubber, vulcanization of natural rubber, Buna-S, Buna-N and their **engineering applications.** Fabricated Reinforcing Polymers**- engineering applications.Lubricants:** Definition, classification and function of lubricants, Types of lubrication and mechanisms – Thick Film or Hydrodynamic Lubrication, Thin Film or Boundary Lubrication, Extreme Pressure Lubrication. Classification and properties of lubricants – Viscosity, flash and fire point, cloud and pour point and acid value.

### Engineering applications

**UNIT - III**

### Water Technology (8L)

1. **Introduction: -** Hardness of water – types of hardness (temporary and permanent), calculation of hardness- Numerical problems. Estimation of hardness of water by EDTA Method.
2. **Water for Industrial purpose:** Food, sugar, textile, paper and pharma industries, water for steam making characteristics of boiler feed water, boiler troubles- scale and sludge & Carry over (priming &foaming), boiler corrosion, caustic embrittlement.
3. **Water Treatment:** Internal conditioning- phosphate, carbonate & calgon conditioning. External Treatment: Ion-exchange process. Desalination-reverse osmosis. Municipal water treatment-sedimentation, coagulation, filtration, disinfection-chlorination, ozonization. **Engineering applications: Methodology and working of mineral water plant for drinking purpose.**

### UNIT - IV

**Electrochemistry (8L)**

Conductance – conductors (metallic and electrolytic), types of conductance – specific, equivalent and molar conductance – effect of dilution on conductance.

Free energy and emf, cell potentials, electrode potential (oxidation and reduction).Types of electrodes - redox electrode (quinhydrode electrode), metal – metal insoluble salt electrode and Ion selective electrode.Cell notation and cell reaction –Nernst equation and applications.**Engineering Applications.**

**Batteries** : Types of batteries

1. Primary batteries – Lechalanche cell (dry cell), Lithiumcell
2. Secondary batteries(Accumulators) – Lead acid battery, Lithium-ion battery
3. Fuel cells- H2 – O2 fuel cell and MeOH-O2 fuel cell-advantages and applications.

### Engineering applications – future water powered car, Hydrogen production and storage.

**UNIT - V**

### Corrosion and Surface treatment (8L)

Corrosion – basic concepts –types of corrosion, chemical, electrochemical corrosion(absorption of O2 and evolution of H2) -factors affecting the rate of corrosion.

**Cathodic protection** – sacrificial anodic protection and impressed current cathodic protection method.

### Surface treatment

Mechanical surface treatment and coatings, casehardening and surface coating, thermal spraying, vapour deposition, Ion implantation, Diffusion coating.

Methods of metallic coatings-hot dipping (tinning and galvanizing), metal cladding (Al cladding), electroplating (copper plating) and electroless plating (nickel plating), electroforming, ceramic, organic and diamond coating.

### UNIT-VI

**Organic reactions and drug molecules (5L)**

Introduction: reactions involving substitution (SN1, SN2) addition to double bond(C=C), elimination (E1 and E2), oxidation (using KMnO4, CrO3), reduction (Hydrogenation by Ni/H2, Pd/C)

**Drugs:** Definition, classification structure and applications of commonly used drug molecules- paracetamol, aspirin, ibuprofen and diphenhydramine (Benadryl)

Principles of spectroscopy and selection rules: Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules- **Applications**.

### TEXT BOOKS:

* 1. Engineering Chemistry: PK Jain & MK Jain, Dhanapathrai Publications(2018)
  2. Engineering Chemistry: by Thirumala Chary Laxminarayana & Shashikala,Pearson Publications(2020)

### REFERENCE BOOKS:

1. Textbook of Engineering Chemistry: Jaya Shree Anireddy, Wiley Publications(2019)
2. Engineering Chemistry: by &B.Rama Devi, PrsantaRath& Ch. VenkataRamana Reddy, Cengage Publications(2018)
3. Engineering Chemistry: Shashi Chawla, Dhanapathrai Publications(2019)
4. Textbook of Engineering Chemistry: SS Dara, SS Umare S. Chand Publications(2004)

### 9EC01: DATA STRUCTURES

(Common to all branches)

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| **L** | **T** | **P** | **C** |
| **3** | **0** | **0** | **3** |

### I Year II semester

**Pre requisites: Problem Solving using C Course Objectives:**

* 1. To provide the knowledge of structures, unions, enum and typedef.
  2. To understand and learn the applications of Abstract data Type, linear data structures such as stacks, queues and linked list.
  3. To comprehend different nonlinear data structures.
  4. To understand and analyze the concepts of various searching and sorting techniques.

### Course Outcomes:

After completion of this course student will be able to:

1. Design the programs using structures, unions and enum.
2. Demonstrate the concepts of Abstract data type and also applications of stacks and queues.
3. Implement basic operations on single, double and circular linked list.
4. Solve problems involving Binary Search trees and AVL trees.
5. Articulate the concepts of graphs, heaps and hashing.
6. Develop algorithms for various searching and sorting techniques and analyze their performance.

### UNIT I:

**Structures:** Introduction, types, initialization and accessing, Array of Structures, Nested Structures, Self-referential structures. Unions, enum, typedef, Dynamic Memory allocation.

### UNIT II:

**Introduction to data structures:** Abstract data type (ADT), Stacks, Queues and Circular queues and their implementation with arrays.

Applications of Stack: infix to post fix conversion, postfix expression evaluation. Applications of Queues.

### UNIT III:

**Linked list:** introduction, advantages of Linked list over Arrays. **Single linked list:** creation, insertion, deletion and display operations **Double linked list:** creation, insertion, deletion and display operations

**Circular linked list:** creation, insertion, deletion and display operations, Implementation of Stacks and Queues with singly linked list.

### UNIT IV:

**Trees:** Terminology, Binary Tree: types, representation and traversals (in-order, pre-order, post-order).

**Binary Search Tree:** introduction, operations (insertion, deletion, display)

**AVL Trees**: Definition, examples, and operations (insertion, deletion and searching).

### UNIT V:

**Graphs:** terminology, representation, traversals (DFS and BFS).

**Heaps:** Introduction, Min Heap, Max Heap, Operations on Heaps, Heap Sort.

**Hashing:** Hash Table, Hash functions.

**Collision resolution techniques**: separate chaining, open addressing-linear probing, quadratic probing, double hashing.

### UNIT VI:

**Searching:** linear and binary search methods.

**Sorting:** Bubble Sort, Insertion Sort, Selection Sort, Quick sort, Merge sort Performance analysis of Searching and Sorting Algorithms.

### TEXT BOOKS:

1. Data Structures Using C second edition by [ReemaThareja](https://www.amazon.in/Reema-Thareja/e/B00357V8ME/ref%3Ddp_byline_cont_book_1) Oxford university press
2. Data Structure through C by Yashavant Kanetkar.

### REFERENCES:

1. Alfred V. Aho, Jeffrey D. Ullman, John E. Hopcroft. Data Structures and Algorithms. Addison Wesley,1983 .
2. Data Structures using c Aaron M.Tenenbaum ,YedidyahLangsam,MosheJAugenstein.
3. Introduction to Data Structures in C ByKamtane
4. Data Structures, A pseudocode Approach with C by Richard F. Gilberg and Behrouz A. Forouzan.

### 9HC12: ADVANCED CALCULUS

(Common to all branches)

### I year II Semester

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| **L** | **T** | **P** | **C** |
| **2** | **1** | **0** | **3** |

**Pre Requisites**: Mathematics Knowledge at Pre-University Level

### Course Objectives:

* 1. Basic concepts of multivariable differential calculus.
  2. Evaluation of double and triple integrals.
  3. Solutions of first order linear and non-linear partial differential equations.
  4. Series expansion of a given function in terms of sine and cosine terms.
  5. Basic Concepts of vector differential calculus.
  6. Concepts of vector integral calculus

### Course Outcomes:

After the course completion the students will be able to

1. Find the limits and test for the continuity and differentiability of a function.
2. Solve the problems on multiple integrals.
3. Solve linear and nonlinear first order partial differential equations.
4. Find Series expansion a function defined over the intervals.
5. Find directional derivative, gradient, divergence and curl of a function.
6. Solve problems of line, surface and volume integrals.

**UNIT-I: Functions of several variables:** Limits, Continuity and partial derivative, total derivative, Jacobian, Maxima and minima of two variable functions (without constraints).

**UNIT-II: Multiple Integrals:** Double integrals, change of order of integration, change of variables (Cartesian to polar), Triple integrals (Cartesian form).

**UNIT-III: Partial Differential Equations:** Formation of partial differential equations, solutions to first order linear and non-linear partial differential equations - standard Forms,

**UNIT-IV: Fourier series:** Dirichlet conditions, Fourier series of functions over the intervals of length 2l& 2π. Half range sine and cosine series, Problems on Parseval’s theorem (without proof).

**UNIT-V: Vector Differentiation:** Vector and scalar point functions, gradient, directional derivatives; divergence and curl of a vector point function and problems.

**UNIT-VI: Vector Integration:** Line integrals, surface integrals, volume integrals, Green, Gauss divergence and Stokes theorems (without proofs) and problems.

