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 Regulations)

DEPARTMENT OF CIVIL ENGINEERING

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

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 andnorms 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 andwrite effective reports and design documentation, make effective presentations, and give andreceive 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 inmultidisciplinary environments.

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

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]

I & II 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	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 Lab	0	0	3	1.5	40	60
9	9K373	Computer Aided Drafting of Building Lab	0	0	3	1.5	40	60
Total			**12**	**4**	**11**	**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 Lab	0	0	3	1.5	40	60
9	9K475	Engineering Geology Lab	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	**18**	**4**	**9**	**22.5**	**460**	**540**

9HC06: APPLIED PHYSICS

(Common to Civil Engineering and Mechanical Engineering)

L	T	P	C
2	1	0	3

B.Tech. I Year I Semster

PO	1	2	3	4	5	6	7	8	9	10	11	12
Impact												

Course Objectives

1. To understand basic fundamentals of crystallography, crystal structures and theirproperties.
2. To understand the various defects of a crystal.
3. To know the various types of vibrations, radius of gyration, moment of inertia andUltrasonics and their importance.
4. To make the students to widen the conceptual understanding of the fundamentalprinciples of interference and diffraction.
5. To understand the basic concepts of normal light, Laser and its applications and toknow about the fundamentals of radioactivity and its applications.
6. To discuss about the nano-technology, preparation techniques and characterization(XRD & TEM), CNTs.

Course Outcomes

After completing the course the students are able to

1. Get the knowledge to classify the crystal structures, their parameters and draw thevarious crystal planes using Miller indices.
2. Understand and analyze the various crystal defects-its types.
3. Understand about the vibrations, radius of gyration, moment of inertia and ultrasonic.
4. Analyze the wave nature of light, superposition principle, differentiation between interference, diffraction and their applications
5. 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.
6. To understand the nano& bulk concepts, surface to volume ratio, quantum confinement, CNTs and preparation methods. Analysis techniques like XRD & TEM.

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 UltrasonicsVibrations:

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 EnergyLasers:

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

9FC01: PROBLEM SOLVING USING C

(Common to all branches)

B.Tech. I Year I semester

L	T	P	C
3	0	0	3

PO	1	2	3	4	5	6	7	8	9	10	11	12
Impact												

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,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

Reference Books:

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

9HC11: MATRIX ALGEBRA AND CALCULUS

(Common to all branches)

B.Tech.I year I Semester

L	T	P	C
2	1	0	3

PO	1	2	3	4	5	6	7	8	9	10	11	12
Impact												

Pre Requisites: Mathematics Knowledge at Pre-University Level

Course Objectives:

1. Basic operation of matrices and about the linear system and some analyticalmethods 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 theequations 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)

B.Tech.I Year I semester

L	T	P	C
2	0	0	2

PO	1	2	3	4	5	6	7	8	9	10	11	12
Impact												

Course Objectives:

To enable students to:

1. Recognize and distinguish between different parts of speech
2. Learn the correct usage of articles in sentences
3. Write sentences using tenses
4. Identify when each punctuation marks is needed and its correct usage
5. Recognize the difference between direct and indirect speech and form statements in themUnderstand 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:

1. Demonstrate competence with suitable accuracy in vocabulary, and language fluency.
2. State the definition of nouns, verbs, adjectives, and adverbs.
3. Identify the differences of each tense and use the tenses accurately.
4. Identify specialized reading strategies for specific types of texts
5. Produce written work that is substantive, organized, and grammatically accurate

UNIT-I

Vocabulary-1

Root words
Synonyms and Antonyms
Homonyms, Homophones and Homographs
One word substitutesUNIT II Vocabulary-2
Idioms and Phrases
Confusables

UNIT III

Grammar-1

The Parts of Speech

Use of Articles
Omission of Article

UNIT – IV

Grammar-2

Tenses
Prepositions
Concord

UNIT – V

Reading & Writing

Techniques of Reading, Reading Comprehension
Kinds of Sentences
Punctuation

UNIT – VI

Writing-2

Voice – Active voice and Passive Voice
Speech-Direct & Reported Speech
Common errors in English

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 andHemalathaagarajan,Frank Bros. & Co.

9HC61: ORAL COMMUNICATION LAB –I

(Common to all branches)

B.TechI year I semester

L	T	P	C
0	0	2	1

PO	1	2	3	4	5	6	7	8	9	10	11	12
Impact												

Course Objectives:

To enable students to:

1. Comprehend the basic tactics to communicate effectively and set a road map to achieve their communication goals.
2. Know the importance of pronunciation in effective communication and work on mitigating the MTI in their spoken English;
3. 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.
4. 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:

1. Describe people, objects and situations using simple sentences.
2. Use appropriate tenses and expressions in different contexts of conversations.
3. Identify major areas of concern in their oral communication and address them.
4. 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:

1. Ice-breaking activities
2. Personal Communication SWOT Analysis Communication Case Studies: The Terrible &The Terrific

Unit 2:

Pronunciation Matters

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

Activities:

1. Odd Word Out
2. 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:

1. Speaking activity on daily routine, how students spent their recent vacation, speaking abouttheir childhood, speaking about future plans.
2. 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:**

1. Picture descriptions.
2. Guessing games - listening to the descriptions.
3. Narrating memorable incidents from life.
4. 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:

1. Building stories - chain activity.
2. Story prompts activity. Narrate the story. (all the hints are given except linking words andtenses)

REFERENCES:

1. An Interactive Grammar of Modern English" by Shivendra K Verma andHemalath
2. "Skill Sutras" by JayashreeMohanraj, Prism Books Pvt. Ltd.
3. "Better English pronunciation" by J.D. Connor.
4. "Effective Communication" John Adair, Pan Macmillan Ltd.
5. "Body Language", by Allan Pease, Sudha Publications.
6. "Communicative English", by Hariprasad M. and Prakasam V, Neel Kamal Publications.

9HC65: APPLIED PHYSICS LAB

(Common to Civil Engg and Mech Engg)

B.Tech.I year I semester

L	T	P	C
0	0	3	1.5

PO	1	2	3	4	5	6	7	8	9	10	11	12
Impact												

Course Objectives

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

Course Outcomes

After completing the experiment, students are able to

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

List of Experiments

1. Compound Pendulum:

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

2. Torsional Pendulum:

-Determination of rigidity modulus of a given material of wire usingTorsional pendulum.

3. LCR Circuit:

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

4. RC Circuit:

-Determination of time constant of a RC-circuit.

5. Sonometer:

Verification of laws of transverse vibrations of a stretched string.

6. Melde's Experiment:
-Determination of frequency of an electrically vibrating tuning fork usingMelde's experiment.
7. Newton's Rings:
-Determination of wavelength of a monochromatic light source by usingNewton's rings experiment.
8. Diffraction Grating:
-Determination of wavelength of a given laser source of light by usingdiffraction grating in normal incidence method.

9. Light Emitting Diode (LED):
-Studying the characteristics and calculating the forward resistance of aLED.
10. Dispersive Power:
-Calculation of dispersive power of a given material of prism by usingspectrometer.
11. Stewart-Gee's Experiment:
-Determination of magnetic induction flux density along the axis of acurrent carrying circular coil using Stewart and Gee's experiment.

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

9FC61: PROBLEM SOLVING USING C LAB

(Common to all branches)

B.Tech.I Year I Semester

L	T	P	C
0	0	3	1.5

PO	1	2	3	4	5	6	7	8	9	10	11	12
Impact												

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 theapproach or algorithm to be implemented for the problem given.]

Unit I (Cycle 1)

1. Write an algorithm for converting a given Celsius temperature to its equivalentFahrenheit 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 aquadratic 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 andheight.
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 ofper 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 numberand 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. $1+x+x^2+x^3+ \quad +x^n$, given x and n.
4. 4. $1! + 2! + 3! + \quad + n!$, given n.
5. $1 – x^2/2! + x^4/4! – x^6/6! + x^8/8! – x^{10}/10! + \ldots$ to n terms where the n^{th} term becomesless 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, uppertriangular, diagonal, scalar, or unit matrix.

Unit IV (Cycle 8)

1. Write C functions for the following:
2. A function that takes an integer n as argument and returns 1 if it is a prime numberand 0 otherwise.
3. A function that takes a real number x and a positive integer n as arguments andreturns x^n.

4. A function that takes a positive integer n as an argument and returns the n^{th} Fibonaccinumber.

5. Using recursion write C functions for the following:
6. Factorial of a non-negative integer n.
7. Number of combinations of n things taken r at a time.
8. Greatest Common Divisor of two integers.
9. 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.
3. Larger of two numbers.
4. Smaller of two numbers.
5. Sum of the squares of two numbers.
6. Write a program to generate Pascal's triangle.
7. 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:
2. Create a file by the name given by the user or by command line argument and add thetext given by the user to that file.

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

Cycle 12:

Case study on Electricity Billing, Restaurant Billing System.

9BC01: ENGINEERING GRAPHICS

(Common to all branches of Engg)

B.Tech.I Year I semester

L	T	P	C
1	0	4	3

PO	1	2	3	4	5	6	7	8	9	10	11	12
Impact												

Pre Requisites:
Nill

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 varioustype of curves used in engineering
2. Understand Orthographic projections and draw projections of simple drawing entitiessuch as points Lines.
3. Draw projections of different types of regular Planes, solids in various positions wrtprincipal planes of projection.
4. Draw Sections of various Solids including Cylinders, cones, prisms and pyramids anddraw 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 usingcomputer 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 planeand 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 RegularSolids – Prism, Cylinder, Pyramid – Auxiliary views.

Development of Surfaces: Methods of development, Development of lateral Surfaces ofRight 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, PearsonEducation
2. Agrawal B. &Agrawal C. M. (2012), Engineering Graphics, TMH Publication
3. AUTOCAD Software Theory and User Manuals

9HC04: ENGINEERING CHEMISTRY
(Common to all branches of Engg)

B.Tech I Yr IISem

L	T	P	C
2	1	0	3

PO	1	2	3	4	5	6	7	8	9	10	11	12
Impact												

Course Objectives:

1. To understand microscopic chemistry in terms of atomic and molecular orbital's
2. To learn the preparation and applications of commercial polymers andlubricant 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 waterandalso 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 ofanalyticaltechniques 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 (F_2, Cl_2 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)

a) Introduction: - Hardness of water – types of hardness (temporary and permanent), calculation of hardness- Numerical problems. Estimation of hardness of water by EDTA Method.
b) 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.
c) 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

a) Primary batteries – Lechalanche cell (dry cell), Lithiumcell

b) Secondary batteries(Accumulators) – Lead acid battery, Lithium-ion battery
c) Fuel cells- H_2 – O_2 fuel cell and MeOH-O_2 fuel cell-advantages and applications.

Engineering applications – future water powered car, Hydrogen production andstorage.

UNIT - V

Corrosion and Surface treatment (8L)

Corrosion – basic concepts –types of corrosion, chemical,electrochemical corrosion(absorption of O_2 and evolution of H_2) -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 (S_N1, S_N2) addition to double bond(C=C), elimination (E^1 and E^2), oxidation (using $KMnO_4$, CrO_3), reduction (Hydrogenation by Ni/H_2, 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. ChandPublications(2004)

9EC01: DATA STRUCTURES

(Common to all branches)

B.TechI Year II semester

L	T	P	C
3	0	0	3

PO	1	2	3	4	5	6	7	8	9	10	11	12
Impact												

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 andCircular 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 sortPerformance analysis of Searching and Sorting Algorithms.

TEXT BOOKS:

1. Data Structures Using C second edition by ReemaThareja Oxford university press
2. Data Structure through C by Yashavant Kanetkar.

REFERENCES:

1. Alfred V. Aho, Jeffrey D. Ullman, John E. Hopcroft. Data Structures andAlgorithms. 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 andBehrouz A. Forouzan.

9HC12: ADVANCED CALCULUS

(Common to all branches)

B.TechI year II Semester

L	T	P	C
2	1	0	3

PO	1	2	3	4	5	6	7	8	9	10	11	12
Impact												

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, directionalderivatives; 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. 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.

9K201: ENGINEERING MECHANICS
(For Civil Engineering)

B.TechI Year II Semester

L	T	P	C
2	1	0	3

PO	1	2	3	4	5	6	7	8	9	10	11	12
Impact												

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 andalso learn various analyses ofsimple trusses.
3. Understand the concepts of Centroid and Area and Mass Moments ofInertia and make them learnhow to calculate these for different shapes and objects
4. Learn principles of virtual work and energy methods to analyzeproblems of rigid bodies actedupon by a system of forces
5. Learn and solve the problems of particle Kinematics and Kinetics by EnergyMethods.
6. Be able to develop the capacity to predict the effect of force on the motion of therigid 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 ofplane sections fromfirst principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections; Mass moment inertia ofcircular 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 EngineeringMechanics, 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,laxmiPublications,1998

9HC64: ENGINEERING CHEMISTRY LAB

(Common to all branches)

B.techI year I Semester

L	T	P	C
0	0	3	1.5

PO	1	2	3	4	5	6	7	8	9	10	11	12
Impact												

Course Objectives:

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)

B.TechI Year II semester

L	T	P	C
0	0	3	1.5

PO	1	2	3	4	5	6	7	8	9	10	11	12
Impact												

Prerequisites: Problem Solving using C

LabCourse 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 implementthem 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:
2. Converting infix expression into postfix expression
3. Evaluating the postfix expression

Cycle 4:

1. Write a C program that uses functions to perform the following operations on singly linked list:

i) 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:

i) Creation ii) Insertion iii) Deletion iv) Traversal in both ways

Cycle 6:

1. Write a C program using functions to perform the following operations oncircular singly linked list:

i) Creation ii) Insertion iii) Deletion iv) Traversal

Cycle 7:

1. Write a C program to implement operations on the following Data StructuresUsing Singly linked list:

i) Stack ii) Queue

Cycle 8:

1. Write a C program that uses functions to perform the following:

i) Creating a Binary Search Tree.

ii) 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 performthe following searching operations for a Key value in a given list of integers:

i) 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:

i) 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:

i) 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)

B.TechI Year II semester

L	T	P	C
0	0	3	1.5

PO	1	2	3	4	5	6	7	8	9	10	11	12
Impact												

Course Objectives:

To enable students to:

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

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.

Unit 1

Small talk and conversational techniques

Tips on enhancing conversation skills.