### Text Books:

1.R K Jain and S R K Iyengar Advanced Engineering Mathematics, Narosa Publications.

1. B.S. Grewal, Elementary Engineering Mathematics, Khanna Publishers
2. Alan Jeffery, Advanced Engineering Mathematics, Academic Press
3. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint,2010.
4. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006.

### 9K201: ENGINEERING MECHANICS

**(For Civil Engineering)**

### I Year II Semester

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P** | **C** |
| **2** | **1** | **0** | **3** |

**Course Objective :** The student will

* 1. Understand the concepts of Resultant and Equilibrium of Forces
  2. Learn the concepts of friction and their real time applications and also learn various analyses ofsimple trusses.
  3. Understand the concepts of Centroid and Area and Mass Moments of Inertia and make them learnhow to calculate these for different shapes and objects
  4. Learn principles of virtual work and energy methods to analyze problems of rigid bodies actedupon by a system of forces
  5. Learn and solve the problems of particle Kinematics and Kinetics by Energy Methods.
  6. Be able to develop the capacity to predict the effect of force on the motion of the rigid bodies

### UNIT-I

**Introduction to Engineering Mechanics:** Force Systems, Basic concepts and axioms, Rigid Body equilibrium, System of Forces, Coplanar Concurrent Forces, Lami’s theorem, Components in Space – Resultant of Force System; Moment of Forces and its Application; Varignon’s principle; Couples; Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems; Static Indeterminacy.

### UNIT-II

**Friction:** Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, wedge friction, Belt Friction, screw jack & differential screw jack.

### UNIT-III

**Centroid and Centre of Gravity:** Centroid of simple figures from first principle, centroid of composite sections; Centre of Gravity and its implications;

### UNIT-IV

**Moment of Inertia:** Area moment of inertia- Definition, Moment of inertia of plane sections fromfirst principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections; Mass moment inertia of circular plate, Cylinder, Cone.

### UNIT-V

**Particle Dynamics:** Rectilinear motion; Plane curvilinear motion (rectangular, path, and polar coordinates). 3-D curvilinear motion; Relative and constrained motion; Newton’s Second law (rectangular, path, and polar coordinates). Work-kinetic energy, power, potential energy. Impulse- momentum (linear, angular); Impact (Direct).

### UNIT-VI

**Introduction to Dynamics of Rigid Bodies:** Basic terms, general principles in dynamics; Types of motion, Instantaneous centre of rotation in plane motion and simple problems; D’Alembert’s principle and its applications in plane motion and connected bodies; Work energy principle and its application in plane motion of connected bodies; Kinetics of rigid body rotation;

### TEXT BOOK

1. K. Vijay Kumar Reddy and J. Suresh Kumar, Singer’s Engineering Mechanics, BS Publications, Hyderabad,2011

### REFERENCES

1. Engineering Mechanics by S.P. Timoshenko, D.H.Young & J.V.Rao, Tata McGraw Hill Publishers,4thEdition,2010
2. Engineering Mechanics by S.S. Bhavikatti, Newage International Publishers,2012
3. Engineering Mechanics (Statics) by J.L.Meriam & L.G.Kraige, Wiley Publishers, 6th Edition,2006
4. Engineering Mechanics by A.K.Tayal, Umesh Publications,13th Edition,2010
5. Engineering Mechanics by R.K. Rajput, laxmi Publications,1998

### 9HC64: ENGINEERING CHEMISTRY LAB

(Common to all branches)

### I year I Semester Course Objectives:

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P** | **C** |
| **0** | **0** | **3** | **1.5** |

1. Preparation of Inorganic compounds
2. Determination surface tension of a liquid
3. Determination viscosity of lubricant
4. Determination acid value of an oil
5. Estimation hardness of water
6. Analysis the amount of chloride content
7. Determination of cell constant and conductance of solutions
8. Determination of redox potential and emf of solutions
9. Determination of the rate constant of acid
10. Synthesis of a polymer (Thiakol rubber / Urea-Farmaldehyde resin)
11. Synthesis of a drug- Aspirin
12. Estimation of Mn+7 by Colorimetry method

### Course Outcomes:

After completion of the course, the student will be able to:

1. Prepare the Inorganic compounds
2. Determine surface tension of a liquid, viscosity of lubricant, and acid value of an oil
3. Estimate hardness of water and Analyze the amount of chloride content
4. Determine cell constant and conductance of solutions, redox potential and emf of solutions, the rate constant of acid
5. Synthesize a polymer (Thiakol rubber / Urea-Farmaldehyde resin), a drug- Aspirin

**List of Experiments**

* 1. Preparation of coordination complex NiDMGComplex
  2. Determination of surface tension
  3. Determination of viscosity
  4. Saponification/acid value of an oil
  5. Ion exchange column for removal of hardness of water / Estimation of Hardness of water by EDTAMethod
  6. Determination of chloride content of water
  7. Determination of cell constant and conductance of solutions (HCl Vs NaOH / Mixture of acid Vs Strongbase)
  8. Potentiometry - determination of redox potential and emf (FeSO4 Vs KMNO4 / HCl Vs NaOH)
  9. Determination of the rate constant of acid catalyzed hydrolysis ofmethylacetete
  10. Synthesis of a polymer- Thiakol rubber / Urea-Farmaldehyderesin
  11. Synthesis of a drug-Aspirin
  12. Estimation of Mn+7 by Colorimetrymethod

### 9EC61: DATA STRUCTURES USING C LAB

(Common to all Branches)

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| --- | --- | --- | --- |
| **L** | **T** | **P** | **C** |
| **0** | **0** | **3** | **1.5** |

### I Year II semester

**Prerequisites: Problem Solving using C Lab Course objectives:**

1. Create programs on structures and unions
2. Develop the programs on Linear and Non-Linear data structures
3. Write programs on various searching and sorting algorithms.

### Course Outcomes:

After completion of the course, the student will be able to:

1. Write programs on structures and unions.
2. Implement Stacks, Queues and circular queues using arrays.
3. Write programs to implement basic operations on various types of linked list.
4. Implement insertion and traversal operations on binary search tree
5. Develop programs on various searching, sorting algorithms.

Note: Lab Projects will be allocated to the students at the beginning of the semester.

### Cycle 1:

* 1. Define a structure for complex number. Write functions on complex numbers (addition, subtraction, absolute value, multiplication, division, complex conjugate) and implement them in a menu driven style.
  2. Define a structure student having members roll no., name, class, section, marks. Create an array of 10 students give the data and find the average marks, section-wise.

### Cycle 2:

* 1. Write a C program that implement stack and its operations using arrays
  2. Write a C program that implement Queue and its operations using arrays.
  3. Write a C program that implement Circular Queue and its operations using arrays.

### Cycle 3:

* 1. Write a C program that uses Stack operations to perform the following:
     1. Converting infix expression into postfix expression
     2. Evaluating the postfix expression

### Cycle 4:

* 1. Write a C program that uses functions to perform the following operations on singly linked list:
     1. Creation ii) Insertion iii) Deletion iv) Traversal

### Cycle 5:

* 1. Write a C program that uses functions to perform the following operations on doubly linked list:
     1. Creation ii) Insertion iii) Deletion iv) Traversal in both ways

### Cycle 6:

* 1. Write a C program using functions to perform the following operations on circular singly linked list:
     1. Creation ii) Insertion iii) Deletion iv) Traversal

### Cycle 7:

* 1. Write a C program to implement operations on the following Data Structures Using Singly linked list:
     1. Stack ii) Queue

### Cycle 8:

* 1. Write a C program that uses functions to perform the following:
     1. Creating a Binary Search Tree.
     2. Traversing the above binary tree in pre-order, in-order and post-order.

### Cycle 9:

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

### Cycle 10:

* 1. Write C programs that implement the following sorting methods to sort a givenlist of integers in ascending order:
     1. Bubble Sort ii) Insertion Sort iii) Selection Sort

### Cycle 11:

* 1. Write C programs that implement the following sorting methods to sort a given list of integers in ascending order:
     1. Quick sort ii) Merge sort iii) Heap Sort

### Cycle 12:

15 Lab Projects- Design and Develop Case Studies such as ,Graph Traversal Techniques, Collision Resolution Techniques

### 9HC62: ORAL COMMUNICATION LAB - II

(Common to all Branches)

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### I Year II semester

**Course Objectives:**

To enable students to:

* Strike a conversation and engage in effective small talk.
* Lose stage fear and confidently interact with others in different roles and tap their creative side.
* Speak for a minute, fluently and cohesively.
* Make official presentations with effective use of PPTs.
* Engage in group discussions in a confident and professional manner.
* Shed fear of questions from the audience and the interviewers.

### Unit 1

**Small talk and conversational techniques**

Tips on enhancing conversation skills.

Conversation starters, small talk questions, how to talk to stranger**s** andpractice activities on initiating informal conversations.

* Talk about your favourite things.
* Interview each other.

### Unit 2

**Role Play/skit/one act play**

* Role play assuming fictional characters and non-fictional characters.
* One Act plays
* Ad’ Venture: Advertisement creation and enacting.

### Unit 3

**Just a minute (JAM)**

One-minute speaking activity on topics of students’ choice and Extempore.

### Unit 4 Presentation skills

Introduction to structural talk.Techniques of making effective presentations.

* Five minute PowerPoint presentations.

### Unit 5

**Group Discussions**

Tips on Dos and Don'ts of Group Discussion (GD).Discussion on evaluation pattern during GD.

* Practice sessions: GDs on different topics.

### Unit 6

**Facing questions: Mock Interviews**

Strategies of handling Question and Answer sessions after Presentations/seminars.

* Question Toss: Practice on asking and answering questions.

### Suggested Reading:

* + “Effective Technical Communication” by M. Ashraf Rizvi, McGraw Hill.
  + “Skill Sutras” by JayashreeMohanraj, Prism Books Pvt. Ltd.
  + “Technical Communication: Principles and Practice” by Meenakshi Raman, OUP.
  + “Effective Communication” John Adair, Pan Macmillan Ltd.
  + “Body Language”, by Allan Pease, Sudha Publications.
  + “Business Communication: From Principles to Practice” MM Monippally, TataMcGraw Hill.

### Course Learning Outcomes:

1. Understand the nuances of striking a great conversation in formal and informal situations.
2. Gain experience of facing an audience and speaking in public.
3. Design a winning presentation and present it with ease.

### 9BC61: WORKSHOP/MANUFACTURING PROCESSES LAB

(Common to All Branches)

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### I year II semester

**COURSE OBJECTIVES:**

1. To know the different popular manufacturing process
2. To gain a good basic working knowledge required for the production of various engineering products
3. To provide hands on experience about use of different engineering materials, tools, equipment’s and processes those are common in the engineering field
4. To identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances

**COURSE OUTCOMES:** After completion of the course, the student will be able to:

CO-1: Use various types of conventional manufacturing Processes

CO-2: Manufacture components from wood, MS flat, GI Sheet etc. – hands on experience CO-3: manufacturing of components by machining like shafts, holes & threaded holes, surface finishing of components etc.

CO-4: Produce small devices / products /appliances by assembling different components

**LIST OF EXPERIMENTS**

|  |  |  |
| --- | --- | --- |
| **S.No** | **Trades** | **Experiment name** |
| 1 | Fitting Shop | 1. Preparation of T-Shape Work piece 2. Preparation of U-Shape Work piece which contains: Filing, Sawing, Drilling, Grinding. |
| 2 | Carpentry | 1. Cross Half Lap joint 2. Half Lap Dovetail joint |
| 3 | Electrical & Electronics | 1. One lamp one switch 2. Stair case wiring |
| 4 | Welding | 7. Practice of Lap and Butt joint by Arc welding |
| 5 | Casting | 1. Preparation of mould cavity using solid pattern 2. Preparation of mould cavity using split pattern |
| 6 | Tin Smithy | 1. Preparation of Rectangular Tray 2. Preparation of Square box |
| 7 | Plastic molding& Glass Cutting | 1. Injection Moulding 2. Glass Cutting with hand tools |
| 8 | Machine Shop (Demonstration only) | Demonstration of Turning, Drilling and grinding operations on Lathe, Drilling and grinding machines |

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**I Year B.Tech, Semester-1 COMPLEX VARIBLE AND STATISTICS**

(Common to CE & ME)

#### L T P/D C

**Code:** 9HC13 **2 1 0 3**

**Pre Requisites**: Mathematics Knowledge at Pre-University Level.

**Course Objectives:** To make the students to understand and expected to learn

1. Basic concepts of differential calculus of a complexvariable function.
2. Complex integration and its application to evaluate definite integrals.
3. Concept of random variables and probability distributions.
4. Sampling distributions and their properties and the concepts on estimation.
5. Concepts on testing the hypothesis concerning to large samples.
6. Test of hypothesis concerned to small size samples and goodness of fit and independence of attributes using chi-square distribution.

**Syllabus**

**UNIT-I: Complex Variable-Differentiation:** Differentiation, analytic functions, Cauchy- Riemann equations, harmonic functions, finding harmonic conjugate and analytic functions.

**UNIT-II: Complex Variable–Integration:** Cauchy - Integral theorem and Integral formula (without proofs), singularities, zeros of analytic functions, Residues, Cauchy residue theorem (without proof), Evaluation of definite integral involving sine and cosine functions.

**UNIT-III: Random Variables and Probability Distributions:** Discrete and continuous random variables, probability mass and density functions, expectation and variance. Binomial, Poisson and Normal distributions.

**UNIT-IV: Sampling Distributions and Estimation:**Sampling distribution of the mean ( - known and unknown), sums and differences, central limit theorem. Point estimation and Interval estimation concerning to mean for Large Samples.

**UNIT-V:Test of hypothesis for large samples**:Type–I and Type-II Errors, Hypothesis testing concerning to one mean and two means, one Proportion and difference of proportions.

**UNIT-VI: Test of hypothesis for small samples**:Student t-test, Hypothesis testing concerning one mean and two Means, F-test and 2 test-Goodness of fit, Independence of Attributes.

**Suggested Readings:**

1. B.S. Grewal, Elementary Engineering Mathematics, Khanna Publishers
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
3. Probability and Statistics for Engineers: Miller and John E. Freund, PHI Publishers, 9th Edition
4. SCHAUM’S outlines: Probability and Statistics, Murray R. Spiegel, John Schiller, R. Alu Srinivasan, Mc Graw Hill publishers.

**Course Outcomes:**Students will able to

* 1. Solve the problems on differential calculus of complex variable.
  2. Solve the problems on contour integration.
  3. Solve problems on discrete and continuous probability distributions.
  4. Solve problems on sampling and estimation.
  5. Solve problems on testing the hypothesis concerning to large size
  6. Solve problems on small size samples also goodness of fit and independence of attributes using chi-square distribution.

9K301: Strength of Materials-1

# B.Tech II Year I Sem. L T P/D C

**4 1 - 3**

**Pre-Requisites**: Engineering Mechanics

# Course Objectives

1. To understand the basic concept of the stress and strain for different materials.
2. To know the mechanism of the development of shear force and bending moments in beams.
3. To analyze and understand flexural stress.
4. To study about Shear Stresses and Theories of Failure
5. To study deflection of beams, in different types of loadings and support conditions.
6. To understand the basic concepts of Principal Stresses and Strains.

# Course Outcomes

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

1. Evaluate the strength of various civil engineering materials against structural actions such as compression, tension, shear, bending (L5)
2. Evaluate the behaviour and strength of civil engineering materials under the action of compound stresses with regard to failure concepts (L5)
3. Assess the slope and deflection of beams subjected to various loads (L5)
4. Analyse various situations involving structural members subjected to plane stesses by application of Mohr’s circle of stress (L4)

# UNIT - I

**Simple Stresses and Strains:** Elasticity and plasticity – Types of stresses and strains – Hooke’s law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson’s ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of varying section – composite bars – Elastic constants.

# UNIT - II

**Shear Force and Bending Moment:** Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed load, uniformly varying loads and combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.

# UNIT - III

**Flexural Stresses:** Theory of simple bending – Assumptions – Derivation of bending equation: M/I = f/y = E/R - Neutral axis – Determination of bending stresses – Section modulus of rectangular and circular sections (Solid and Hollow), I,T and Angle sections – Design of simple beam sections.

# UNIT – IV

**Shear Stresses:** Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T sections.

**Theories of Failure**: Introduction – Various theories of failure - Maximum Principal Stress Theory, Maximum Principal Strain Theory, Maximum shear stress theory- Strain Energy and Shear Strain Energy Theory .

# UNIT – V

**Deflection of Beams:**

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

# UNIT - VI

**Principal Stresses and Strains :** Introduction – Stresses on an inclined section of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear– Mohr’s circle of stresses – Principal stresses and strains – Analytical and graphical solutions.

# TEXT BOOKS:

1. Strength of Materials by B.C. Punmia, Laxmi Publishers 10th Edition June 2013, ISBN 978-81-318-0925-9.
2. Strength of Materials by R. K Rajput, S. Chand & Company Ltd.
3. Strength of Materials by R.K.Bansal, Lakshmi Publications House Pvt. Ltd.

# REFERENCES:

1. Strength of Materials by R. Subramanian, Oxford University Press
2. Mechanics of Materials Ferdinand P. Beer et al., Tata McGraw Hill Education Pvt. Ltd 5th edition 2009.
3. Strength of Materials by B.S. Basavarajaiah, B.S. Mahadevappa, Universities Press, 3rd Edition 2015.
4. Mechanics of Materials by R. C. Hibbeler, Pearson Education
5. Strength of Materials by T.D.Gunneswara Rao and M.Andal, Cambridge Publishers

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# 9K302 : FLUID MECHANICS

**B. Tech. II Year I semester L T P/D C 2 1 0 3**

**Pre Requisites**: Engineering Mechanics

**Course Objectives**: The objectives of the course are to:

1. Introduce the concepts of fluids and its specific properties in contrast with the solids;
2. Train the students on fluid statics and its applications in computing forces on immersed and floating bodies including stability analysis of the floating bodies;
3. Introduce various descriptions of fluid flows, kinematics of fluid flow;
4. Arrive at the equations of fluid flow considering various forces and application of these equations for measurement of fluid flow;
5. Introduce the tool of dimensional analysis useful for experimental studies on complex phenomena;
6. Obtain friction loss in pipes and study the flow behaviour in pipe networks useful in designing water distribution networks;
7. Introduce the concept of boundary layer, drag and lift forces for bodies passing through fluids.