Conversation starters, small talk questions, how to talk to strangers andpractice activities on initiating informal conversations.

1. Talk about your favourite things.
2. Interview each other.

Unit 2

Role Play/skit/one act play

1. Role play assuming fictional characters and non-fictional characters.
2. One Act plays
3. 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.

1. Five minute PowerPoint presentations.

Unit 5

Group Discussions

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

1. Practice sessions: GDs on different topics.

Unit 6

Facing questions: Mock Interviews

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

1. Question Toss: Practice on asking and answering questions.

REFERENCES:

1. "Effective Technical Communication" by M. Ashraf Rizvi, McGraw Hill.
2. "Skill Sutras" by JayashreeMohanraj, Prism Books Pvt. Ltd.
3. "Technical Communication: Principles and Practice" by Meenakshi Raman, OUP.
4. "Effective Communication" John Adair, Pan Macmillan Ltd.
5. "Body Language", by Allan Pease, Sudha Publications.
6. "Business Communication: From Principles to Practice" MM Monippally, TataMcGrawHill.

9BC61: WORKSHOP/MANUFACTURING PROCESSES LAB

(Common to All Branches)

B.Tech.I year II semester

L	T	P	C
0	1	3	2.5

PO	1	2	3	4	5	6	7	8	9	10	11	12
Impact												

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 workto 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 experienceCO-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	3. Cross Half Lap joint 4. Half Lap Dovetail joint
3	Electrical &Electronics	5. One lamp one switch 6. Stair case wiring
4	Welding	7. Practice of Lap and Butt joint by Arc welding
5	Casting	8. Preparation of mould cavity using solid pattern 9. Preparation of mould cavity using split pattern
6	Tin Smithy	10. Preparation of Rectangular Tray 11. Preparation of Square box
7	Plastic molding& Glass Cutting	12 Injection Moulding 13 Glass Cutting with hand tools
8	Machine Shop (Demonstration only)	Demonstration of Turning, Drilling and grinding operations on Lathe, Drilling and grinding machines

9HC13: COMPLEX VARIBLE AND STATISTICS

(Common to CE & ME)

B.Tech. II Year I Semester:

L	T	P	C
2	1	0	3

PO	1	2	3	4	5	6	7	8	9	10	11	12
Impact												

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 complex variable 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 attributesusing chi-square distribution.

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 usingchi-square distribution.

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 χ^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.

9K301: Strength of Materials-1

B.Tech II Year I Sem.

L	T	P	C
2	1	0	3

PO	1	2	3	4	5	6	7	8	9	10	11	12
Impact												

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 actionof 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 stessesby 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 betweenS.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

9K302: FLUID MECHANICS

B. Tech. II Year I semester

L	T	P	C
2	1	0	3

PO	1	2	3	4	5	6	7	8	9	10	11	12
Impact												

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 immersedand 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 theseequations for measurement of fluid flow;
5. Introduce the tool of dimensional analysis useful for experimental studies on complexphenomena;
6. Obtain friction loss in pipes and study the flow behavior in pipe networks useful indesigning water distribution networks;
7. Introduce the concept of boundary layer, drag and lift forces for bodies passing throughfluids.

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 behavior 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 Euler's and Bernoulli's equations for flow along a streamline and apply these lawsto 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; vapor pressure, boiling point, cavitation; surface tension, capillarity, Bulk modulus of elasticity, compressibility.

UNIT-II:

Fluid Statics - Fluid Pressure: Pressure at a point, Pascal's law, hydrostatic law, pressure variation with temperature, density and altitude. Piezometer, U-Tube Manometer, Single Column Manometer, U-Tube Differential Manometer, Micro manometers. 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 irrational 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, Naiver – Stokes equations (Explanatory), Momentum equation and its application – forces on pipe bend.

Pitot tube, Ventura 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-karma 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 Hobbler, 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.

9K303: Surveying

L	T	P	C
3	0	0	3

B. Tech. II Year I semester

PO	1	2	3	4	5	6	7	8	9	10	11	12
Impact												

Course Objectives:

The student should have the capability to:

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

Course Outcomes:

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

1. **CO1** Apply the basic principles of surveying to calculate distances/angular measurements, areas and volumes (L3) (U 1 and 3)
2. **CO2** Explain different surveying instruments used in determining the local and global positions (L2) (U 2 and 5)
3. **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)
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 andDetermination 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, volumeof 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.

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)

9K304: Building Materials and Construction Planning

B. Tech. II Year I semester

L	T	P/D	C
3	-	-	3

PO	1	2	3	4	5	6	7	8	9	10	11	12
Impact												

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, 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)

UNIT-I

Stones and Bricks, Tiles: Building stones–classifications and quarrying–properties–Structural requirements–dressing.

Bricks–Composition of Brick earth–manufacture and structural requirements, Fly ash, Ceramics.

UNIT–II

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

Admixtures–mineral & chemical admixtures–uses.

UNIT-III

Mortars: Lime and Cement Mortars

Brick masonry–types–bonds; Stone masonry–types; Composite masonry–Brick-stone composite; Concrete, Reinforced brick.

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

UNIT-IV

Timber, Aluminum, Glass, Paints and Plastics: Wood-structure–types and properties– seasoning – defects; alternate materials for Timber–GI / fibre–reinforced glass bricks, 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
Building Planning: Principles of Building Planning, Classification of buildings and building by laws
Building Services: Plumbing Services: Water Distribution, Sanitary – Lines & Fittings; Ventilations: Functional requirements systems of ventilations. Air- conditioning- Essentials and Types; Acoustics–characteristic– absorption– Acoustic design; Fire protection– Fire Hazards– Classification of fire - resistant materials.

TEXTBOOKS:
1. Building Construction–by Rangwala, Charotar Publishing House Pvt. Ltd.; 34th Edition 2022
2. Building Materials by Rangwala, Charotar Publishing House Pvt. Ltd.; 43rd Edition 2019
3. Building Construction by S. P Arora and S. P Bindra Dhanpat Roy Publications January 2010

REFERENCES:
1. Building Materials by Duggal S K, New Age International publications, 2019
2. Building Materials and Construction by GC Sahu, Joygopal Jena, Mc Grawhill Pvt. Ltd 2015.
3. Building Materials by P.C.Varghese, PHI, 2015.
4. Building Construction by P. C.Varghese PHI, 2015.

9HC63: Soft Skills Lab

B. Tech. II Year I semester

L	T	P/D	C
0	1	2	2

PO	1	2	3	4	5	6	7	8	9	10	11	12
Impact												

Course objectives:

To enable students to:

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

Units	Tutorial (1 per week)	No. of Periods	Lab (2 per week)	No. of Periods
1.Know Yourself	1.1 Importance of knowing yourself 1.2 SWOT / SWOC Analysis 1.3 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

9K371: STRENGTH OF MATERIALS LABORATORY

B. Tech. II Year I semester

L	T	P/D	C
0	0	3	1.5

PO	1	2	3	4	5	6	7	8	9	10	11	12
Impact												

Course Objectives:
The course aims at providing hands on practice to observe the behavior 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

9K372: SURVEYING LABORATORY

B. Tech. II Year I semester

L	T	P/D	C
0	0	3	1.5

PO	1	2	3	4	5	6	7	8	9	10	11	12
Impact					M							H

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 fieldlevel 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

9K373: COMPUTER AIDED DRAFTING OF BUILDINGS LABORATORY

B. Tech. II Year I semester

L	T	P/D	C
0	0	3	1.5

PO	1	2	3	4	5	6	7	8	9	10	11	12
Impact	L		M		H					L		

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:

2. Make use of AutoCAD commands for drawing 2D building drawings (L2)
3. Create plans and sections for simple buildings (L5)
4. 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 – LaxmiPublications.
2. Lab Manual

9K405: STRENGTH OF MATERIALS-II

B.Tech II Year II Sem.

L	T	P/D	C
2	1	0	3

PO	1	2	3	4	5	6	7	8	9	10	11	12
Impact												

Pre-Requisites: Strength of Materials - I

Course Objectives:

1. understand the nature of stresses developed in simple geometries shafts under differentloading actions.
2. understand behaviour of short column and long column under direct loading and eccentricloading
3. Learn the concepts of springs, columns &cylindrical and spherical shells for various typesof simple loads
4. To calculate the stability and elastic deformation occurring in various simple geometriesfor 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 equilibriumconditions 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 ofstructural 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 indirectbending 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 puretorsion – 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'scritical 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 eccentricloading – 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 anddams – 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 volumeof 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 inertiareferred 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, ISBN978-81-318-0925-9.
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 5thedition 2009.
3. Strength of Materials by B.S. Basavarajaiah, B.S. Mahadevappa, Universities Press, 3rdEdition 2015.
4. Mechanics of Materials by R. C. Hibbeler, Pearson Education

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

9K406: STRUCTURAL ANALYSIS – I

B.Tech. II Year II Sem.

L	T	P/D	C
2	1	0	3

PO	1	2	3	4	5	6	7	8	9	10	11	12
Impact		H	M	L								

Pre-Requisites: Strength of Materials – I

Course Objectives: The objective of the course is to

1. CO1 Able to differentiate the types of frames and understand the different types of energy theorems and arches.
2. CO2 Able to differentiate propped cantilever, fixed and continuous beam like structures.
3. 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

1. CO1 Analyze the types of frames with different types of energy theorems and also arches.
2. CO2 Analyze the propped cantilever, fixed and continuous beam like structures with different type of loads.
3. 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. 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.

9K407: HYDRAULICS AND HYDRAULIC MACHINERY

B.Tech II Year II Sem.

L	T	P/D	C
2	1	0	3

PO	1	2	3	4	5	6	7	8	9	10	11	12
Impact	M	H	L	L								

Course Objectives: The objective this course is to:

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 rapidlyvaried 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, andarrive 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 ofjet 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

PO	1	2	3	4	5	6	7	8	9	10	11	12
Impact												

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
1. **CO1** Explain the material properties used in concrete production (cement, aggregates, water, admixtures etc) (L2)
2. **CO2** Examine the behaviour of fresh and hardened concrete (L4)
3. **CO3** Design concrete mixes to meet specific requirements such as strength, durability, workability, and economy as per IS codes (L6)
4. **CO4** Explain the processes involved in concrete production, including batching, mixing, transportation and curing (L2)
5. **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.

9K409: Engineering Geology

B.Tech II Year II Sem.

L	T	P/D	C
3	0	0	3

PO	1	2	3	4	5	6	7	8	9	10	11	12
Impact	L			H		M						

Course Objectives

Student shall be able,

1. CO1 Define the formation and properties of rocks and minerals, soils and other geological materials and their impact on engineering projects (L2)
2. CO2 Understand the subsurface information and groundwater potential sites through geophysical
3. investigations (L3)
4. CO3 Analyze the geological hazards that can affect construction projects such as landslides,
5. earthquakes, rock falls and soil liquefaction (L3)
6. 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:

1. CO1 Explain the formation and properties of rocks and minerals, soils and other geological materials and their impact on engineering projects (L2)
2. CO2 Identify subsurface information and groundwater potential sites through geophysical investigations (L3)
3. CO3 Identify geological hazards that can affect construction projects such as landslides, earthquakes, rock falls and soil liquefaction (L3)
4. 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.

9AC48: BASIC ELECTRICAL & ELECTRONICS ENGINEERING

B.Tech II Year II Sem.

L	T	P/D	C
3	0	0	3

PO	1	2	3	4	5	6	7	8	9	10	11	12
Impact												

Course Objectives

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

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

L	T	P/D	C
3	0	0	0

PO	1	2	3	4	5	6	7	8	9	10	11	12
Impact												

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

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.

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, Bio magnification, 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 wastemanagement 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).

TEXT BOOKS:

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

2. REFERENCE BOOKS:

3. Environmental Studies by Erach Bharucha, 2005 University Press.
4. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
5. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
6. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
7. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
8. Text book of environmental science and technology - dr. M. Anji reddy 2007, bs publications.

9K474: FLUID MECHANICS AND HYDRAULIC MACHINERY LABORATORY

B. Tech. II Year II semester

L	T	P/D	C
0	0	3	1.5

PO	1	2	3	4	5	6	7	8	9	10	11	12
Impact	H	M			L				L			

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 asturbines and pumps; (L4)
3. Interpret and compare the results of analytical models introduced in theory classes to theactual 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 ofvelocity 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 ofvelocity 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.

9K475 Engineering Geology Laboratory

B.Tech II Year II Sem.

L	T	P/D	C
0	0	3	1.5

PO	1	2	3	4	5	6	7	8	9	10	11	12
Impact	L			H			M					

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.

9AC95: BASIC ELECTRICAL & ELECTRONICS ENGINEERING LAB

B.Tech II Year II Sem.

L	T	P/D	C
0	0	3	1.5

PO	1	2	3	4	5	6	7	8	9	10	11	12
Impact	X	X			X							

Electrical Experiments

1. Brake test on 3-phase induction motor (performance characteristics).
2. Speed control of DC shunt motor by
3. a) Armature Voltage Control .
4. b) Field flux control method.
5. Brake test on DC shunt motor.
6. Swinburne's test on DC shunt machine.
7. OCC characteristics of DC shunt generator.
8. 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

9K476: TECHNICAL SEMINAR

B. Tech II Year II Semester

L	T	P/D	C
0	1	0	1

PO	1	2	3	4	5	6	7	8	9	10	11	12
Impact									L	H		M

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

Procédure

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**

9K510: REINFORCED CONCRETE DESIGN

	L	T	P/D	C
B.Tech III Year I Sem.	**2**	**1**	**-**	**2.5**

1	2	3	4	5	6	7	8	9	10	11	12
X	X	X	X		X						

Course Objectives:

To enable the student

1. Understand the applications of concrete, basic requirements of concrete structures and learn the fundamentals of design philosophies.
2. Familiarize with relevant codes of practice (IS 456:2000), professional approaches, working stress method, ultimate load method, limit state method and field problems.
3. Is able to learn Design of flexure failures in beams and deflections in beams.
4. Understand the Design of Reinforced concrete Slabs with different types support conditions.
5. Understand the Design of RC Columns, Footing and Stair cases.
6. Acquire ability to draw, understand and interpret the structural drawings for various RC elements such as beams, slabs, columns and footings, including aspects of detailing.