**Course Outcomes:** Upon completion of this course, students should be able to:

* 1. Determine the shear force on the surfaces, friction loss in conduits and assess flow behaviour in pipe networks (L2) (U1, U5).
  2. Assess hydrostatic forces on immersed and floating bodies and predict stability of floating bodies (L4) (U2).
  3. Apply laws of kinematics to fluid flow and arrive at 1D, 2D, 3D continuity equations (L3) (U3)
  4. Derive Eulers and Bernoullis equations for flow along a streamline and apply these laws to measure fluid flow (L3) (U4a).
  5. Explain the principles of dimensional analysis to arrive at non dimensional entities (L5) (U4b).
  6. Assess the effect of boundary layer formation over the solid bodies (L5) (U6)d

# UNIT-I:

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

# UNIT-II:

**Fluid Statics** - Fluid Pressure: Pressure at a point, Pascals law, hydrostatic law, pressure variation with temperature, density and altitude. Piezometer, U-Tube Manometer, Single Column Manometer, U-Tube Differential Manometer, Micromanometers. pressure gauges, Hydrostatic force on submerged horizontal, vertical, and inclined surfaces. Buoyancy and stability of floating bodies.

# UNIT – III:

**Fluid Kinematics:** Description of fluid flow, Stream line, path line and streak lines and stream tube. Classification of flows : Steady, unsteady, uniform, non uniform, laminar, turbulent, rotational and irrotational flows – Equation of continuity for one, two , three dimensional flows– stream and velocity potential functions, circulation and vortices, flow net analysis.

# UNIT – IV:

**Fluid Dynamics**: Surface and body forces – Euler’s and Bernoulli’s equations for flow along a stream line for 3-D flow, Navier – Stokes equations (Explanatory), Momentum equation and its application – forces on pipe bend.

Pitot tube, Venturi meter, and orifice meter – classification of orifices, flow over rectangular, Triangular and trapezoidal and stepped notches - Broad crested weirs.

**Dimensional Analysis and Dynamic Similitude** - Definitions of Reynolds Number, Froude Number, Mach Number, Weber Number and Euler Number; Buckingham’s π-Theorem.(Added)

# UNIT – V:

**Closed Conduit Flow:** Reynolds’s experiment – Characteristics of Laminar & Turbulent flows. Laws of Fluid friction – Darcy’s equation, variation of friction factor with Reynolds’s number – Moody’s Chart, Minor losses – pipes in series – pipes in parallel – Total energy line and hydraulic gradient line. Pipe network problems Flow between parallel plates, Flow through long tubes, flow through inclined tubes, water hammer (no derivations).

# UNIT – VI:

**Boundary Layer Theory:** Boundary layer concept, characteristics of boundary layer on a thin flat plate, laminar and turbulent Boundary layers, displacement, momentum, and energy thicknesses, Von-karmen momentum integral equation (no derivations), BL in transition, separation of BL, control of BL, flow around submerged objects-Drag and Lift- Magnus effect.

# TEXT BOOKS:

1. Fluid mechanics by Modi and Seth, Standard Book House.
2. Fluid Mechanics by RC Hibbeler, SI Units, Pearson Publications.

# REFERENCES:

1. Fluid Mechanics and Machinery by CSP. Ojha, R Berndtsson, PN. Chandramouli, Oxford University Press.
2. Fluid Mechanics and Hydraulics Machines By RK Bansal, Laxmi publications (P) Ltd.
3. Fluid Mechanics By Frank M White, McGraw-Hill.
4. Theory and Applications of Fluid Mechanics By K. Subramanya, Tata McGraw Hill.
5. Rajput.R.K, “A text book of Fluid Mechanics and Hydraulic Machines”, S. Chand & Company Ltd.

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## 9K303: Surveying

B. Tech. II Year I semester L T P/D C

**3 0 0 3**

**Course Objectives:**

The student should have the capability to:

* Know the basic principles and methods of surveying.
* Get exposed to different surveying instruments used in determining the local and global positions
* Learn about setting out curves and recording of observation accurately and perform calculations based on the observation
* Learn to use advanced surveying equipment’s for accurate results

**Course Outcomes:**

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

* **CO1** Apply the basic principles of surveying to calculate distances/angular measurements, areas and volumes (L3) (U 1 and 3)
* **CO2** Explain different surveying instruments used in determining the local and global positions (L2) (U 2 and 5)
* **CO3** Develop different maps and plans, set out curves and other layouts from the traversing data collected in the field (L3) (U 2 and 4)
* **CO4** Demonstrate the use of advanced equipment for GPS measurements/ preparing maps (L2) (U 5 and 6)

## UNIT - I

**Introduction and Basic Concepts:** Introduction, Objectives, classification and principles of surveying, Scales, Shrinkage of Map, Conventional symbols and Code of Signals, Surveying accessories, phases of surveying.

## Measurement of Distances and Directions

**Linear distances-** Approximate methods, Direct Methods- Chains- Tapes, ranging, Tape corrections.

**Areas -** Determination of areas consisting of irregular boundary and regular boundary. Mid Ordinate, Average Ordinate, Trapezoidal and Simpsons methods

## UNIT - II

**Prismatic Compass** - Bearings, Included angles, Local Attraction, Magnetic Declination, and Magnetic Dip.

**Leveling-** Types of levels and leveling staves, temporary adjustments, methods of leveling, booking and Determination of levels, Effect of Curvature of Earth and Refraction.

## UNIT - III

**Contouring-** Characteristics and uses of Contours, methods of contour surveying.

**Volumes -**Determination of volume of earth work in cutting and embankments for level section, volume of borrow pits, capacity of reservoirs.

**Theodolite Surveying:** Types of Theodolites, Fundamental Lines, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometrical leveling when base is accessible and inaccessible.

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## UNIT - IV

**Traversing:** Methods of traversing traverse computations and adjustments, Omitted measurements.

**Tacheometric Surveying:** Principles of Tacheometry, stadia method of Tacheometry, Determination of Horizontal distances and Elevations.

## UNIT - V

**Curves:** Types of curves and their necessity, Horizontal Curves - elements of simple and compound curves - Method of setting them

**Modern Surveying Methods:** Principle and types of E.D.M. Instruments, Total station - advantages and Applications. Field Procedure for total station survey, Errors in Total Station Survey

## UNIT - VI

Global Positioning Systems - Segments, GPS measurements, errors and biases, Surveying with GPS, Co-ordinate transformation, accuracy considerations. Introduction to GIS, Advantages and limitations

## TEXT BOOKS:

1. Text book of surveying by C.Venkataramaiah, Universities Press. (ISBN: 9788173717406, 2011, Second Edition)
2. Surveying and levelling by R. Subramanian, Oxford university press, New Delhi. (ISBN: 9780198085423, 2014, Second Edition)
3. Duggal S K, “Surveying (Vol – 1 & 2), Tata McGraw Hill Publishing Co. Ltd. New Delhi. (ISBN: 9781259028991, 2017, Fourth Edition)

## REFERENCES:

1. Arthur R Benton and Philip J Taety, Elements of Plane Surveying, McGraw Hill. (ISBN: 9780071008426, 1991, First Edition)
2. Arora K R “Surveying (Vol 1, 2 & 3), Standard Book House, Delhi. (ISBN: 9788189401238, 2019, Fourth Edition)
3. Surveying and Levelling by NN Basak, McGraw Hill – 2014. (ISBN: 9789332901537, 2014, Second Edition)

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9K304: Building Materials and Construction Planning

B. Tech. II Year I semester L T P/D C

3 - - 3

Course Objectives:

To introduce the students to,

1. study about the basic building materials, properties and their applications.
2. The manufacturing process of cement, its basic composition and its testing specifications.
3. The types of masonry, mortars and finishes provided in a building.
4. The types of timber, paints and the emerging building materials.
5. To understand the different types of arches, roofs and floors.
6. The principles of planning and construction bye-laws and services.

Course Out comes:

After the completion of the course student should be able to

1. Contrast different types of building materials, including their properties, characteristics, applications and limitations(L2)(U1)
2. Select appropriate building materials based on their properties of cement and performance requirements for different construction projects(L3)(U2)
3. Make use of various construction techniques like masonry and plastering and processes involved in using different building materials and types of roofs and arch Types (L3)(U3)(U5)
4. Identify local building planning and services codes and regulations that govern the use of building materials like timber ,aluminum and form wok types in construction projects building services and (L3) (U4)( U6)

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## UNIT-I

StonesandBricks,Tiles:Buildingstones–classificationsandquarrying–properties–structuralrequirements–dressing.

Bricks–CompositionofBrickearth–manufactureandstructuralrequirements,Flyash,Ceramics.

## UNIT–II

Cement&Admixtures:Ingredientsofcement–manufacture–Chemicalcomposition–Hydration-field&labtests.