Course Outcomes:

At the end of the course the student

1. Is able to use and suggest concrete for various practical applications.
2. Is able to interpret various specifications of relevant standards, to field problems and professional practices.
3. Is able to design beams in singly reinforced, doubly reinforced rectangular and flanged beams.
4. Is able to design slabs with different conditions and different supports.
5. Is able to design axial loading, Uni-axial and biaxial bending of columns and Design of isolated square, rectangular and circular footings.
6. Interprets and communicates the design and detailing of rc beams, slabs, columns, stair cases and footings, through appropriate structural drawings.

UNIT-I:

Introduction to Reinforced Cement Concrete:

Applications of Concrete, Need for Reinforcement in Concrete ,Types and Properties of Concrete and Steel, Tests on concrete and steel, RCC as a material, Basic requirements of an RCC Structure ,stability, strength, serviceability and durability.

Principles of Limit state design and Ultimate strength of R.C. Section: Development of design philosophies-Working stress method (WSM), Ultimate load method, and Limit state method (LSM) relative merits and demerits. Basic concepts and characteristics loads and strengths, Partial safely factors. Stress strain relationship for concrete and steel.

UNIT –II:

Limit state of collapse (flexure): Limit State analysis of rectangular RCC beams, balanced,

under-reinforced and over reinforced sections; Analysis and design of singly and doubly reinforced rectangular sections.

UNIT-III:

Limit state of collapse (Shear & Torsion): Limit State analysis of section for shear and torsion. Assumptions, Analysis and design of flanged beams. Anchorage and development length, Curtailment of reinforcement in beams.

Limit states of serviceability: Short term, long term and total deflections, check for deflection and cracking.

UNIT-IV:

Analysis and design of slabs: Definition of a Slab, Types of Slabs, one way, two way simply supported slabs subjected to only uniformly distributed loads. IS Code method - Design of solid rectangular slabs as per IS 456:2000, Detailing of reinforcement in slabs.

Design of staircases: Types of stair case, loads on stair cases, effective span as per IS code provisions, distribution of loading on stairs, with waist slabs.

UNIT-V:

Analysis and design of columns: Assumptions, axially loaded circular, square and Rectangular columns, Uni axial and biaxial bending of columns- subjected to a axial load & bending. Design as per IS 456:2000 code and Interaction diagrams.

UNIT-VI:

Analysis and Design of Footings: Design of isolated square, rectangular and circular footings, sloped footings as per IS code 456:2000.

TEXT BOOKS:

1. N.KrishnaRaju &R N Praneesh "Reinforced Concrete Design" New Age International(P) Limited, Publishers 1st Edition 2003
2. Unni Krishnan Pillai and Devadass Menon,"Reinforced Concrete Design" ,Tata McGraw-Hill Publishing Co Ltd,3rd Edition 2017.

REFERENCES:

1. IS 456 (2000): Plain and Reinforced Concrete - Code of. Practice
2. SP16: Design Aids For Reinforced Concrete related to IS : 456.
3. V.L.Shah & S.R.Karve, "Limit State Theory and Design of Reinforced Concrete", Structures Publications, 7th Edition, 2014.
4. Limit State Design of Reinforced concrete-by P.C. Varghese, PHI Learning Private Limited 2008-2009.
5. Fundamentals of Reinforced concrete Design-by M.L.Gambhir, PHI Learning Private Limited 2008-2009.

9K511 STRUCTURAL ANALYSIS – II

1	2	3	4	5	6	7	8	9	10	11	12
	H	M	L								

B.Tech III Year I Sem. **L T P C**
2 1 0 3

Course Objectives: The objective of the course is to
CO1 Able to identify the various actions in arches and find the moments according to moment distribution method.
CO2 Able to find the moments from Kani's Method and different between the cantilever and portal frame method.
CO3 Able to distinguish between flexibility and stiffness matrix methods and understand the significance of influence lines in solving the continuous beams.
Course Outcomes: At the end of the course the student will able to
CO1 Analyze the various actions in arches and the moments according to moment distribution method.
CO2 Analyze the moments from Kani's Method and frames in the cantilever and portal frame method.
CO3 Analyze the continuous beams using flexibility and stiffness matrix methods and using with influence lines

UNIT – I
Two Hinged Arches: Introduction – Classification of Two hinged Arches – Analysis of two hinged
parabolic arches – Secondary stresses in two hinged arches due to temperature and elastic shortening
of rib.
UNIT – II
Moment Distribution Method - Analysis of continuous beams with and without settlement of supports
using - Analysis of Single Bay Single Storey Portal Frames including side Sway - Analysis of inclined
frames - Shear force and Bending moment diagrams, Elastic curve.
UNIT – III
Kani's Method: Analysis of continuous beams including settlement of supports - Analysis of single bay
single storey Frames including Side Sway using Kani's Method - Shear force and bending moment diagrams - Elastic curve.
UNIT – IV
Approximate Methods Of Analysis: Introduction – Analysis of multi-storey frames for lateral loads:
Portal Method, Cantilever method.
UNIT – V
Matrix Methods Of Analysis: Introduction to Flexibility and Stiffness matrix methods of analyses using

'system approach' upto three degree of indeterminacy– Analysis of continuous beams including settlement of supports using flexibility and stiffness methods.

UNIT- VI

Influence Lines For Indeterminate Beams: Introduction – influence line diagram for shear force and
bending moment for two span continuous beam with constant and influence line diagram for shear force and bending moment for propped cantilever beams.

TEXT BOOKS:

1. Structural Analysis Vol –I &II by Vazarani and Ratwani, Khanna Publishers.
2. Structural Analysis Vol I & II by G.S. Pandit S.P. Gupta Tata McGraw Hill Education Pvt. Ltd.
3. Indeterminate Structural Analysis by K.U. Muthu et al., I.K. International Publishing House Pvt. Ltd

REFERENCES:

1. Structural analysis T. S Thandavamoorthy, Oxford university Press.
2. Mechanics of Structures Vol –II by H.J. Shah and S.B. Junnarkar, Charotar Publishing House Pvt. Ltd.
3. Basic Structural Analysis by C.S.Reddy., Tata McGraw Hill Publishers.
4. Examples in Structural Analysis by William M.C. McKenzie, Taylor & Francis.
5. Structural Analysis by R. C. Hibbeler, Pearson Education.
6. Structural Analysis by Devdas Menon, Narosa Publishing House.

9K512: GEOTECHNICAL ENGINEERING

1	2	3	4	5	6	7	8	9	10	11	12
x	x	X				X					

B.Tech III Year I Sem.

L	T	P/D	C
2	1	-	3

Course Objectives: To enable the student to

1. Understand the importance of formation and basic properties of soil
2. To learn about index properties of soil and available soli classification methods
3. Understand flow process through porous media.
4. Understand concepts of Stress distribution in soil and Effective stress of soil
5. Get an idea of Compaction and consolidation of soil
6. Understand the concepts of shear strength of soil

Course Outcomes: At the end of the course, the student

1. Can depict the various phases and fabric of soil
2. Can able to determine the index properties and classify the soil
3. Is able to apply the concepts of water flow through soil in the context of design and construction of embankments, canals etc.
4. Is able to Apply stress distribution and effective stress in soil for designing the foundation.
5. Can compute the compressibility of different types of soil.
6. Is able to draw the Mohr's circle and find out shear strength parameters of soil

SYLLABUS

UNIT I

Introduction: Origin and formation of soil, History of soil mechanics, Phase diagrams, Basic Definitions-Voids ratio, Porosity, Degree of saturation, Moisture content, Specific gravity, Bulk density, Dry density, Saturated density, Submerged density - inter relationships.

Structure of soil: Clay mineralogy, Flocculated and dispersed structure, single grained and honey comb structures, Double diffuse layer

UNIT-II:

Index Properties of Soils: Definitions and importance of Index properties, particle size distribution, sedimentation analysis (Hydrometer analysis only) Importance of consistency limits, Classifications of Soils: Necessity, IS classification of soils, plasticity chart and its importance, field identification of soils.

UNIT-III:

Flow of Water Through Soil: Darcy's law - Assumptions and validity, seepage velocity, superficial velocity and their relationships, coefficient of percolation Coefficient of permeability

and its determination (excluding field method). Factors affecting permeability – Permeability of stratified soils.

UNIT-IV:

Effective stress in Soils - Total pressure and effective stress and its importance, Quick sand phenomenon, Soil moisture and modes of occurrence, capillary phenomenon**.**

Stresses in Soil: Boussinesq's and Westergaard's theories for concentrated, circular, rectangular loads, strip load - Newmark's chart. Pressure bulb. Contact pressure.

UNIT - V

Compaction of Soils: Definition; objects, concept of compaction, factors affecting compaction, Effect of compaction on soil properties. Field compaction methods -Rollers and vibrators; Field compaction control - Procter's needle.

Compressibility of Soils: Meaning, fundamental definition, Mass-spring analogy - Terzaghi's one dimensional consolidation theory - Assumptions, limitations and applications (Derivation and mathematical solution not required) – Normal, under and over consolidated soils, Pre-consolidation pressure, coefficient of consolidation and their importance.

UNIT - VI

Shear Strength of Soil: Concept of shear strength - Mohr’s strength theory, Mohr - Coulomb theory. Shear strength tests under different drainage conditions. Shear strength parameters, factors affecting shear strength of soils.

TEXT BOOKS:

1. Gopal Ranjan and Rao A.S.R, Basic and Applied Soil Mechanics, (2000), New Age International (P) Ltd., New Delhi. Shashi K. Gulathi & Manoj Datta, Geotechnical Engineering, (2009), “Tata Mc Graw Hill.

2.Punmia, B.C. Ashok Kumar Jain & Arun Kumar Jain, "Soil Mechanics and Foundations", Laxmi Publishing Co., New Delhi. 2003.

3. Murthy, V.N.S., " Principles of Soil Mechanics and Foundation Engineering", 5th Revised Ed., UBS Publishers and Distributors ltd, New Delhi, 2001.

REFERENCES:

1. Bowles, J.E, “Foundation Analysis and Designs” 5th Ed. Mc Graw Hill Publishing, New York – 2008.
2. Venkatramaiah, C.,"Geotechnical Engineering”, revised third Ed., New Age International publishers, 2006.
3. Alam Singh and Chowdhary G.R, Soil Engineering in Theory and Practice, (1994), CBS Publishers and Distributors Ltd., New Delhi.

9K513: DISASTER MITIGATION AND MANAGEMENT

(Professional Elective – I)

B. Tech III Year I Sem.

L	T	P/D	C
3	-	-	3

a	b	c	d	e	f	g	h	i	j	k
X		X		X						

Course objectives:

1. To equip the students with the basic knowledge of hazards, disasters, risks and vulnerabilities including natural, climatic and human induced factors and associated impacts.
2. To impart knowledge in students about the nature, mechanism causes, consequences and mitigation measures of the various natural disasters including hydro meteorological and geological based disasters.
3. To enable the students to understand risks, vulnerabilities and human errors associated with human induced disasters including chemical, biological and nuclear warfare agents.
4. To equip the students with the knowledge of various chronological phases in the disaster management cycle.
5. To create awareness about the disaster management framework and legislations in the context of national and global conventions.
6. To enable students to understand the applications of geospatial technologies like remote sensing and geographical information systems in disaster management.

Course outcomes

1. Analyze and critically examine existing programs in disaster management regarding vulnerability, risk and capacity at local, national and international levels
2. Ability to choose the appropriate activities and tools and set up priorities to build a coherent and adapted disaster management plan.
3. Ability to understand various mechanisms and consequences of natural and human induced disasters for the participatory role of engineers in disaster management.
4. Develop an awareness regarding the chronological phases of disaster preparedness, response and relief operations for formulating effective disaster management plans.
5. Applying the concepts of remote sensing and geographical information systems for their effective application in disaster management

SYLLABUS

UNIT-I

Introduction- Natural, human induced and human made disasters – Meaning, nature, types and effects; International decade of natural disaster reduction (IDNDR); International strategy of natural disaster reduction (ISDR)

UNIT-II

Natural disasters– Hydro meteorological disasters: Causes, impacts, Early warning systems, structural and non-structural measures for floods, drought and cyclones; Tropical cyclones: Overview, cyclogenesis, drought monitoring and management.

UNIT III

Geographical based disasters- Earthquakes and Tsunami- Overview, causes, impacts, zoning, structural and non-structural mitigation measures; Tsunami generation; Landslides and avalanches: Overview, causes, impacts, zoning and mitigation measures. Case studies related to various hydro meteorological and geographical based disasters.

UNIT IV:

Human induced hazards: Risks and control measures in a chemical industry, Causes, impacts and mitigation measures for chemical accidents, chemical disaster management, current status and perspectives; Case studies related to various chemical industrial hazards eg: Bhopal gas tragedy; Management of chemical terrorism disasters and biological disasters; Radiological Emergencies and case studies; Case studies related to major power break downs, fire accidents and traffic accidents .

UNIT V:

Use of remote sensing and gis- in disaster mitigation and management; Scope of application of ICST (Information, communication and space technologies in disaster management, Critical applications& Infrastructure; Potential application of Remote sensing and GIS in disaster management and in various disastrous conditions like earthquakes, drought, Floods, landslides etc.

UNIT VI:

Concept of disaster management- Introduction to disaster management, Relationship between Risk, vulnerability and a disaster, Disaster management cycle, Principles of disaster mitigation: Hazard identification and vulnerability analysis, Early warning systems and forecasting; Infrastructure and development in disaster management; Disaster management in India: National disaster management framework at central, state, district and local levels. Community based disaster management.

TEXT BOOKS:

1. Rajib, S and Krishna Murthy, R.R (2012) “Disaster Management Global Challenges and Local Solutions" Universities Press Hyderabad.
2. Battacharya, T. (2012), Disaster Science and Management. Tata McGraw Hill Company, New Delhi.
3. Navele, P & Raja, C.K. (2009), Earth and Atmospheric Disasters Management, Natural and Manmade. B.S. Publications, Hyderabad.

REFERENCES:

1. Fearn-Banks, K (2011), Crises computations approach: A case book approach. Route ledge Publishers, Special Indian Education, New York & London.
2. Notes / Reading material published by National Disaster Management Institute, Ministry of Home Affairs, Govt. of India.

9K514 ADVANCED STRUCTURAL ANALYSIS

(Professional Elective - I)

1	2	3	4	5	6	7	8	9	10	11	12
	H	M	L								

B.Tech III Year I Sem.

L T P C

3 0 0 3

Course Objectives: The objective of the course is to

CO1 Able to Understand the matrix method of analysis statically indeterminate frames and trusses.

CO2 Know the transformation of coordinates and assembly of stiffness matrices

CO3 Differentiate between flexibility and stiffness methods of analysis of beams, frames and plane

trusses

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

CO1 Analyze the multistory building frames by various approximate methods.

CO2 Solve the continuous beams, portal frames by matrix methods of analysis.

CO3 Analyze and design of large frames with or without shear walls

UNIT- I

Introduction to matrix methods of analysis statically indeterminacy and kinematics indeterminacy degree

of freedom-coordinate system-structure idealization stiffness and flexibility matrices-suitability element stiffness equations-elements.

UNIT- II

flexibility equations-mixed force-displacement equations-for truss element, beam element and tensional element

Transformation of coordinates-element stiffness matrix-and load vector-local and global coordinates.

UNIT- III

Assembly of stiffness matrix from element stiffness matrix-direct stiffness method-general procedure bank

matrix-semi bandwidth-computer algorithm for assembly by direct stiffness matrix method.

UNIT- IV

Analysis of plane truss-continuous beam-plane frame and grids by Flexible methods.

UNIT- V

Analysis of plane truss-continuous beam-plane frame and grids by stiffness methods.

UNIT- VI

Special analysis procedures-static condensation and sub structuring-initial and thermal stresses. Shear Walls Necessity-structural behavior of large frames with and without shear walls-approximate

methods of analysis of shear walls.

TEXT BOOKS:

1. Matrix methods of structural analysis by Willam Weaver and gere, CBS Publishers.
2. Advanced Structural Analysis by A.K. Jain Nemchand Publishers

REFERENCES:

1. Advanced Structural Analysis by Devdas Menon, Narosa publishing house.
2. Matrix methods of structural analysis by Pandit and gupta
3. Matrix methods of structural analysis by J Meek
4. Structural Analysis by Ghali and Neyveli

Code: 9K515. GREEN BUILDINGS

(Professional Elective – I)

B.Tech III Year I Sem.

Course Objectives

- This course introduces the concepts of sustainability in the context of energy and resource efficient buildings. It also intends to make students aware of rating systems like LEED, GRIHA etc.
- Itdiscusses the role of low carbon cements and recycled aggregate in minimizing consumption ofnatural resources.
- The course also emphasizes the concepts of embodied, operational, life cycleenergy and minimizing energy consumption.

Course Outcomes (COs)

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

1. Recall the necessity of environmentally sustainable buildings and contrast the green building with the traditional building
2. Summarize green building concepts and different rating agencies to classify the type of building
3. Identifygreen building materials and practices
4. Explainkey design principles of green buildings
5. examine green design concepts for air conditioning.
6. Dissect methods for material conservation.

Unit – IGLOBAL WARMING:

Definition - Causes and Effects - Contribution of Buildings towards Global Warming – Carbon Footprint – Global Efforts to reduce carbon Emissions Green Buildings – Definition - Features-Necessity – Environmental benefit - Economical benefits - Health and Social benefits - Major Energy efficient areas for buildings – Embodied Energy in MaterialsGreen Materials - Comparison of Initial cost of Green V/s Conventional Building - Life cycle cost of Buildings.

Unit – IIGREEN BUILDING

Concept of Green building, Principles of green buildings, Eco-friendly materials;key requisites of a Green Building, Important Sustainable features for Green Building; Certification systems – Green Rating for Integrated Habitat Assessment (GRIHA) and Leadership inEnergy and Environmental Design (LEED)**.**

Unit – III GREEN BUILDING MATERIALS AND PRACTICES:

Green Building Materials and Equipment in India, Green Building Features, Materials and Resources, Water Efficiency, Optimum EnergyEfficiency, Typical Energy Saving Approach in Buildings.

Unit – IVGREEN BUILDING DESIGN:

Introduction, Reduction in Energy Demand, Onsite Sources and Sinks, Maximise SystemEfficiency, steps to reduce Energy Demand; Use of Renewable Energy Sources;Eco-friendly captive power generation for Building requirement.

Unit – VAIR CONDITIONING:
Introduction,CII Godrej Green business centre,Design philosophy,Design interventions,Energy modeling, HVAC System design,Chiller selection,pump selection,Selection of coolingtowers,Selection of air handing units,Precooling of fresh air,Interior lighting system,Key featureof the building.

Unit – VI MATERIAL CONSERVATION:
Handling of non-process waste, waste reduction during construction,materials with recycled content,local materials,material reuse,certified wood, Rapidly renewable building materials and furniture.

Text Books:

1. Green Building Hand Book by Tomwoolley and Samkimings, 2009.
2. Handbook on Green Practices published by Indian Society of Heating Refrigerating and Air Conditioning Engineers, 2009.

References:

1. Complete Guide to Green Buildings by Trish riley
2. Standard for the design for High Performance Green Buildings by Kent Peterson, 2009
3. Bradley A. Striebig, Adebayo A. Ogundipe and Maria Papadakis, Engineering Applications inSustainable Design and Development. First edition, 2016.

Code: 9K577 -Geotechnical Engineering lab

B.Tech III Year I Sem.

Course Objectives

1. This Lab Course will enable the students to understand the Different test need to be done in order to know the Geotechnical Properties of soil and use them in real time civil engineering problems

Course Outcomes:

1. Students are able to Determine the Index Properties of Soil.
2. Students are able to Determine the Engineering Properties of Soil.

List of Experiments

1. Determination of specific gravity of soil sample by pycnometer method

2. Grain size analysis of soil sample by sieve analysis

3. Determination of in situ density by core cutter method

4. Determination of in situ density by sand replacement method

5. Determination of liquid limit and plastic Limit of soil samples by Casagrande method

6. Determination of compaction characteristics of soil by standard proctor compaction test

7. Determination of compaction characteristics of soil by Modified proctor compaction test

8. Determination of coefficient of permeability of soil sample by constant and variable head method

9. Determination of shear strength parameters of soil by direct shear test

10. Determination of shear strength parameters of soil sample by unconfined compression test.

11. Determination of shear strength parameters of soil sample by Triaxial shear test

12. Determination of compression index and coefficient of consolidation by consolidation test

Code:9K588 - STAAD PRO LABORATORY

B.Tech III Year I Sem.

L T P/D C
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Course Objectives:

1. To expose the students to various computer programming skills related to Civil Engineering field.
2. To empower the students to develop programs using Excel /other related software's.

Course Outcomes:

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

1. Use Excel sheets for Civil Engineering applications.
2. Write computer programs for structures with various loading and support conditions using Civil Engineering related software such as STAAD Pro.

LIST OF EXPERIMENTS:

Using -STAADPRO. Software

1. Analysis of continuous beam with different loading conditions.
2. Analysis of Frame with different loading conditions.
3. Analysis and Design of Column.
4. Analysis and Design of a single storied Building.
5. Analysis and Design of a multi storied Building under seismic and wind load.
6. Analysis and Design of a Simple Truss.
7. Determine the stresses in footing to the given loads.
8. Design of footing for the given loading condition.
9. Analysis of slab in **STAAD**
10. pre engineered building PEB structures.
11. Design of RCC beams and slabs.
12. Design of Axially loaded short column.

Code:9K589---CONCRETE TECHNOLOGY LAB

B.Tech III Year I Sem.

a	b	c	d	e	f	g	h	i	j	k	l
x	x	x									

Course Objectives:

1. Perform the test procedures to find Physical properties of Cement
2. Understand the test procedures to find Specific Gravity, Bulking of Aggregates.
3. Evaluate fresh concrete properties
4. Understand the test procedures to find properties of Hardened Concrete

Course Outcomes:

The student will be able to:

1. Test Fineness, Specific Gravity, Setting Time, Soundness and Compressive Strength ofCement
2. Test Specific Gravity of Coarse Aggregate and Fine Aggregate, Bulking of Fine Aggregate.
3. Design Concrete Mix Proportioning by Using Indian Standard Method.
4. Test Workability of Fresh Concrete and Compressive strength, Split Tensile Strength ofHardened Concrete.

	Exp No.	EXPERIMENT NAME
Cycle –I	**Tests on Cement:**	
	1	Standard Consistency
	2	Initial & final Setting Time
	3	Specific Gravity of cement
	4	Fineness and Soundness of cement
	5	Compressive Strength of cement
	Tests on Aggregates:	
	6	Specific Gravity of Coarse Aggregate
	7	Specific Gravity of Fine Aggregate.
	8	Bulking of Fine Aggregate.
Cycle –II	9	IS method of mix design of concrete.
	Tests on Fresh Concrete:	
	10	Slump cone Test
		Compaction factor Test
		Vee Bee Test
	Tests on Hardened Concrete:	
	11	Compressive & Split Tensile & Flexural strength Tests.

	12	Modulus of Elasticity & Non Destructive Tests on concrete.

III YEAR II SEMESTER

9K613: DESIGN OF STEEL STRUCTURES

B.Tech III Year II Sem.

L	T	P/D	C
2	1	-	3

a	b	c	d	e	f	g	h	i	j	k	l
X	X	X	X		X						

Course Objectives:

To Enable the students

1. Learn and apply the design philosophies (working stress method and limit state method) for various steel structural components and their connections, as per the relevant standards.
2. Understand the Failure modes, Behaviour of compression members, Elastic buckling of slender compression members, Sections used for compression members.
3. Understand the design principles of tension members design of lug angles staggered bolting of Steel Structures to field problems.
4. To learn plastic analysis plastic hinge, plastic moment and design of laterally supported beams and laterally unsupported Beams
5. Understand the types of trusses, Estimation of loads and design of purlins, design of its members with angle sections
6. To learn design of simple slab base and gusseted base and design of plate girders optimum depth design of main section.

Course Outcomes:

At the end of the course, the student

1. Attains fundamental knowledge of the design of various Steel Structures and connections and is able to interpret the specifications of relevant codes.
2. Gets adequate knowledge and skills to apply the design principles to field problems.
3. Is able to design principles to field problems of tension members.
4. Is able to draw, understand and interpret the detailing aspects of steel structural drawings.
5. Is able to investigate into the critical issues of steel structures, compare various options and chose the best solution for the problems in the area of steel structures.
6. Is able to design the end bearing Stiffness and intermediate stiffness.

UNIT- I:

Materials and Specifications: Chemical composition of steel, types of Structural Steel - classification of Rolled Steel Sections.

Loads and Load Combinations: Design Loads & load Combinations; Characteristic Loads, Partial safety factors for materials and loads.

Bolted Connections (Limit State Method): Introduction, Behaviour of Bolted joints, Design strength of ordinary Black Bolts, Design strength of High Strength Friction Grip bolts (HSFG).

Welded Connections (Limit State Method): Introduction, Welding process, Welding

electrodes, Advantages of Welding, Types and Properties of Welds, Types of joints, Weld symbols, Weld specifications, Effective areas of welds, Design of welds, Simple joints, Moment resistant connections.

UNIT –II:

Design of Compression Members: Introduction, Failure modes, Behaviour of compression members, Elastic buckling of slender compression members, Sections used for compression members, Effective length of compression members, Design of compression members.

UNIT- III:

Design of tension members (Limit State Method): Introduction to tension members - Applications of tension members, Modes of Failure, Design of Tension Members –Design of Lug Angles - Staggered bolting.

UNIT –IV:

Plastic Analysis : Plastic moment-plastic section modulus Plastic Analysis of continuous beams – design of flexural members Design of Laterally Supported beams and unsupported beams- bending and shear strength /buckling -built-up sections beam splice .

UNIT –V: Design Of Welded Plate Girders

-Elements economical depth design of main section- connections between web and flanges design of end bearing Stiffeners and intermediate Stiffeners design of web splice and flange splice .

UNIT –VI:

Design Of Industrial Structures

(Limit State Method): Types of Roof trusses, loads on trusses wind load, purlin Design, truss design of welded Gantry girder .

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TEXT BOOKS

1. Design of Steel Structures -, S.S Bhavikatti 5thEDITION IK International publishing house(P)limited 2012
2. Limit State Design of Steel Structures 2nd EDITION –S.K .Duggal. TATA Megra Hill 2015

REFERENCE BOOKS

1. Design of steel structure – K. S Sai Ram, Person Education.2010
2. Design of steel structure Ashok Kumar Jain ,B.C Punmia, Arun Kumar Jain LAXMI PUBLICATIONS (P)LTD.1998
3. IS800-2007, General Construction in Steel - Code of Practice.
4. Steel Tables as per IS 800, Birla Publications Pvt. Ltd.
5. IS 875 –2015 PART 3 - Code of Practice.

9K614: ENVIRONMENTAL ENGINEERING

B.Tech. III Year II Sem.

L T/P/D/ C

3 0/0/0 /2

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

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

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

Unit – I

Introduction: Waterborne diseases – protected water supply – Population forecasts, design period – types of water demand – factors affecting – fluctuations – fire demand – water quality and testing – drinking water standards: sources of water - Comparison from quality and quantity and other considerations – intakes – infiltration galleries.

Unit – II

Layout and general outline of water treatment units – sedimentation – principles – design factors – coagulation-flocculation clarifier design – coagulants - feeding arrangements. Filtration – theory – working of slow and rapid gravity filters – multimedia filters – design of filters – troubles in operation - comparison of filters – disinfection – theory of chlorination, chlorine demand - other disinfection practices–Design of distribution systems–pipe appurtenances.

Unit – III

Characteristics of sewage –waste water collection–Estimation of waste water and storm water – decomposition of sewage, examination of sewage – B.O.D. Equation – C.O.D. Design of sewers – shapes and materials – sewer appurtenances, manholes – inverted siphon – catch basins – flushing tanks – ejectors, pumps and pump houses – house drainage – plumbing requirements – sanitary fittings-traps – one pipe and two pipe systems of plumbing – ultimate disposal of sewage – sewage farming –self-purification of rivers.

Unit – IV

Waste water treatment plant – Flow diagram - primary treatment Design of screens – grit

chambers – skimming tanks – sedimentation tanks – principles of design – Biological treatment – trickling filters – ASP– Construction and design of oxidation ponds. Sludge digestion – factors effecting – design of Digestion tank – Sludge disposal by drying – septic tanks working principles and design – soak pits.