Admixtures–mineral&chemicaladmixtures–uses.

## UNIT-III

Mortars:LimeandCementMortars

Brickmasonry–types–bonds;Stonemasonry–types;Compositemasonry–Brick-stonecomposite;Concrete,Reinforcedbrick.

## Finishers: Plastering,Pointing,Painting,Claddings–Types–Tiles–ACP

## UNIT-IV

Timber,Aluminum,Glass,PaintsandPlastics:Wood-structure–typesandproperties–seasoning–defects;alternatematerialsforTimber–GI/fibre–reinforcedglassbricks,steel&aluminum,Plastics.

Formwork:Types:Requirements–Standards–Scaffolding–Design;Shoring,Underpinning.

## UNIT–V

Building Components: Lintels, Arches, walls, vaults – stair cases – types of floors, types of roofs – flat,curved, trussed; foundations– types; Damp Proof Course; Joinery– doors – windows – materials –types.

## UNIT–VI BuildingPlanning:PrinciplesofBuildingPlanning,Classificationofbuildingsandbuildingbylaws

Building Services: Plumbing Services: Water Distribution, Sanitary – Lines & Fittings; Ventilations:Functionalrequirements systemsofventilations.Air-conditioning- Essentials andTypes; Acoustics–characteristic– absorption– Acousticdesign; Fireprotection– FireHazards– Classificationoffire-resistantmaterials.

## TEXTBOOKS:

1. BuildingConstruction–by Rangwala,Charotar Publishing House Pvt. Ltd.; 34th Edition 2022

(1 January 2022)

1. BuildingMaterialsbyRangwala,Charotar Publishing House Pvt. Ltd.; 43rd Edition 2019

(1 January 2017)

1. Building Construction by S. P Arora and S. P Bindra   DhanpatRoyPublications January 2010

## REFERENCES:

1. BuildingMaterials by Duggal S K,NewAge International publications 1 January 2019
2. BuildingMaterials and Construction by GCSahu,JoygopalJenaMcGrawhillPvtLtd2015.
3. BuildingMaterials by P.C.Varghese,PHI1 January 2015.
4. BuildingConstruction by P. C.VarghesePHI1 January 2015.

**Soft Skills Lab**

Subject Code: 9HC63 **CSE, ECE, CIVIL: II/I** Lab Code: 8HC63

**L – T –P/D – C IT, MECH, ECM, EEE: II/II L – T –P/D - C**

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*Maximum Marks: 100 (Internal – 30 / External – 70)*

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**Course objectives:**

To enable students to:

* make self-assessment.
* know the importance of certain soft skills like time management and goal setting.
* sharpen their verbal ability to handle the competitive exams.
* enhance their team skills and design thinking capabilities for effective problem solving and decision making.
* know their emotional quotient which guides their thinking, behavior and helps them manage stress efficiently.
* equip themselves with the prerequisites, and relevant techniques to effectively attend corporate interviews.

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| **Units** | **Tutorial (1 per week)** | **No. of Periods** | **Lab (2 per week)** | **No. of Periods** |
| **1. Know Yourself** | 1. Importance of knowing yourself 2. SWOT / SWOC Analysis 3. SWOT / SWOC Grid | **1**  **1** | Practice exercises on   * Self-Analysis * Questionnaire, * SWOT Practice | **4** |
| **2. Organising Oneself** | 2.1 Developing positive outlook towards life  2.2 Time management  2.3 Goal Setting | **1**  **1** | Practice activities on   * Managing time * Goal Setting | **4** |
| **3. Verbal Aptitude** | 3.1 Reading Comprehension:  Strategies to comprehend difficult passages from a book; SQ3R (survey, question, read, recite, and review)  3.2 Word Analogies  3.3 Spotting Errors  3.4 Sentence Completion / Sentence Equivalence | **1**  **1**  **1**  **1** | Practice exercises on   * Reading from difficult passages from books * Word analogies * Spotting Errors * Sentence Completion / Sentence Equivalence | **8** |
| **4. Skills to Excel** | 4.1 Team work and Team Dynamics - Collaboration and Leadership  4.2 Decision Making, Design Thinking  4.3 Critical thinking and Creative  Problem Solving. | **1**  **1**  **1** | Practice activities on   * Team building activities * Practice Activities, Case Studies and Group Discussions on decision making and problem solving, creativity and innovation. | **6** |
| **5.** **Self-Management Skills** | 5.1 Emotional Intelligence  5.2 Stress Management | **1**  **1** | Practice activities on   * Case Studies and Group Discussions on managing stress and enhancing emotional intelligence. | **4** |
| **6. Interview Skills** | 6.1 Interview Skills: Meaning and Purpose of an Interview  6.2 Types of interviews; Interview Preparation techniques  6.3 Dress code at an interview  6.4 FAQs in HR Interview | **1**  **1**  **1** | Mock Interviews | **6** |

**Text Book:** SOFT SKILLS – Dr. K. Alex, S. Chand publications  
**Suggested Readings: \*** SOFT SKILLS – Meenakshi Raman ; \* Word Power made Easy – Norman Lewis ; \* Objective English - Pearson’s Publications ; \* Skill Sutras- Jayashree Mohanraj \* The Power of Soft Skills – Robert A. Johnson ; \* Soft Skills for Everyone – Jeff Butterfield

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# 9K371 : STRENGTH OF MATERIALS LABORATORY

**B. Tech. II Year I semester L T P/D C**

**0 0 3 1.5**

# Educational Objective Course:

The course aims at providing hands on practice to observe the behaviour and failure patterns of commonly used construction materials subjected to tensile, compressive, torsion and shear loadings. The course also deals with the relative hardness and impact resistance of metals.

**Course Outcomes:**

At the end of the course, the student will be able to: The student will be able to conduct tests and obtain engineering properties of different materials under different types of loading.

**List of Experiments**

1. Performing of Tension test for the given Mild steel rod.

2. Performing Bending test on (Steel / Wood) Cantilever beam.

3. Performing Bending test on simply supported beam.

4. Performing Torsion test for the given Mild steel plate.

5. Performing Hardness test for the given materials.

6. Performing Spring test for different springs provided.

7. Performing Compression test on wood or concrete

8. Performing Impact test on Mild steel.

9. Performing Shear test for the given Mild steel.

10. Verification of Maxwell’s Reciprocal theorem on beams.

11. Use of electrical resistance strain gauges

12. Performing deflection test on Continuous beam.

**References:**

Laboratory manual prepared by Civil Engineering Department

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## 9K372: SURVEYING LABORATORY

**B. Tech. II Year I semester L T P/D C**

**0 0 3 1.5**

**Pre Requisites**: Surveying Theory

## Course Objectives:

1. To impart the practical knowledge in the field – measuring distances, directions, angles,
2. To determining R.L.’s and to set out Curves and draw Plans and Maps

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

* 1. Apply the principle of surveying for civil Engineering Applications and calculate areas
  2. Drawing plans and contour maps using different measuring equipment at field level and write a detailed technical laboratory report

## List of Experiments

1. Surveying using chain – when points and intervisible
2. Surveying using chain – when points and not intervisible
3. Surveying of an area by chain – Cross staff survey
4. Compass survey – radiation method (closed traverse)
5. Determine of distance between two inaccessible points with compass
6. Leveling – Longitudinal
7. Leveling – cross-section and plotting
8. Leveling – Fly Leveling
9. Measurement of Horizontal angle and area calculation using theodolite – repetition method
10. Measurement of Horizontal angle and area calculation using theodolite – reiteration method
11. Trigonometric leveling using theodolite – Single plane method
12. Trigonometric leveling using theodolite – Double plane method
13. Setting out curve using Rankines method
14. Introduction to total station
15. Introduction to modern surveying instruments such as GPS

## REFERENCES:

1. Surveying Laboratory Manual

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# 9K373 : COMPUTER AIDED DRAFTING OF BUILDINGS LABORATORY

**B. Tech. II Year I semester L T P/D C**

**- - 3 1.5**

# Course Objectives:

The objective of this course is to introduce Auto CAD to the students and make them proficient in Auto CAD for drafting of simple building plans, sections, and other components.

# Course Outcomes:

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

1. Make use of AutoCAD commands for drawing 2D building drawings (L2)
2. Create plans and sections for simple buildings (L5)
3. Present drawings in required format according to user requirements (L4)

# List of Experiments

1. Introduction to Computer Aided Drafting – CAD software.
2. Practice exercises on CAD software.
3. Drafting Plan for a Single storied building using AutoCAD
4. Drafting Plan for a Multi storied building using AutoCAD
5. Developing sections and elevations for a Single storied building.
6. Developing sections and elevations for a Multi storied building.
7. Detailing of building components – Doors, Windows.
8. Stairs and Staircases – Drawing Section and Plan.
9. Sketching of Roof Trusses.
10. Development of working drawings of a building.
11. 3D modelling of a single storied building in Auto CAD.
12. Modelling of building components Auto CAD (Lab project).