Unit –V

Air pollution– classification of air pollution– Effects air pollution–Global effects– Meteorological parameters affecting air pollution–Atmospheric stability–Plume behavior – Control of particulates – Gravity settlers, cyclone filters, ESPs–Control of gaseous pollutants–automobile pollution and control.

Unit-VI

Solid Waste: Definitions, Types of solid wastes, sources of solid wastes, Characteristics, and perspectives; properties of solid wastes, Sampling of Solid wastes, Elements of solid waste management - Integrated solid waste management, Solid Waste Management Rules 2016.

Text books:

1. Environmental Engineering by H. S Peavy, D. R. Rowe, G. Tchobanoglous, McGraw Hill Education (India) Pvt Ltd, 2014
2. Environmental Engineering by D. P. Sincero and G.A Sincero, Pearson 2015.
3. Environmental Engineering, I and II by BC Punmia, Std. Publications.
4. Environmental Engineering, I and II by SK Garg, Khanna Publications.
5. Environmental Pollution and Control Engineering CS Rao,Wiley Publications.

Reference books:

1. Water and Waste Water Technology by Steel, Wiley
2. Waste water engineering by Metcalf and Eddy, McGraw Hill, 2015.
3. Water and Waste Water Engineering by Fair Geyer and Okun, Wiley, 2011
4. Water and Waste Water Technology by Mark J Hammar and Mark J. HammarJr.Wiley, 2007.
5. Introduction to Environmental Engineering and Science by Gilbert Masters, Prentice Hall, New Jersey.
6. Introduction to Environmental Engineering by P. AarneVesilind, Susan M. Morgan, Thompson /Brooks/Cole; Second Edition 2008.
7. Integrated Solid Waste Management, Tchobanoglous, Theissen& Vigil. McGraw Hill Publication.

9K615: FOUNDATION ENGINEERING

B Tech III Year II Sem

L	T	P/D	C
2	1	-	3

1	2	3	4	5	6	7	8	9	10	11	12
x	x	x									

Prerequisite – Geotechnical Engineering

Course Objectives: To enable the student to

1. To Plan and execute the Soil exploration program for civil Engineering Projects.
2. Get an idea of analysing the stability of slopes.
3. To determine the lateral earth pressures and design retaining walls.
4. To determine the Bearing capacity of Soils.
5. Understanding the concepts of pile foundation.

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

1. Can Depict the principles and methods of Geotechnical Exploration
2. Assess the stability of slopes
3. Compute the lateral earth pressures and check the stability of retaining walls
4. Analyse and design the shallow and deep foundations

SYLLABUS

Unit – I

Soil Exploration: Need – methods of soil exploration – boring and sampling methods – penetration tests – plate load test– planning of soil exploration programme, Bore logs and preparation of soil investigation report.

Unit – II

Slope Stability: Infinite and finite earth slopes – types of failures – factor of safety of infinite slopes – stability analysis by Swedish slip circle method, method of slices, Bishop's Simplified method of slices – Taylor's Stability Number.

Unit – III

Earth Pressure Theories: Active, Passive and at rest soil pressures Rankine's theory of earth pressure –Coulomb's earth pressure theory.

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

Unit – IV

Bearing Capacity: Definitions of ultimate, net and safe bearing capacities, Allowable bearing pressure. Terzaghi and Brinch Hansen are bearing capacity equations - assumptions and limitations. Bearing capacity of footings subjected to eccentric loading. Effect of ground water table on bearing capacity.

Unit – V

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

Unit – VI

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

Textbooks

1. Murthy, V. N. S. Advanced Foundation Engineering. CBS Publishers & Distributors, 2007.
2. Arora, K. R. (2008). Soil mechanics and foundation engineering (geotechnical engineering). Standard Publishers Distributors, Nai Sarak, Delhi, 953p.
3. Gopal Ranjan and Rao A.S.R, Basic and Applied Soil Mechanics, (2000), New Age International (P) Ltd., New Delhi. Shashi K. Gulathi & Manoj Datta, Geotechnical Engineering, (2009), "Tata Mc Graw Hill.

References

1. Punmia, B.C. Ashok Kumar Jain & Arun Kumar Jain, "Soil Mechanics and Foundations", Laxmi Publishing Co., New Delhi. 2003Braja M Das, Principles of soil dynamics, Cengage Engineering, 2014.
2. Bowles, J.E., (2001) Foundation Analysis and Design – 4th Edition, McGraw-Hill Publishing company, Newyork.
3. Das, Braja M. Principles of foundation engineering. Cengage learning, 2015

Code: 9K616-Transportation Engineering

B Tech III Year II Sem

L	T	P/D	C
3	0	0	2.5

1	2	3	4	5	6	7	8	9	10	11	12
				M							M

Course Objectives:

The student is being exposed to the subject with following Objectives:

1. Understand the design concepts of highways, the quality of the materials required for the construction of highways
2. To learn about the different techniques used in construction of flexible and rigid pavements.
3. Know how to collect the field data for the evaluation of traffic patterns.
4. Know the requirements for designing the railway tracks and the material required for the construction of permanent way.
5. Get an idea for the planning of airports and fixing of run way orientation.
6. Applying the various corrections while constructing Airports and runway lighting.

Course Outcomes:

On successful completion of the course, the student shall:

1. Applies the Pavement design concepts to different types of pavements
2. Takes precautions required for the execution of construction of pavements and applies relevant IRC standards.
3. Analyze the collected field data and design suitable traffic management system
4. Is able to apply the design concepts of super elevation of railway curves.
5. Knows how to select a site for airport construction and have working knowledge of run way orientation methods,
6. Apply the corrections to the run way length and understands the circumstances in which they are to be applied.

SYLLABUS

Unit – I:

Highway Development and Planning: Development in India, necessity for highway planning, different road development plans, classification of roads, road network patterns, highway alignment, factors affecting highway alignment, engineering surveys, drawings and reports, highway project - Importance of geometric design, design controls and criteria, highway cross section elements, sight distance elements, stopping sight distance, overtaking sight distance and intermediate sight distance.

Unit – II:

Design of horizontal alignment, design of super elevation and extra widening, design of transition curves, design of vertical alignment, gradient, vertical curves. Traffic Engineering and Regulations: Basic parameters of traffic, volume, speed and density, traffic volume studies, data

collection and presentation, speed studies, data collection and presentation, origin and destination studies, parking studies, on street and off street parking,

Unit – III:
Road accidents, causes and preventive measures, accident data recording, condition diagram and collision diagram, traffic signs, types and specifications, road markings, need for road markings, types of road markings, design of traffic signals – Webster method.

Unit – IV:
Permanent way components, cross section of permanent way, functions of various components like rails, sleepers, and ballast, gauge, creep of rails, theories related to creep, sleeper density- Geometric design of railway track: Gradients, grade compensations, cant and negative super elevation

Unit – V:
Cant deficiency, degree of curve, points and crossings, rail joints and welding of joints railway stations and yards, signalizing and interlocking.

Airport Engineering: Airport site selection, runway orientation, basic runaway length.

Unit – VI:
Corrections for elevation, temperature, airport classification, runway geometric design, factors controlling taxiway layout - Terminal area, apron, hangar, blast consideration, typical airport layouts, wind rose diagram, runway lighting system and marking.

TEXTBOOKS

1. Khanna, S. K. and Justo, C. E. G (1994), "Highway Engineering", Nemchand & Bros, New Delhi. India.
2. Chandra, S and Agarwal, M. M. (2007) "Railway Engineering" Oxford Higher Education, University Press New Delhi
3. Khanna. S. K. Arora, M. G. and Jain. S. S. (1994) "Airport Planning and Design" Fifth edition. Nem Chand & Bros, Roorkee, India.

REFERENCES

1. Saxena S.C and Arora, S, “Text book of railway Engineering” Dhanpat Rai and Sons., 1988.
2. Yang, H. and Huang., “Pavement Analysis and Design”, Prentice Hall India Ltd-2004.
3. McShane, W.R., Roess, R.P. and Prassas, E.S., Traffic Engineering. Prentice Hall. Englewood Cliffs, 1997.

9K617: Geographic Information Systems
(professional elective-II)

B Tech III Year II Sem.

L	T	P/D	C
3	0	0	3

a	b	c	d	e	f	g	h	i	j	k	l
	L		M	M							

Course Objectives:

The student is being exposed to the subject with following Objectives:

1. To gain insights into the Remote sensing process
2. To provide the basic definition of GIS and its application.
3. To understand the various model generation pattern.
4. To understand the data formats with editing and error rectification of topology.
5. To learn the basic analysis of data and interpretation of thesame.
6. To understand the application of GIS in Project Planning and Execution. And understand the wide areas of application in Civil Engineering arena.

Course Outcomes:

On successful completion of the course, the student shall:

1. Understand the Image capturing process
2. know the basic definition of GIS.
3. be able to generate various model from raw data.
4. be able to edit and rectify the topography data.
5. be capable to analyze and interpret the data generated.
6. be able to know the concept of application of GIS in Projects. And various spheres of applications for Civil Engineers.

Unit I

Concepts of Remote Sensing – Basics of remote sensing – elements involved in remote sensing – electromagnetic spectrum – remote sensing terminology & units – energy resources – energy interactions with earth surface features & atmosphere – atmospheric effects, satellite orbits – Sensor Resolution – types of sensors – Remote Sensing Platforms and Sensors – IRS satellites

Unit II

Introduction – GIS Definition – Development – application areas – Map Concept – Map Definition – Elements of Maps – Types of Maps – Advantages and Disadvantages of analog / digital maps – Coordinate systems – geometric models of earth – global / local coordinate system – Transformations

Unit III

Projection systems – classification – cylindrical projection – conical projection – selection of a particular projection – Fundamental concepts

of GIS – Modeling Real World Features – Raster data model – Data Analysis, Local Operations, Neighborhood Operations, Zonal Operations Physical Distance Measurement – Vector Data model – Comparison of Raster and Vector Based Data Analysis

Unit IV

Data formats – Spatial and non-spatial data – data collection and input – data conversion – hardware and software requirements – Topology – Types of Topology – Rules of Topology – Slivers – Editing and error rectification – Topological relationships, TIN and DEM

Unit V

Spatial Analysis – Buffer Analysis – Variations in buffering – Applications in buffering-overlay analysis – Feature type and Overlay – Vector Overlay Methods – Network Analysis – Impedance – Shortest Path analysis – Closest facility – concepts of proximity analysis

Unit VI

GIS Project Planning – Steps in GIS Project – Software engineering as applied to GIS, GIS Project Planning, Systems Development Life Cycle (SDLC – 7 Step Process), Systems analysis and user requirement studies, Problem Identification and Implementation of a GIS Project (only process identification).

GIS Application areas – Transportation – Water Resources – Environment – Geology –Emergency Management – Agriculture – Real Estate (only the concepts and ideas); Advances in GIS – Concepts, Application of mobile and Web GIS.

Textbooks:

1. Kang-Tsung Chang, Intorduction to Geographic Information Systems, TataMcGraw Hill Publishing Company Ltd, New Delhi, 2008.
2. Peter A. Burrough and Rachael A.McDonnell, Principles of Geographical Information Systems, Oxford University Press, 2005.

References:

1. C.P. Lo, Albert K.W. Yeung, Concepts and Techniques of GeographicInformation Systems, Prentice Hall India Pvt. Ltd, New Delhi, 2002

Code: 9K618. Environmental Impact Assessment

(professional elective-II)

B Tech III Year II Sem.

Course Objectives: The objectives of the course are to

- Define and Classify Environmental Impacts and the terminology
- Introduce and explainthe environmental Impact assessment procedure and methodology
- List and describe environmental audits

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

1. Relate the importance of EIA
2. Identify the environmental attributes to be considered for the EIA study
3. Formulate objectives of the EIA studies
4. Identify the methodology to prepare rapid EIA
5. Summarize the new changes introduced in the new 2020 EIA draft
6. Prepare EIA reports and environmental management plans

UNIT- I

EIA: The Need for EIA, Indian Policies Requiring EIA, The EIA Cycle and Procedures,Screening, Scoping, Baseline Data, Impact Prediction, Assessment of Alternatives, Delineation ofMitigation Measure and EIA Report, Public Hearing, Decision Making, Monitoring the ClearanceConditions, Components of EIA, Roles in the EIA Process.

UNIT- II

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

UNIT- III

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

UNIT- IV

Environmental Legislation: Environmental laws and protection acts,Constitutional provisions-powers and functions of Central and State government, The Environment(Protection) Act 1986, The Water Act 1974, The Air act 1981, Wild Life act 1972, Guidelines for controlof noise, loss of biodiversity, solid and Hazardous waste management rules.

UNIT-V

Life Cycle Assessment: Life cycle analysis, Methodology, Management, Flow of materials-cost criteria.Changes introduced in India's EIA new draft Notification of 2020 compared with the EIA notification of 2006; List of projects requiring Environmental clearance, Application form,Composition of Expert Committee, Ecological sensitive places, International agreements.

UNIT- VI

Case Studies: Preparation of EIA for developmental projects- Factors to be considered in makingassessment decisions, Water Resources Project, Pharmaceutical industry, thermal plant, Nuclear fuelcomplex, Highway project, Sewage treatment plant, Municipal Solid waste processing plant, Air ports.

TEXT BOOKS:

1. Anjaneyulu. Y and Manickam. V., Environmental Impact Assessment Methodologies, B.S.Publications, Hyderabad, 2007
2. Barthwal, R. R., Environmental Impact Assessment, New Age International Publishers.

REFERENCES:

1. Jain, R.K., Urban, L.V., Stracy, G.S., Environmental Impact Analysis, Van Nostrand Reinhold Co., New York, 1991.
2. Rau, J.G. and Wooten, D.C., Environmental Impact Assessment, McGraw Hill Pub. Co., New York, 1996.

Code: 9K619 Repair and Rehabilitation of Structures

(Professional Elective - II)

B Tech III Year II Sem.

L / T / P / D / C
3 / 0 / 0 /0 / 3

Course Objectives:

To introduce the students to,

1. Familiarize Students with deterioration of concrete in structures
2. Equip student with concepts of NDT and evaluation
3. Understand failures and causes for failures in structures
4. Familiarize different materials and techniques for repairs
5. Understand procedure to carryout Physical evaluation of buildings and prepare report.
6. Understand the retrofitting strategies and technique.