# References:

1. Computer Aided Design Laboratory by M. N. Sesha Praksh &Dr. G. S. Servesh – Laxmi Publications.
2. Lab Manual

# 9K405: STRENGTH OF MATERIALS-II

**B.Tech II Year II Sem. L T P/D C**

# 2 1 0 3

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

# Course Objectives:

1. understand the nature of stresses developed in simple geometries shafts under different loading actions.
2. understand behaviour of short column and long column under direct loading and eccentric loading
3. Learn the concepts of springs, columns &cylindrical and spherical shells for various types of simple loads
4. To calculate the stability and elastic deformation occurring in various simple geometries for different types of loading.
5. Understand the stress behavior in the thin cylinders and thick cylinders
6. To understand the unsymmetrical bending and shear center importance for equilibrium conditions in a structural member of having different axis of symmetry

# Course Outcomes:

1. Explain the concepts and principles, theory of elasticity and calculate the strength of structural components particularly torsion and direct compression (L2)
2. Determine the strengths and deformations of structural components (L5)
3. Analyse strength and stability of structural members subjected to direct and indirect bending stresses (L4)
4. Evaluate the shear centre and unsymmetrical bernding (L2)

# UNIT- I:

**Torsion of circular shafts:**

Theory of pure torsion – Derivation of Torsion equation - Assumptions made in the theory of pure torsion – Polar section modulus – Power transmitted by shafts – Combined bending and torsion – Design of shafts according to theories of failure

# UNIT –II:

**Columns and Struts**

Introduction – Types of columns – Short, medium and long columns – Axially loaded compression members – Crushing load – Euler’s theorem for long columns- assumptions- derivation of Euler’s critical load formulae for various end conditions – Equivalent length of a column – slenderness ratio – Euler’s critical stress – Limitations of Euler’s theory– Long columns subjected to eccentric loading – Rankine formula.

# UNIT- III:

**Beam Columns:** Laterally loaded struts – subjected to uniformly distributed and concentrated loads.

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

# UNIT – IV

**Direct and Bending stresses**: Stresses under the combined action of direct loading and bending moment, core of a section – determination of stresses in the case of retaining walls, chimneys and dams – conditions for stability-Overturning and sliding

# UNIT – V

**Thin Cylinders**: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains – changes in dia, and volume of thin cylinders – Thin spherical shells.

**Thick Cylinders**: Introduction - Lame’s theory for thick cylinders – Derivation of Lame’s formulae – distribution of hoop and radial stresses across thickness – design of thick cylinders – compound cylinders.

# UNIT –VI:

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

**Shear Centre**: Introduction - Shear centre for symmetrical and unsymmetrical ( I, T and L) sections

# TEXT BOOKS:

1. Strength of Materials by B.C. Punmia, Laxmi Publishers 10th Edition June 2013, ISBN 978-81-318-0925-9.
2. Strength of Materials by R. K Rajput, S. Chand & Company Ltd.
3. Strength of Materials by R.K.Bansal, Lakshmi Publications House Pvt. Ltd.

# REFERENCES:

1. Strength of Materials by R. Subramanian, Oxford University Press
2. Mechanics of Materials Ferdinand P. Beer et al., Tata McGraw Hill Education Pvt. Ltd 5th edition 2009.
3. Strength of Materials by B.S. Basavarajaiah, B.S. Mahadevappa, Universities Press, 3rd Edition 2015.
4. Mechanics of Materials by R. C. Hibbeler, Pearson Education

Strength of Materials by T.D.Gunneswara Rao and M.Andal, Cambridge Pub

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**9K406**  **STRUCTURAL ANALYSIS – I**

**B.Tech. II Year II Sem. L T P C**

**2 1 0 3**

Pre-Requisites: Strength of Materials – I

**Course Objectives:** The objective of the course is to

CO1 Able to differentiate the types of frames and understand the different types of energy theorems and arches.

CO2 Able to differentiate propped cantilever, fixed and continuous beam like structures.

CO3 Able to understand the knowledge able concepts like of slope deflection method and Moving loads and influence lines with their significance.

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

CO1 Analyze the types of frames with different types of energy theorems and also arches.

CO2 Analyze the propped cantilever, fixed and continuous beam like structures with different type of loads.

CO3 Analyze the different types of beams and frames by slope deflection method and Moving loads and influence lines.

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

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

**Three Hinged Arches** – Introduction – Types of Arches – Comparison between Three hinged and Two hinged Arches - Linear Arch - Eddy’s theorem - Analysis of Three hinged arches - Normal Thrust and radial shear and bending moment .

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

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

**Slope Deflection Method:** Derivation of slope-deflection equation, application to continuous beams with and without sinking of supports -Determination of static and kinematic indeterminacies for frames - Analysis of Single Bay, Single storey Portal Frames by Slope Deflection Method including Side Sway - Shear force and bending moment diagrams and Elastic curve.

**UNIT – V** **Moving Loads And Influence Lines:** Introduction maximum SF and BM at a given section and absolute maximum shear force and bending moment due to single concentrated load , Equivalent uniformly distributed load-Focal length - Definition of influence line for shear force and bending moment - load position for maximum shear force and maximum bending Moment at a section - Point loads, uniformly distributed load longer than the span, uniformly distributed load shorter than the span.

**TEXT BOOKS:**

1. Structural Analysis Vol –I & II by V.N. Vazirani and M.M. Ratwani, Khanna Publishers.

2. Structural Analysis Vol I & II by G. S. Pandit and S.P. Gupta, Tata McGraw Hill Education Pvt. Ltd.

3. Structural analysis T. S Thandavamoorthy, Oxford university Press

4. Structural Analysis Vol I & II by S S Bhavikatti, Vikas Publishing house Pvt.Ltd.

**REFERENCE BOOKS:**

1. Structural Analysis by R. C. Hibbeler, Pearson Education

2. Basic Structural Analysis by K.U. Muthu et al., I.K. International Publishing House Pvt. Ltd

3.Mechanics of Structures Vol – I and II by H.J. Shah and S.B. Junnarkar, Charotar Publishing House Pvt. Ltd.

4. Basic Structural Analysis by C. S. Reddy, Tata McGraw Hill Education Pvt. Ltd. 5. Fundamentals of Structural Analysis by M.L. Gamhir, PHI Learning Pvt. Ltd.

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**9K407: HYDRAULICS AND HYDRAULIC MACHINERY**

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| **B.Tech II Year II Sem.** | **L** | **T** | **P/D** | **C** |
| **Course Objectives:** The objective this course is to: | **2** | **1** | **0** | **3** |

* 1. introduce open channel flow, in contrast to pipe flow, and particularly analysis of uniform flow including most economical sections;
  2. study characteristics of non uniform flows consisting of gradually varied and rapidly varied flow including surface profiles and energy dissipation in a hydraulic jump;
  3. understand the basic concepts on which turbo machinery (turbines and pumps) works.
  4. study working of various hydraulic turbines and pumps.

**Course Outcomes:** At the end of the course, the student is able to:

1. analyze uniform flows through open channels, calculate uniform flow parameters, and arrive at the most economical sections (L4) (U1)
2. classify different profiles in gradually varied flow and compute profile lengths (L4) (U2)
3. compute sequent depths and energy dissipation due to hydraulic jumps in open channels (L3) (U3)
4. arrive at the force generated on the vanes and work done by the vanes due to impact of jet on the vanes (L3) (U4)
5. compute work done by the turbines and pumps and carryout hydraulic design and working proportions of the turbines and pumps (L5) (U5, U6)

# UNIT-I: Open Channel Flow

Introduction to Open Channel Flow-Comparison between open channel flow and pipe flow, geometrical parameters of a channel, classification of open channel flow.

**Uniform Flow in Open Channels–**Uniform Flow-Continuity Equation, Energy Equation and Momentum Equation, Characteristics of uniform flow, Chezy’s formula, Manning’s formula. Factors affecting Manning’s Roughness Coefficient. Most economical section of channel. Computation of Uniform flow, Normal depth.

# UNIT – II: Non-Uniform Flow in Open Channels - Gradually Varied Flow

Specific energy, specific energy curve, critical flow, specific force, specific force curve, critical depth. Channel Transitions. **Gradually Varied Flow** – dynamic equation of gradually varied flow, classification of channel bottom slopes, classification, and characteristics of surface profiles. Computation of water surface profile by direct Step method.

# UNIT – III: Non-Uniform Flow in Open Channels - Rapidly Varied Flow

Hydraulic jump; Momentum equation for a jump in horizontal rectangular channel, energy dissipation in hydraulic jumps; types of hydraulic jump – applications of hydraulic jump; surges

**9K408 : CONCRETE TECHNOLOGY**

**B. Tech. II Year II semester L T P/D C**

**3 0 0 3**

**Course Objectives:** To enable the students to

1. Learn origin and basics of cement, its manufacturing, testing and its applications.
2. Learn about aggregates and its classification and properties.
3. Learn about fresh concrete, its manufacturing process and its behaviour. Also, basics of admixtures and its impact on behaviour of concrete.
4. Understand behaviour of hardened concrete and testing of hardened concrete.
5. Learn the process of Mix-Design of concrete using IS code books.
6. Learn different types of concrete and its behaviour and applications.