Course Out comes:

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

1. Explain deterioration of concrete in structures
2. Carryout analysis using NDT and evaluate structures
3. Assess failures and causes of failures in structures
4. Carryout Physical evaluation.
5. Submit report on condition of the structure.
6. Carryout analysis using preliminary test methods and Case studies.

UNIT – I

Deterioration of concrete in structures: Physical processes of deterioration like Freezing and Thawing, Wetting and Drying, Abrasion, Erosion, Pitting, Chemical processes like Carbonation, Chloride ingress, Corrosion, Alkali aggregate reaction, Sulphate attack Acid attack, temperature and their causes, Mechanism, Effect, preventive measures. - Cracks: Cracks in concrete, type, pattern, quantification, measurement & preventive measures.

UNIT- II

Non-Destructive Testing- Nondestructive test methods for concrete including Rebound hammer, Ultrasonic pulse velocity, Rebar locator, Corrosion meter, Penetration resistance and pull-out test, Core cuttingCorrosion: Methods for corrosion measurement and assessment including half-cell potential and resistivity, Mapping of data.

UNIT-III

Failure of buildings: Definition of building failure-types of failures- Causes of Failures- Faulty Design, Accidental over Loading, Poor quality of material and Poor Construction practices- Fire damage - Methodology for investigation of failures-diagnostic testing methods and equipment's-repair of cracks in concrete.

UNIT-IV

Materials for repair and rehabilitation -Admixtures- types of admixturespurposes of using admixtures- chemical composition- Natural admixturesFibres- wraps- Glass and Carbon fibre wraps- Steel Plates-Concrete behavior under corrosion, disintegrated mechanisms- moisture effects and thermal effects – Visual investigation- Acoustical emission methods- Corrosion activity measurement- chloride content – Depth of carbonation- Impact echo methods- Ultrasound pulse velocity methods- Pull out tests.

UNIT: V

Repair Techniques: Grouting, Jacketing, Shotcreting, externally bonded plates, Nailing, Underpinning and under water repair; Materials, Equipment's, Precautions and Processes.

UNIT: VI

Investigation of structures: Distress, observation and preliminary test methods. Case studies: related to rehabilitation of bridge piers, dams, canals, heritage structures, corrosion and erosion damaged structures.

TEXT BOOKS:

1. 'Maintenance & Repair of Civil Structures' by B.L. Gupta & Amit Gupta.
2. 'Rehabilitation of Concrete Structures' by B. Vidivelli, Standard Publishers.
3. 'Concrete Bridge Practice Construction, Maintenance & Rehabilitation' by V. K. Raina.

REFERENCES:

1. 'Concrete Structures- protection Repair and Rehabilitation' by R. Doodge Woodson, BH Publishers.
2. Daniel Balageas, Claus – Peter Fritzenaml Alfredo Guemes, Structural Health Monitoring, Published by ISTE Ltd., U.K. 2006
3. Guide book on Non-destructive testing of concrete structures, Training course series No. 17. International Atomic Energy Agency, Vienna, 2002
4. Hand Book on "Repair and Rehabilitation of RCC Buildings". Published by Director General, CPWD, Govt. of India, 2002
5. Hand Book on Seismic Retrofitting of Buildings, published by CPWD & Indian Building Congress in association with IIT, Madras, Narosa Publishing House, 2008.

6. Santha Kumar, A.R., (1996), Concrete Chemical Theory and Applications, Indian Society for Construction Engineering and Technology, Madras.

7. Diagnosis and treatment of structures in distress by R.N.Raikar, Published by R&D Centre of Structwel Designers & Consultants Pvt.Ltd., Mumbai, 1994.

8. Garas, F.K,.Clarke, J.L, Armer, GST (1997), Structural assessment, Butterworths, UK.

9. R.T. Allen and S.C.Edwards, (1998), Repair of Concrete St

10. uctures, Blakie and Sons, UK

9K690: Geographic Information Systems Laboratory

B Tech III Year II Sem.

L	T	P/D	C
-	-	3	1.5

1	2	3	4	5	6	7	8	9	10	11	12
				M				H			

Course Objectives:

1. The student shall be trained to extract geographic data from Toposheet.
2. The student shall learn to digitize the various features and define their attributes.
3. The student shall learn to generate maps with defined patterns.

Course Outcomes:

1. The student will be able to extract various details from the topography survey map.
2. The student shall be able to convert the raw data into vector and raster forms.
3. The student shall be able to generate maps with various geographic features.

Laboratory Experiments

1. Georeferencing of Toposheet / satellite Imagery and verification
2. Digitization of Points and Lines
3. Digitization of polygons
4. Editing Map Elements
5. Attribute Date Entry and Manipulation
6. Cleaning, Building and Transformation
7. Vector data Analysis – Overlay
8. Vector data Analysis - Buffer
9. Raster data analysis
10. Map Generation With Patterns and Legends
11. Network Analysis
12. Interpolation Methods

References

1. Q GIS Documentations
2. Laboratory Manual

9K691 Environmental Engineering Lab

B Tech III Year II Sem.

Course Objectives: the objectives of the course are to

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

Course outcomes: After the completion of the course student should be able to

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

1. Determination of pH
2. Determination of Electrical Conductivity
3. Determination of Total Solids (Organic and inorganic)
4. Determination of Acidity
5. Determination of Alkalinity
6. Determination of Hardness (Total, Calcium and Magnesium Hardness)
7. Determination of Chlorides
8. Determination of optimum coagulant Dosage
9. Determination of Dissolved Oxygen (Winkler Method)
10. Determination of COD
11. Determination of BOD/DO
12. Determination of Residual Chlorine
13. Noise level measurement

TEXT/REFERENCE BOOKS:

1. Introduction to Environmental Engineering and Science by Gilbert Masters, Prentice Hall, New Jersey. 2. Introduction to Environmental Engineering by P. AarneVesilind, Susan M. Morgan, Thompson / Brooks/ Cole; Second Edition 2008.
3. Peavy, H.s, Rowe, D.R, Tchobanoglous, G. Environmental Engineering, Mc-Graw - Hill International Editions, New York 1985.
4. MetCalf and Eddy. Wastewater Engineering, Treatment, Disposal and Reuse, Tata McGrawHill, New Delhi.
5. Manual on Water Supply and Treatment. Ministry of Urban Development, New Delhi.
6. Plumbing Engineering. Theory, Design and Practice, S.M. Patil, 1999
7. Integrated Solid Waste Management, Tchobanoglous, Theissen& Vigil. McGraw Hill Publication
8. Manual on Sewerage and Sewage Treatment Systems, Part A, B and C. Central Public Health and Environmental Engineering Organization, Ministry of Urban Development.

9K692: TRANSPORTATION ENGINEERING LABORATORY

B Tech III Year II Sem

L	T	P/D	C
-	-	3	1.5

a	b	c	d	e	f	g	h	i	j	k	l
	L			M							

Course Objectives:

To enable the student

1. Assess the quality of the material used in pavement construction and compare with IRC specifications.
2. Identify the field data required for assessing the traffic parameters.

Course Outcomes

At the end of the course, student should have learnt

1. To apply methods for assessing various types of material to be used in the pavement construction.
2. To plan for the collection of field data, present the same for performing critical analysis and hence aid in taking decisions so as to enable smooth movement of traffic

List of Experiments

Tests on Bitumen

1. Penetration Test
2. Ductility test
3. Softening point test
4. Specific gravity test
5. Viscosity test
6. Flash and fire point test

Tests on Aggregates

1. Aggregate crushing value test
2. Los Angeles Abrasion test
3. Aggregate Impact Value test
4. Shape test (Flakiness Index & Elongation Index)
5. Water absorption test
6. Soundness

Traffic Studies

1. Traffic volume study
2. Spot speed study
3. O & D studies
4. Speed & delay studies

Miscellaneous tests (Demonstration only)

1. Determination of CBR
2. Preparation of representative sample by coning and quartering
3. Bitumen Extraction test
4. Marshall stability – concept and test

TEXTBOOKS

1. Khanna, S. K. and Justo, C. E. G, A Veeraraghavan (2013), "Highway Materials & Pavement Testing", Nem Chand and Brothers.
2. Laboratory Manual

IV YEAR I SEMESTER

9K720: ESTIMATION COSTING AND SPECIFICATION

B. Tech IV Year I Sem.

a	b	c	d	e	F	g	h	i	j	k
x	x	x						x		

L	T	P/D
3	1	- 3

Course Objectives:

To enable the students understand

1. The working of detailed estimates for a building.
2. The working of detailed estimates for roads and canals.
3. The rate Analysis for different items of works.
4. The working and scheduling of shuttering and bar bending.
5. About contract, Tenders, Earnest Money Deposit (EMD), M-Book and concept of present practices of tenders.
6. To introduce the student to the basic concept and procedure of valuation.

Course Outcomes:

After the successful completion of the course, the student will be able

1. To prepare detailed estimates for different buildings.
2. To do the rate analysis for different items of works of buildings.
3. To prepare the rate analysis for different items of works.
4. To prepare the schedules for shuttering and bar bending.
5. To work out different types of contracts, prepare tenders, to suit the present day practices of tendering.
6. To valuate buildings as per norms.

UNIT –I:

General items of works in a building- - Standard unit principles of working out quantities for detailed and abstract estimates- Approximate method of estimation.Detailed estimates of buildings.

UNIT –II:

Estimation of earthwork for roads and canals.

UNIT –III:

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

UNIT –IV:

Shuttering material requirements and schedules. Estimation of reinforcement- bar bending scheduling and costing.

UNIT –V:

Contracts: Types of contracts- Contract documents- Conditions of contract- Sub contracting.
Bidding: Bid documents and bidding.

UNIT –VI:

Valuation of buildings.Standard specifications for different items of building construction.

TEXT BOOKS:

1. Estimating and Costing in Civil Engineering – Theory and Practice by B N Dutta, 28th Revised Edition, 2016, UBS Publishers Distributors Pvt. Ltd.
2. Textbook of Estimating and Costing: Civil Engineering by G S Birdie, DhanpatRai Publications, 1988.

REFERENCES:

1. Estimating and Costing in Civil Engineering by Jagjit Singh, Galgotia Publications, New Delhi, 1996.
2. Estimating, Costing, Specifications and Valuation in Civil Engineering by M. Chakraborthi, Publisher: M Chakraborti, 24th Edition, 2010.
3. Civil Engineering Contracts and Estimation by B S Patil, Universities Press III Edition, (2009), Hyderabad.
4. Standard scheduled rates and relevant BIS codes.

9K721: HYDROLOGY AND WATER RESOURCES ENGINEERING

B.Tech. IV Year I Sem.

L T/P/D/ C

3 0/0/0 /3

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

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

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

Unit-1

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

Unit-2

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

Runoff Components of Runoff, Factors affecting runoff, Basin yield, SCS-CN method of estimating runoff, Flow duration curves, Mass curve of runoff – Analysis.

Unit - 3

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

Unit-4

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

Unit-5

Groundwater Hydrology Occurrence, movement and distribution of groundwater, aquifers – types, Specific Yield, Permeability, Storage coefficient, Transmissibility, Darcy's Law. Well Hydraulics - Steady radial flow into well for confined and unconfined aquifers, Recuperation tests. Well constants. Crop Water Requirements – Water requirement of crops-Crops and crop seasons in India, cropping pattern, duty and delta; Quality of irrigation water; Soil-water relationships, root zone soil water, infiltration, consumptive use, irrigation requirement, frequency of irrigation; Methods of applying water to the fields: surface, sub-surface, sprinkler and trickle / drip irrigation.

Unit-6

Canal Systems: Canal systems, alignment of canals, canal losses, estimation of design discharge. Design of channels- rigid boundary channels, alluvial channels, Regime channels, Kennedy's and Lacey's theory of regime channels. Canal outlets: non-modular, semi-modular and modular outlets. Water logging: causes, effects and remedial measures. Lining of canals-Types of lining-Advantages and disadvantages. Drainage of irrigated lands- necessity, methods.

TEXT BOOKS:

1. Hydrology by K. Subramanya (Tata McGraw-Hill)
2. Irrigation Engineering and Hydraulic structures by Santhosh Kumar Garg Khanna publishers
3. G L Asawa, Irrigation Engineering, Wiley Eastern

REFERENCE BOOKS:

1. Elements of Engineering Hydrology by V.P. Singh (Tata McGraw-Hill)
2. Engineering Hydrology by Jaya Rami Reddy (Laxmi Publications
3. Ground water Hydrology by David Keith Todd, John Wiley & Son, New York.
4. Elements of Water Resources Engineering by K.N.Duggal and J.P.Soni (New Age 5. International).

Code: 9K722: FINITE ELEMENT METHOD FOR CIVIL ENGINEERS

(professional Elective-III)

B.Tech. IV Year I Sem.

Course Objectives: The subject provides introduction to finite element methods to analyse structural
elements

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

1. apply potential energy method to structural engineering problems
2. generate and solve the governing FE equations for one-dimensional problems
3. generate and solve the governing FE equations for beams and two-dimensional problems.
4. formulate FE equations using four nodded iso-parametric elements.
5. solve FEM equation using the numerical method Gauss quadrature.
6. analyze basic structural elements using ANSYS software

Unit – I: Introduction to Finite Element Method:
Introduction to Finite Element Method; Basic Equations in Elasticity – strain displacement relations – stress strain equations– concept of plane stress – plane strain; Concept of Potential energy principle – Rayleigh-Ritz method; advantages and disadvantages of FEM.
Unit – II: Finite Element Analysis (FEA) of – one dimensional problems. Bar element; shape functions, hermit polynomials; stiffness matrix.
Unit – III:
FEA of Beam elements. stress strain relation; shape functions; stiffness matrix; application for continuous beams.
FEA of Two dimensional problems.Concept of CST element and LST element; formulation of CST element; shape functions – stress strain relation; element stiffness and force matrices.
Unit – IV: 4- node quadrilateral elements (Iso-parametric) formulation. Formulation for 4-node CST element, about Lagrangian – Serendipity elements.
Unit – V: Numerical Integration techniques for static loads: One point and two point Gaussian Quadrature; Static condensation.
Unit – VI: Introduction to ANSYS, Illustration on different modules of ANSYS / Structural engineering applications of the package; creation of a simple 1-D model, 2-D model; analysis and post processing of the results.

TEXT BOOKS:

1. Tirupathi R-Chandrupatla: “Introduction to finite elements in engineering”, PHI publishers
2. Reddy, J. N, (1993). “An Introduction to the Finite Element Method”, McGraw Hill, New York.