**Course Outcomes:** At the End of the course, the student

**CO1** Explain the material properties used in concrete production (cement, aggregates, water, admixtures etc) (L2)

**CO2** Examine the behaviour of fresh and hardened concrete (L4)

**CO3** Design concrete mixes to meet specific requirements such as strength, durability, workability, and economy as per IS codes (L6)

**CO4** Explain the processes involved in concrete production, including batching, mixing, transportation and curing (L2)

**CO5** Contrast different types of special concretes for construction (L2)

**UNIT I CEMENT:** Portland cement – chemical composition – Hydration, Setting of cement – Structure of hydrated cement – Tests on physical properties – Different grades of cement. Admixtures: Types of admixtures – mineral and chemical admixtures.

**UNIT - II AGGREGATES**: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregate – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand – Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine, Manufactured sand and coarse Aggregates – Gap graded aggregate – Maximum aggregate size- Properties Recycled aggregate.

**UNIT – III FRESH CONCRETE**: Workability – Factors affecting workability – Measurement of workability by different tests – Setting times of concrete – Effect of time and temperature on workability – Segregation & bleeding – Mixing, vibration and revibration of concrete – Steps in manufacture of concrete – Quality of mixing water.

**UNIT - IV HARDENED CONCRETE** : Water / Cement ratio – Abram’s Law – Gel/space ratio – Gain of strength of concrete – Maturity concept – Strength in tension and compression – Factors affecting strength – Relation between compression and tensile strength - Curing. TESTING OF HARDENED

CONCRETE:Compression tests– Tension tests – Factors affecting strength – Flexure tests – Splitting tests – Pull-out test, Non-destructive testing methods – codal provisions for NDT. ELASTICITY, CREEP & SHRINKAGE – Modulus of elasticity – Dynamic modulus of elasticity – Posisson’s ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage – types of shrinkage.

**UNIT – V MIX DESIGN** :Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by various methods – BIS method of mix design.

**UNIT – VI SPECIAL CONCRETES**: Introduction to Light weight concrete – Cellular concrete – No-fines concrete – High density concrete – Fibre reinforced concrete – Polymer concrete – High performance concrete – Self compacting concrete.

**TEXT BOOKS:**

1. Concrete Technology by M.S.Shetty – S.Chand&Co. ;7th edition, 2006.
2. Properties of concrete by A.M.Neville – Low priced edition – 5th edition, 2012.
3. 3.Concrete Technology by M.L.Gambhir – Tata Mc.Graw Hill press, New Delhi, 5th edition,2013.

**REFERENCES:**

1. Concrete Technology by A. R. Santha Kumar, Oxford university press, New Delhi,3rd edition,2006.
2. Concrete: Micro Structure, Properties and Materials – P. K. Mehta and J. M. Monteiro, Mc-Graw Hill Publishers, 4th edition, 2013.
3. Special Structural concretes by Rafat Siddique, Galgotia Publications, 1st edition, 2000.
4. IS : 10262 – 2009 Recommended Guidelines for Concrete Mix Design.

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# 9K409 Engineering Geology

**B.Tech II Year II Sem.**  **L T P/D C**

**3 0 0 2**

**Course Objectives**

Student shall be able,

CO1 Define the formation and properties of rocks and minerals, soils and other geological materials and their impact on engineering projects (L2)

CO2 Understand the subsurface information and groundwater potential sites through geophysical

investigations (L3)

CO3 Analyse the geological hazards that can affect construction projects such as landslides,

earthquakes, rockfalls and soil liquefaction (L3)

CO4 Analyze and interpret the proficiency in geologic mapping techniques, including field

observations,mapping symbols and cross-section interpretation (L6)

**Course Outcomes**

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

CO1 Explain the formation and properties of rocks and minerals, soils and other geological materials and their impact on engineering projects (L2)

CO2 Identify subsurface information and groundwater potential sites through geophysical

investigations (L3)

CO3 Identify geological hazards that can affect construction projects such as landslides,

earthquakes, rockfalls and soil liquefaction (L3)

CO4 Develop proficiency in geologic mapping techniques, including field observations,

mapping symbols and cross-section interpretation (L6)

**UNIT – I**

**Introduction**

Definition of Geology, Engineering Geology. Importance of geology from Civil Engineering point of view. Importance of physical geology, petrology and structural geology. Case studies of failures of few civil engineering constructions, weathering of rocks and its effect on the properties of rocks, importance of weathering with reference to dams, reservoirs and tunnels. Earth structure- Lithosphere- Internal structure of the earthquake, Plate Tectonics.

*Applications: For selection of sites and design for major structures such as dams, reservoirs, bridges, deep foundations for high-rise buildings, etc.*

**UNIT – II**

**Mineralogy**

Definition of mineral, mineralogy, Importance of study of minerals: rock forming and ore forming minerals. Different methods of study of minerals.Study of minerals by physical identification method and their physical properties. Determination of Physical properties of following minerals: Feldspar, Quartz, Flint, Jasper, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc, Calcite. Study of ore forming minerals such as Pyrite, Hematite, Magnetite, Amethyst, Galena, Pyrolusite, Graphite, Magnesite, and Bauxite, Coral reefs.

*Applications: To Identify the various minerals useful in design of foundations*

**UNIT – III**

**Petrology**

Definition of a rock, petrology. Classification of rocks-Geological classification of rocks. Rock Cycle. Classification of igneous Forms, structures and textures of igneous rocks. Classification of sedimentary rocks, and its structures and textures. Classification of metamorphic rocks, its structures and textures.

Megascopic Study of Granite, Dolerite, Basalt, Pegmatite, Charnockite, Sandstone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.

*Applications: To Identify various rocks useful for design of foundations.*

**UNIT – IV**

**Structural Geology**

Out Crop, Study of geological structures associated with rocks such as folds, faults, joints, unconformities-their important types. Significance of Strike and dip in geological structures, shield areas and seismic belts, seismic waves, Richter scale, Precautions to be taken for building construction in seismic areas, Ground Water, water table, common types of ground water, springs, geological controls of ground water movement, ground water exploration.

*Applications: In selection of site for major structures such as dam, reservoir, bridges, and high-rise buildings*

**UNIT – V**

Importance of Geophysical investigations, Principles of geophysical methods. Importance of Electrical resistivity method and seismic refraction method from civil engineering point of view.

**Geology of Dams, Reservoirs, Tunnels**

Types of Dams, Importance of geological considerations in the site selection of dams, reservoirs and tunnels. Case histories of dams, geological factors affecting the water tightness and life of a reservoir. Purpose of tunneling, types of tunnels, over break, lining of tunnels.

*Applications: Site selection for dams, life of reservoirs, planning of tunnels*

**UNIT-VI**

**Geological Hazards:** Geographical aspects of earthquake, tsunamis and landslides. Disaster prevention mitigation and management.

*Applications: Taking necessary measures when the disasters occur*

**TEXT BOOKS:**

1. Engineering Geology By N. Chennakesavulu, McMillan India Ltd.

2. Engineering Geology by S K Duggal, H K Pandey McGraw Hill Education Pvt Ltd 2014.

**REFERENCES:**

1. Geology for Engineers and Environmental Scientists, Pearson.

2. Krynine& Judd, Principles of Engineering Geology &Geotechnics, CBS Publishers & Distribution.

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**Code: 9AC48 BASIC ELECTRICAL & ELECTRONICS ENGINEERING**

L T P/D C

3 0 0 3

CO’s: after studying this course, the student will be able to

1. Understand the fundamentals of electrical engineering and DC machines.
2. Understand the principles of AC circuits.
3. Understand the principle and operation of three phase induction motor and measuring instruments.
4. Understand the principle and operation of diode.
5. Understand the principle and operation of transistor.
6. Understand the principles of digital electronics.

**Unit – I: Fundamentals of Electrical Engineering and DC Machines:**

Ohm’s Law, Kirchhoff’s Laws, types of sources, passive elements. Series parallel circuits, mesh and nodal analysis. Superposition, Reciprocity theorem.

**DC Machines**: Principle of operation of D.C generators, types, E.M.F equation. Principle of operation of D.C motors, Types motors, Torque equation, Losses and efficiency, simple problems on D.C Generators and motors.

**Unit – II: Fundamentals of AC circuits:**

AC voltage wave form and basic definitions: Peak Value, R.M.S. value, Average values, Form factor and Peak factor, ’j’ operator, Analysis of single phase AC circuits series and parallel (Simple circuits). Three phase circuits – Star - delta connection, Relation between line and phase voltages / currents in a 3-phase Star-Delta balanced system.

**Unit – III: Induction Motors and Instruments:**

Concept of Faraday’s laws, 3- phase induction motor working principle, operation and construction details.

**Instruments**: Introduction, classification of instruments, operating principles, essential features of measuring instruments, permanent magnet moving coil (PMMC) instruments, moving iron (MI) instruments.

**UNIT IV-DIODE:** Overview of Semiconductors, PN junction diode and Zener diode –Diode circuits: rectifiers (bridge type only), filters, clippers and clampers.

**UNIT V- TRANSISTOR**: BJT construction, operation, characteristics (CB, CE and CC configurations) and uses – JFET and MOSFET construction, operation, characteristics (CS configuration) and uses.

**UNIT VI-DIGITAL ELECTRONICS**: Number systems – binary codes –binary arithmetic - Boolean algebra, laws & theorems - simplification of Boolean expression using K maps - logic gates - implementation of Boolean expressions is using logic gates - standard forms of Boolean expression.

**Text Books:**

1. Basic Electrical Engineering –T.K. Nagesarkar and M.S. Sukhja, Oxford University Press.2nd edition.
2. Basic electrical Engineering – M.S. Naidu and S. Kamakshiah – TataMcGraw-Hill, 2005 edition.
3. Principles of Electronics - V.K.Mehta, S.Chand Publications, 2nd edition.

**References:**

1. Theory and problems of Basic electrical Engineering- D.P.Kotahari & I.J.Nagrath PHI.

Electronic Devices and Circuits, Millman & Halkias, TMH publications.

**9HC05 - ENVIRONMENTAL SCIENCE**

II B. Tech II Sem (for CSE, ECE and CE)

(Mandatory course)

L T P/D C

3 0 0 0

There are no credits but grading will be given based on marks scored as **Outstanding/ Excellent/ Very good/ Good/ Above average/ Average/ Satisfactory/Not satisfactory**

**Course Objectives:**

1. To understand structure and function of ecosystem
2. To learn classification and uses of natural resources
3. To learn about Understanding the impacts of developmental activities and mitigation measures.
4. To know the source, causes and preventive methods of pollution
5. To understand the importance of ecological balance for sustainable development.
6. To understand the environmental policies and regulations

**UNIT-I Ecosystems**: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity.

**UNIT-II Natural Resources**: Classification of Resources: Living and Non-Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land Energy resources: growing energy needs, renewable and non renewable energy sources, use of alternate energy source.

**UNIT-III Biodiversity and Biotic Resources**: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation.

**UNIT-IV Environmental Pollution and Control Technologies**: Environmental Pollution: Classification of pollution, Air Pollution: Primary and secondary pollutants. Acid rain-Threshold limit values of chemicals present in environment, Global warming, Ozone layer depletion, Water pollution: Sources and types of pollution. Soil Pollution: Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, Solid waste: Municipal Solid Waste management, composition and characteristics of e-Waste and its management. Pollution control technologies: Sewage water Treatment, Kyoto protocol, and Montréal Protocol.

**UNIT-V Sustainable development and Green Technology**: Concept of sustainable development, threats to sustainability population and its explosion, Crazy consumerism, over- exploitation of resources, strategies for achieving sustainable development environmental education, conservation of resources, urban sprawl sustainable cities and sustainable communities, human health , role of IT in Environment, Environmental Ethics, Environmental Economic – Concept of Green Building, Clean Development Mechanism ( CDM ).

**UNIT-VI Environmental Policy, Legislation & Environment Impact Assessment**: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste

management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP).

**Course Outcomes**

After completion of the course, the student will be able to:

1. Understand about ecosystem and energy flow among the organisms.
2. Know the resources available, use of them and overexploitation of the resources in the nature.
3. Learn the value, use and value of biodiversity.
4. Understand the causes and effect of pollution and implement measures in control of pollution.
5. Understand the sustainable development and implement green technology for sustainable development.
6. Learn and implement policy to protect the environment.

**TEXT BOOKS:**

1. Perspectives in Environmental Studies: Kaushik A. and Kaushik, C.P. New Age International (P) Ltd. (2008)

**REFERENCE BOOKS:**

1. Environmental Studies by Erach Bharucha, 2005 University Press.
2. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
3. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
4. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
5. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.

# Text book of environmental science and technology - dr. M. Anji reddy 2007, bs publications.

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# 9K474: FLUID MECHANICS AND HYDRAULIC MACHINERY LABORATORY

**B. Tech. II Year II semester L T P/D C**

**- - 3 1.5**

**Pre Requisites**: Fluid Mechanics, Hydraulics and Hydraulic Machinery

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

1. illustrate the students with the components and working principles of various flow measurement and hydraulic machines such as venturimeter, orificemeter, tank fitted with different notches, different types of turbines and pumps.
2. analyze the laboratory measurements and to document the results in an appropriate format.

# Course Outcomes:

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

1. Determine coefficient of discharge for various flow measuring devices such as orifice, mouthpiece, venturimeter, orifice meter, etc; (L3)
2. Determine performance characteristics or efficiency of various hydraulic machines such as turbines and pumps; (L4)
3. Interpret and compare the results of analytical models introduced in theory classes to the actual behavior of real fluid flows and draw appropriate conclusions. (L4)

# List of Experiments (Minimum Ten experiments):

* 1. Verification of the Bernoulli’s theorem;
  2. Calibration of Venturimeter and Orifice meter;
  3. Determination of coefficient of discharge, coefficient of contraction and coefficient of velocity for an orifice;
  4. Determination of coefficient of discharge for rectangular, trapezoidal and V-Notch;
  5. Determination of coefficient of discharge, coefficient of contraction and coefficient of velocity for a mouthpiece;
  6. Determination of friction factor (major losses) of a pipe;
  7. Determination of Loss due to Sudden Expansion and Sudden Contraction (minor losses);
  8. Determination of Manning’s and Chezy’s constants for Open channel flow;
  9. Determination of Energy loss in a hydraulic jump;
  10. Finding performance characteristics of a Pelton wheel turbine;
  11. Finding performance characteristics of a Francis Turbine;
  12. Finding performance characteristics of a Keplan Turbine;
  13. Finding performance characteristics of a single stage / multi stage centrifugal pump;
  14. Finding performance characteristics of a reciprocating pump.

# References:

* + 1. Hydraulics and Fluid Mechanics, P.M. Modi and S.M. Seth, Standard Book House
    2. LAB manual.

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# 9K475 Engineering Geology Laboratory

**B.Tech II Year II Sem.**  **L T P/D C**

**0 0 3 1.5**

**Pre Requisites**: Engineering Geology Theory

**Course Objectives:**

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

**Course Outcomes:**

At the end of the course, the student will be able to identify the various rocks and minerals depending on geological classifications

**List of Experiments:**

1. Study of physical properties and identification of minerals.

2. Study of physical properties and identification Rock forming minerals.

3. Megascopic description and identification of Rocks.

4. Megascopic description and identification of igneous rocks.

5. Megascopic description and identification of sedimentary rocks.

6. Megascopic description and identification of metamorphic rocks.

7. Structural geology problems simple strike

8. Structural geology problems dip problems (calculation of amount of true dip and direction).

9. Interpretation and drawing of sections for geological maps showing normal beds.

10. Interpretation and drawing of sections for geological maps showing tilted beds.

11. Interpretation and drawing of sections for geological maps showing fault beds.

12. Interpretation and drawing of sections for geological maps showing folded beds.

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**Code: 9AC95 BASIC ELECTRICAL & ELECTRONICS ENGINEERING LAB**

L T P/D C

0 0 3 1.5

**Electrical Experiments**

1. Brake test on 3-phase induction motor (performance characteristics).
2. Speed control of DC shunt motor by
   1. a) Armature Voltage Control .
   2. b) Field flux control method.
3. Brake test on DC shunt motor.
4. Swinburne’s test on DC shunt machine.
5. OCC characteristics of DC shunt generator.
6. Verification of superposition and Reciprocity Theorems.

**Electronics Experiments**

1. PN Junction diode characteristics A. Forward bias B. Reverse bias.
2. Zener diode characteristics
3. Half wave Rectifier with and without filters.
4. Full wave Rectifier (Centre tapped and Bridge)with and without filters
5. Transistor CE characteristics (Input and Output)
6. Verification of Logic gates

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**H: High M: Medium L: Low**

**B. Tech II Year II Semester**

**TECHNICAL SEMINAR**

**Code: 9K476 L T P C**

**0 1 0 1**

**Course Objective :**

1. Develop ability to be a public speaker with the aid of Power Point Presentations.
2. Learn delivering technical seminars demonstrating clarity in thinking and enunciating complex technical concepts.
3. Practice and develop communication skills and interview performance skills.

**Course Outcomes:**

1. Demonstrate public speaking with the aid of Power Point Presentations
2. Identify current general and specific technological topics of interest and prepare and present the content cogently.
3. Demonstrate communication skills and interview performance skills

**Procedure**

1. Seminar in-charges shall highlight the significance of technical seminar in the first two sessions and enlighten the students on the utility of these seminars.
2. The slots, titles shall be decided upfront and seminar in charge shall take signatures.
3. The same sheet shall be affixed in the respective classrooms and seminar register.
4. Progress of the seminars is reviewed by the concerned HOD once in 15 days.
5. The evaluation for technical seminars is informed to students and displayed in the classrooms.
6. The presentation (PPT) must contain topic, introduction, explanation, diagrams, tables, applications and conclusions.

**Distribution of marks**

There shall be a Technical Paper writing and seminar evaluated for 100 marks in First Year Second Semester. The evaluation is purely internal and will be conducted as follows:

Content : 20 marks

Presentation including PPT : 20 marks

Seminar Notes : 10 marks

Interaction : 10 marks

Report : 25 marks

Attendance : 10 marks

Punctuality : 5 marks

**Total 100 marks**