REFERENCES:

1. Cook, R. D. (1981). “Concepts and Application of Finite Element Analysis”, John Wiley and Sons.

2. Zienkiewicz, O. C. And Taylor, R. L, (1989). “The Finite Element Method”, Vol.1, McGraw Hill Company Limited, London.

Code: 9K723. Solid Waste Management

(professional Elective-III)

B.Tech. IV Year I Sem.

Course Objectives: The objectives of the course are to

- Teachthe necessity of solid waste management
- Explain the strategies for the collection of solid waste
- Describe the solid waste disposal methods
- Categorize Hazardous Waste

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

1. Identify the physical and chemical composition of solid wastes
2. Analyze the functional elements for solid waste management.
3. Make use of techniques and methods used in transformation, conservation, and recovery of energy from solid waste
4. Apply methods of material and resource recovery from solid waste.
5. Design landfills as a waste disposal system
6. Identify safe disposal methods of hazardous waste

UNIT- I

Solid Waste: Definitions, Types of solid waste, sources of solid waste, Characteristics, andperspectives; properties of solid waste, Sampling of Solid waste, Elements of solid wastemanagement - Integrated solid waste management, Solid Waste Management Rules 2016.

UNIT - II

Solid Waste Management: Solid waste generation; on-site handling,storage and processing; collection of solid waste; Stationary container system and Hauled containersystems – Route planning - transfer and transport; processing techniques;

UNIT- III

Engineering Systems Energy Recovery: Processing techniques; recovery of thermal conversionproducts; Pyrolysis, Gasification, Refuge derived fuel (RDF) - recovery of energy from conversion products; energy recovery systems.

UNIT- IV

Engineering Systems for Materials Recovery: materialsrecovery systems; recovery of biological conversion products; Composting, pre and post processing,types of composting, Critical parameters, Problems with composting.

UNIT- V

Landfills: Evolution of landfills – Types and Construction of landfills; Design considerations – Life oflandfills, Problems with landfills; Lining of landfills – Types of liners; Leachate pollution and control; Monitoring landfills – Landfills reclamation.

UNIT- VI

Hazardous waste Management: – Sources and characteristics, Effects on environment, Riskassessment – Disposal of hazardous wastes – Secured landfills, incineration –

Monitoring; Biomedicalwaste disposal, E-waste management, Nuclear Waste, Industrial waste Management.

TEXT BOOKS:

1. Tchobanoglous G, Theisen H and Vigil SA 'Integrated Solid Waste Management, Engineering
Principles and Management Issues' McGraw-Hill, 1993.
2. Vesilind PA, Worrell W and Reinhart D, 'Solid Waste Engineering' Brooks/Cole Thomson Learning Inc., 2002.

REFERENCE BOOKS:

1. Peavy, H.S, Rowe, D.R., and G. Tchobanoglous, 'Environmental Engineering', McGraw Hill
Inc., New York, 1985.
2. Qian X, Koerner RM and Gray DH, 'Geotechnical Aspects of Landfill Design and Construction' Prentice Hall, 2002.

9K724 PRE-STRESSED CONCRETE DESIGN

(Professional Elective - III)

1	2	3	4	5	6	7	8	9	10	11	12
	H	M	L								

B.Tech IV Year I Sem. **L T P C**
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Course Objectives: The objective of the course is to
CO1 Able to Understand the principles & necessity of prestressed concrete structures and losses of prestress
CO2 Able to Understand Flexure and shear and transfer of prestress in pertensioned members.
CO3 Able to Understand the Composite and continuous beams and deflections on the prestressed members.
Course Outcomes: At the end of the course the student will able to
CO1 Analyze the losses of prestress in members.
CO2 Analyze the Flexure and shear and transfer of prestress in pertensioned members.
CO3 Analyze the Composite and continuous beams and deflections on the prestressed members.

UNIT I
Introduction: Historic development- General principles of prestressing pretensioning and post tensioning- Advantages and limitations of Prestressed concrete- General principles of PSC- Classification and types of prestressing materials- high strength concrete and high tensile steel their characteristics. Methods and Systems of prestressing: Pretensioning and Post-tensioning methods and systems of prestressing like Hoyer system, Magnel Blaton system, Freyssinet system and Gifford- Udall System- Lee McCall system.
UNIT II
Losses of Prestress: Loss of prestress in pretensioned and post-tesnioned members due to various causes like elastic shortage of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, slip in anchorage, frictional losses.
UNIT III
Flexure: Analysis of sections for flexure- beams prestressed with straight, concentric, eccentric, bent and parabolic tendons- stress diagrams- Elastic design of PSC beams of rectangular and I sections- Kern line — Cable profile and cable layout.
Shear: General Considerations- Principal tension and compression- Improving shear resistance of concrete by horizontal and vertical prestressing and by using inclined or parabolic cables- Analysis of rectangular and I beams for shear — Design of shear reinforcements- Bureau of Indian Standards (BIS) Code provisions.
UNIT IV
Transfer of Prestress in Pretensioned Members : Transmission of prestressing force by bond — Transmission length — Flexural bond stresses — IS code provisions — Anchorage zone stresses in post tensioned members — stress distribution in End block —Analysis by Guyon, Magnel, Zielinski and Rowe's methods — Anchorage zone reinforcement- BIS Provisions
UNIT V

Composite and Continuous Beams: Different Types- Propped and unpropped- stress distribution- Differential shrinkage- Analysis of composite and continuous beams- General design considerations.

UNIT VI

Deflections: Importance of control of deflections- Factors influencing deflections — Short term deflections of uncracked beams- prediction of long time deflections- BIS code requirements.

TEXT BOOKS:

1.Rajagopalan.N, "Prestressed Concrete", Narosa Publishing House, 2002.
2.Dayaratnam. P., "Prestressed Concrete Structures", Oxford and IBH,2013
3.LinT.Y. and Ned.H.Burns, "Design of prestressed Concrete Structures",Third Edition, Wiley India Pvt. Ltd.

REFERENCES:

1.KrishnaRajuN.,"Prestressedconcrete",5th Edition, Tata McGraw Hill Company,New Delhi,2012.
2.Andit. G.S. and Gupta. S.P., "Prestressed Concrete", CBS Publishers and Distributers Pvt.Ltd,2012.
3.IS1343:1980,Code of Practice for Prestressed Concrete, Bureau of Indian Standards,New Delhi,2012

9K725: GROUND IMPROVEMENT TECHNIQUES

Professional Elective- IV

B.Tech: IV Year I Sem.

L	T	P/D	C
3	-	-	3

a	b	c	d	e	f	g	h	i	j	k	l
x	x				x	x					

Prerequisites: Geo-Technical Engineering, Foundation Engineering

Course Objectives:

• To Identify difficult ground conditions in engineering practice.

• To select suitable ground improvement techniques for problematic soils.

• To assess suitable physical, chemical, mechanical and hydraulic modifications.

. To get an Idea of Grouting techniques and Soil reinforcement

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

• Identify the suitable ground improvement methods for different types of soils

• Assess different compaction methods for ground modification.

• Design dewatering systems to reduce the settlements.

• Comprehend stabilizations with chemical and grouting techniques.

• Apply the principles of soil reinforcement and confinement in engineering constructions.

UNIT I

Introduction to Ground Improvement: Definition, Objectives of soil improvement, Classification of ground improvement techniques. Identification of soil types, In situ and laboratory tests to characterize problematic soils. Factors to be considered in the selection of the best soil improvement technique.

UNIT II

Mechanical Modification: Deep Compaction Techniques- Blasting Vibro -compaction, Dynamic Tamping and Compaction piles. Specification of compaction. Tolerance of compaction Shallow and deep compaction.

UNIT III

Hydraulic Modification: Definition, aim, principle, techniques, gravity drain, lowering of

water table, multistage well point, vacuum dewatering. Discharge equations. Design of dewatering system including pipe line effects of dewatering.
Drainage & Preloading: Drainage of slopes, preloading, vertical drains, sand drains. Assessment of ground condition for preloading electro kinetic dewatering.

UNIT IV

Chemical Modification-I, Definition, aim, special effects, and methods Techniques – sandwich technique, admixtures, cement stabilization on permeability, Swelling and shrinkage, Criteria for cement stabilization, Stabilization using Fly ash

UNIT V

Chemical Modification-II: Lime stabilization, suitability, process, special effects, criteria for lime stabilization. Other chemicals, chlorides, hydroxides, lignin, hydrofluoric acid. Properties of chemical components, reactions and effects. Bitumen tar or asphalt in stabilization.
UNIT VI

Grouting: Introduction, Effect of grouting, Chemicals and materials used. Types of grouting, grouting procedure, Applications of grouting.

Miscellaneous Methods : Introduction, Soil reinforcement. Thermal methods, Soil reinforcement, reinforcement with strip and grid reinforced soil, In situ ground reinforcement, ground an anchor Ground improvement by confinement – Crib walls, Gabions and Mattresses. Anchors, Rock bolts and soil nailing.

TEXT BOOKS:

1. Purushothama Raj. P, “Ground Improvement Techniques” Laxmi Publications, New Delhi, 1999.
2. M. P. Moseley and K. Krisch (2006) – Ground Improvement, II Edition, Taylor and Francis

REFERENCES:

1. Koerner.R.M. “Construction and Geotechnical Methods in Foundation Engineering” McGraw Hill Publ., New York, 1985.
2. Nelson. J.D and Miller. D.J, “Expansive Soils” John Wiley and Sons, 1992.
Bell, F.G. Butterworth, Methods of treatment of unstable ground-Butterworth, London.
3. Hausmann, M. R. (1990) – Engineering Principles of Ground Modifications, McGraw Hill publications

Code:9K726-Construction Technology and Management

(Professional Elective – IV)

B.Tech: IV Year I Sem.

L / T / P / D / C
3 /0 /0/0 /3

Course Objectives:

To introduce the students to,

1. Study about the construction technology Materials, methods,technologies and their applications.
2. Understand quality planning and programs in construction industry.
3. Demonstrate procedures and quality assurance systems and safety management systems in construction projects.
4. Understand the fundamentals of Value, worth and value engineering and
5. Understand the general techniques in infraction valuation.
6. Understand the latest advances in construction technology and management practices.

Course Out comes:

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

1. Describe the properties of materials used in construction.
2. Explain the properties of concrete and its determination.
3. Describe the various elements of building construction.
4. Explain the technologies for construction.
5. Describe the procedure for planning and executing public works.
6. Apply scheduling techniques in project planning and control.

UNIT I

ConstructionMaterials

Timberproducts–propertiesandusesofveneer,plywood,fibreboard,particleboard,multi wood
Cement: Manufacturing,chemical composition, Tests on cement –specificgravity,standard consistency,initialandfinalsetting time,fineness,soundness,compressivestrength,IS specifications
Aggregates – types, Gradation, importanceofgradation, bulkingof fine aggregateQualityofwaterforconstruction(Briefdiscussiononly,Permissibleli mitsofchemical constituents not required)
Admixtures, uses – mineral admixtures – fly ash and ground granulated blast furnace slag and chemical admixtures – plasticizers, super plasticizers, accelerators, retarders (brief discussion
only).

UNIT II

Concreteand BuildingConstruction

Process of manufacturing concrete – batching, mixing, transportation, placing, compacting, finishing, curing
Properties of fresh concrete: Workability, factors affecting workability, test on workability
(slump test), segregation and bleeding (brief discussion)
Properties of hardened concrete: Strength, factors affecting strength, tests for strength of concrete in compression, tension and flexure

Lintels and arches: Types and construction details
Damp proof course (brief discussion only)
Finishing works: Plastering, pointing, painting – objectives and types
Structural systems – load bearing and framed construction, RCC and steel framed structures.

UNIT III

Construction Technology

Cost-effective construction – rapid wall construction, soil-cement block masonry, voided slab technology, filler slab technology (brief discussion only)
Scaffolding – uses and classification (brief discussion only).

UNIT IV

ConstructionTechniques

Formwork – requirements of good formwork, classification, slipform (brief discussion only) Prefabricated construction – advantages and disadvantages, prefabricated building components. Basic concept of prestressing – fundamental understanding of pre-tensioned and post-tensioned construction
Construction 3D printing (brief discussion only) Building failures – general reasons
Causes of failures in RCC, steel and masonry structures.

UNIT V

ConstructionProjectManagement

Construction projects, categories, life cycle of a project –pre-project phase, project phase, post- project phase, Detailed Project Report – contents.
Tendering: types of tenders, stages in tendering
Contracts: types of contracts – item rate contract, lumpsum contract, percentage rate contract, turnkey contracts, concession contracts – BOT.

UNIT VI

Construction Planning

Work break down structure
Types of Schedules – Construction schedule, Material schedule, labour schedule, equipment schedule, financial schedule
Bar chart, Mile
Networks, Network representation – Activity on Node (AON) Diagram
Network analysis – Critical Path Method (CPM), Programme Evaluation and Review Technique(PERT) – concepts and problems

Textbooks:

1. Shetty M.S. and A. K. Jain (2019), Concrete Technology: Theory and Practice, S. Chand&Company Pvt. Ltd.

2. Varghese P. C. (2007), Building Construction, Prentice Hall India.
3. Punmia B. C., Ashok Kumar Jain and Arun Kumar Jain (2016), Building Construction, Laxmi Publications (P) Ltd.
4. Sharma S.C.and S.V.Deodhar (2019), Construction Engineering & Management, Khanna Book Publishing Co. (P) Ltd.
5. Kumar Neeraj Jha (2015), Construction Project Management: Theory and Practice, Pearson India Education Services Pvt.Ltd.

Referencebooks:

1. SahuG.C.andJoy Gopal Jena (2015), Building Materials and Construction, McGraw HillEducation (India) Private Limited.
2. Gambhir M. L. (2004), Concrete Technology, Tata McGraw-Hill Publishing CompanyLimited.
3. Sharma S.K. (2019), Civil Engineering Construction Materials, Khanna Book Publishing Co. (P) Ltd.
4. Neville A.M. and BrooksJ.J. (2010), Concrete Technology, Pearson Education Ltd.
5. Mehta P. K. and Paulo J. M. Monteiro (2014), Concrete-Microstructure, Properties and Materials, McGraw Hill Education.
6. SanthakumarR. (2006), Concrete Technology, Oxford Universities Press India.
7. Tony Bryan (2010), Construction Technology – Analysis and Choice, Wiley-Blackwell.
8. Joseph J. Moder, Cecil R. Philips and Edward W. Davis (1983), Project Management with CPM, PERT and Precedence Diagramming, Van Nostrand Reinhold Company Inc.
9. Charles Patrick (2012), Construction Project Planning and Scheduling, Dorling Kindersley India Pvt. Ltd.
10. Daniel W. Halpin and Bolivar A. Senior (2011), Construction Management, John Wiley and Sons Inc.

9K727: PAVEMENT ANALYSIS AND DESIGN

Professional Elective_4

B Tech IV Year I Sem

L	T	P/D	C
3	0	0	3

a	b	c	d	e	f	g	h	i	j	k	l
M				M							

Course Objectives:

1. Introduction to various factors affecting pavement design
2. Concepts of mechanistic and empirical methods of flexible pavements
3. Concepts of mechanistic and empirical methods of rigid pavements
4. Understand various verification techniques used for pavement designs
5. Knowledge of pavement evaluation
6. Will e able to understand theories related to pavement maintenance activities

Course Outcomes:

1. Application of basic principles in pavement design
2. Assimilation of mechanistic principles for the pavement design
3. Assimilation of empirical principles for the pavement design
4. Will be able to perform various verification techniques used for pavement designs
5. Explain about appropriate evaluation methods
6. Discuss about pavement maintenance measures for better serviceability of pavements

UNIT - I

Introduction of Pavement Design: Various Factors, Types of Pavements, Functions of Individual Layers, Classification of Axle Types of Rigid Chasis and Articulated Commercial Vehicles, Legal Axle and Gross weights on single and multi units, Tire Pressure, Contact pressure, EAL and ESWL concepts, Equivalent Axle Load Factor, Traffic Analysis: ADT.AADT, Truck factor, Growth factor, Lane, Directional distributions & Vehicle Damage factors, Effect of Transient & Moving loads.

UNIT - II

Stresses in Pavements: Vehicle-Pavement Interaction, Stress inducing factors in flexible and Rigid pavements. Stress in Flexible Pavements: Visco-Elastic Theory and Assumptions. Layered system concepts, Stress solutions for one, two and three layered systems. Fundamental Design concepts. Stresses in Rigid Pavements: Westergaard's theory and Assumptions, Stresses due loading, warping and Frictional Stresses, Friberg's Analysis of Dowel Bars and deflection of dowel-joints.

UNIT- III

Mechanistic Design Methodology for Pavements: General Methodology, Classification of design Methods; Pavement Design Concepts; Flexible Pavements: Climatic Models, Structural models, Distress models: fatigue cracking, rutting and thermal cracking models; Rigid Pavements: Structural models, fatigue cracking: load and curling stress, Pumping and Erosion Models, Faulting Models, Joint Deterioration and Punch out models;

UNIT - IV

Need and verification of Flexible and Rigid pavement Mechanistic design procedures.

Methods of Pavement Designs: Flexible Pavement Design Concepts, Asphalt Institute Methods with HMA and other Base Combinations, AASHTO, IRC Methods as per IRC37 and IRC:SP:72. Design of Rigid Pavements: Introduction to Calibrated Mechanistic Design Process, PCA, AASHTO, IRC specifications,

UNIT - V

Introduction to pre-stressed and continuously Reinforced cement Concrete Pavement Design, Dowel bar design and design of tie bars as per IRC:58.

Pavement Evaluation: Types of pavement evaluation: Serviceability concepts, IRI, Quarter Car Model, skid resistance; Pavement Deflection - Different Methods of NDT, Benkelman Beam, LaCroix Deflectometer, Dynaflect, Road Ratar, Rolling Dynamic Deflectometer, Load man

UNIT - VI

Different Types of Falling Weight Deflectometers (FWD) for evaluation of rigid and flexible pavements. Design of overlays: Types & Design of overlays: Asphalt Institute's Principal Component Analysis, IRC Methods of Overlay Design.

Text Books

1. Design of Functional Pavements, Nai C. Yang, McGraw Hill Publications.
2. Teng, Functional Design of Pavements - McGraw hill - 1990.
3. Concrete Pavements, AF Stock, Elsevier, Applied Science Publishers
4. Principles of Pavement Design, Yoder J. & Witzac Mathew W. John Wiley & Sons.

References

1. Pavement Analysis & Design, Yang H. Huang, Prentice Hall Inc.
2. Pavement and surfacing for Highway & Airports, Micheal Sargious, and Applied science Publishers Limited.
3. Kadiyali and Lal, Principles of highway engineering, Khanna Publishers, Delhi-6
4. IRC related Codes for Flexible and Rigid Pavements design

Code: 9K795. MATLAB

B Tech IV Year I Sem

Course Objectives

2. This Lab Course will enable the students to understand the basicsof programming knowledge in MATLAB and use them in civil engineering problems.

Course Outcomes:

3. Students are able to use MATLAB environment and its programming fundamentals.
4. Students are able to write Programs using commands and functions.
5. Students are able to use MATLAB for solving a problem encountered in Civil Engineering.

LIST OF EXPERIMENTS

1. Getting Started with Matlab and practicing basic operations; Data types, Constants and Variables, Character constants, operators, Assignment statements.
2. Matrix operations (Additions, subtractions, multiplications) with Control Structures, For/While Loops, If control structures, Switch, Break, Continue statements.
3. Finding Eigen Values and Eigen vectors of Matrices with Input-Output functions, Reading and Storing Data.
4. Determination of Stopping sight distance.
5. Determination of Overtaking sight distance.
6. Roots of quadratic equations
7. Limits, Derivatives, simple differential equations
8. 2D Plots of bar chart, pie chart and line graph.
9. Solve an Initial value problem using Runge-Kutta method
10. Program to perform the design of Beam for the user input values
11. Solving any Civil Engineering problem usingMatlab

TEXT BOOKS

1. Bansal .R.K, Goel .A.K, Sharma .M.K, “MATLAB and its Applications in Engineering”, Pearson Education, 2012.
2. Amos Gilat, “MATLAB-An Introduction with Applications”, Wiley India.

REFERENCES

1. Stephen J.Chapman, “Programming in MATLAB for Engineers”, Cenage Learning, 2011.

9K796 REVIT AND ESTIMATION LABORATORY

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		M	L	H							

B.Tech IV Year I Sem.

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Course Objectives: The objective of the course is to
CO1 To empower the students for rate analysis for a given work.
CO2 To empower the students to develop building information modelling workflow.
Course Outcomes: At the end of the course the student will able to
CO1 Develop the documentation for material quantities and rate analysis for different structures.
CO2 Develop the architectural design for the structure based on the requirement of end user.

Experiments:

1. Estimate the quantities of steel in Bar-bending Schedule Of Beams
2. Estimate the quantities of steel in Bar-bending Schedule of rectangular and spiral Columns.
3. Estimate the quantities of steel in Bar Bending Schedule Of Slab
4. Estimate the quantities of steel in Bar-bending Schedule of Isolated Footing
5. Perform the Rate Analysis For earthwork quantities
6. Perform the Rate Analysis For Plain Cement Concrete (P.C.C)
7. Rate Analysis For Reinforcement Concrete (Column Beam And Slab)
8. Rate Analysis For Masonry Work
9. Rate Analysis For Plaster Work
10. Developing The basics building model by creating a Basic Floor Plan
11. Design of Exterior components using Revit Architecture
12. Design of Interior components using Revit Architecture

TEXT BOOKS:

1. Revit and Estimation and Quantity Survey Laboratory Manual.
2. Estimating and Costing in Civil Engineering – Theory and Practice by B N Dutta, 28th Revised Edition, 2016, UBS Publishers Distributors Pvt. Ltd.

REFERENCES:

1. Estimating and Costing in Civil Engineering by Jagjit Singh, Galgotia Publications, New Delhi, 1996.
2. Estimating, Costing, Specifications and Valuation in Civil Engineering by M. Chakraborthi, Publisher: M Chakraborti, 24th Edition, 2010.

9K828: AIRPORT, RAILWAYS, AND WATERWAYS

(professional elective-V)

B Tech IV Year II Sem

1	2	3	4	5	6	7	8	9	10	11	12
				M							M

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3	0	0	0	3

Course Objectives: the objectives of the course are to

- Deal with the characteristics of aircrafts related to airport design; runway and taxiway design, runway orientation, length, grading and drainage.
- Introduce component of railway tracks, train resistance, crossing, signaling, high speed tracks and Metro Rail.
- Explain the classes of harbors, features, planning and design of port facilities.

Course Outcomes: At the end of this course, the students will develop:

- An ability to design of runways and taxiways.
- An ability to design the infrastructure for large and small airports
- An ability to design various crossings and signals in Railway Projects.
- An ability plan the harbors and ports projects including the infrastructure required for new ports and harbors.

UNIT – I

Airport Engineering: Introduction to Air Transportation - Aircraft Characteristics - Factors Affecting Selection of site for Airport – Aprons – Taxiway – Hanger – Geometric design - Computation of Runway Length, Correction for Runway Length, Orientation of Runway, Wind Rose Diagram

UNIT - II

Introduction to Railways: Role of Indian Railways in national development – Railways for Urban Transportation – LRT, Mono Rail, Metro Rail & MRTS. Permanent Way: Components and their Functions: Rails - Types of Rails, Rail Fastenings, Concept of Gauges, Coning of Wheels, Creeps and kinks Sleepers – Functions, Materials, Density – Functions, Materials, Ballast, Sub grade and Embankments, Ballast less Tracks.

UNIT – III

Geometric Design of Railway Track: Gradients and Grade Compensation, Super-Elevation, Widening of Gauges in Curves, Transition Curves, Horizontal/Vertical Curves.

UNIT – IV

Track maintenance and Operation: Points and Crossings - Turnouts, Stations and Yards - Level Crossings. Signaling and Interlocking - Track Circuiting -

Track Maintenance.

UNIT – V

Dock & Harbour Engineering: Water Transportation: Ports and Harbours - Types of water transportation, water transportation in India, Ports and harbours: requirements, classification. Harbour works: breakwaters, jetties, fenders, piers, wharves, dolphins, etc.,

UNIT – VI

Navigational aids: types, requirements, light house, beacon lights, buoys, Port facilities: general layout, development, planning, facilities, terminals. Docks and repair facilities: design, dry docks, wet docks, slipways, Locks and lock gates: materials, size, Dredging: classification, dredgers, uses of dredged materials.

TEXT BOOKS:

1. Venkataramaiah C(2016), "Transportation Engineering Vol II – Railways, Airports, Docks, Harbors, Bridges and Tunnels", Universities Press (India) Private Limited, Hyderabad
2. J S Mundrey, Railway Track Engineering (5th Edition) McGraw Hill Education 2017

REFERENCE BOOKS:

1. Subhash C. Saxena (2008) Airport Engineering, Planning and Design, CBS Publishers and Distributors, New Delhi. (Reprint 2015)
2. R. Srinivasan (2016), Harbour, Dock and Tunnel Engineering 28th Edition, Charotar Publishing House Pvt. Ltd.
3. Saxena SC and Arora S C (2010) A Text Book of Railway Engineering Paperback – 2010, Dhanpat Rai Publications (Reprint 2015)
4. Robert Horonjeff, Francis X. McKelvey, Willian J Sproule, Seth B. Young (2010), Planning & Design of Airports, McGraw-Hill Professional.
5. Transportaion Engineering by R. Srinivasa Kumar, University Press Ind

9K829: Irrigation and Hydraulic Structures

B.Tech. IV Year II Sem.

L TP/DC

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

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

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

Unit - 1

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

Unit - 2

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

Unit- 3

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

Unit- 4

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

Unit- 5

Canal Falls - types of falls and their location, Design principles of Notch Fall and Sarada type Fall. Canal regulation works, principles of design of cross and distributary head regulators, types of Canal escapes - types of canal modules, proportionality, sensitivity, setting and flexibility.

Unit-6

Cross Drainage works: types, selection of suitable type, various types, design considerations for cross drainage works, Design of Super passage.

Text books:

1. Irrigation Engineering and Hydraulic structures by Santhosh kumar Garg, Khanna Publishers.
2. Irrigation engineering by K. R. Arora Standard Publishers.
3. Irrigation and water power engineering by Punmia& Lal, Laxmi publications Pvt. Ltd., New Delhi

Reference books:

1. Theory and Design of Hydraulic structures by Varshney, Gupta & Gupta
2. Irrigation Engineering by R.K. Sharma and T.K. Sharma, S. Chand Publishers 2015.
3. Irrigation Theory and Practice by A. M. Micheal Vikas Publishing House 2015.
4. Irrigation and water resources engineering by G.L. Asawa, New Age International Publishers.

9K830:GEOSYNTHETICS
(Professional Elective-V)

B.Tech. IV Year II Sem.

COURSE OUTCOMES:

At the end of the course, the students will develop ability to

1. Identify and recognize potential use of geo synthetics and understand the testing of mechanical endurance of properties of geosynthetics.
2. Exemplify and explain design of geotextiles.
3. Illustrate the geogrid properties and testing methods and analyze-distinguish the selection of geotextiles for drainage arrangements.
4. Justify and prioritize to use type of geonets in civil engineering works.
5. Create system of geomembrane
6. Elaborate and estimate sustainable design for improving the application for Geocomposites

UNIT – I

Introduction: An overview on the development and applications various geosynthetics - the geotextiles, geogrids, geonets, geomembranes and geocomposites.

UNIT – II

Designing with Geotextiles: Geotextile properties and test methods – functions - Designing for separation, reinforcement, stabilization, filtration, drainage.

UNIT – III

Designing with Geogrid: Geogrid properties and test methods – physical properties, mechanical properties, endurance properties and environmental properties – Designing for grid reinforcement and bearing capacity.

UNIT – IV

Designing with Geonets: Geonet properties and test methods – Physical properties, mechanical properties, hydraulic properties, endurance properties and environmental properties -Designing geonet for drainage.

UNIT – V

Designing with Geomembranes: Geomembrane properties and test methods – physical properties, mechanical properties, chemical properties and biological hazard - Applications for geomembranes.

UNIT – VI

Geocomposites: Definition, types, and applications; Ground improvement methods involving geocomposites, Use of geocomposites in drainage and filtration applications, Design considerations for geocomposite drainage systems, erosion control and sediment management; geocomposite applications.

TEXTBOOKS:

1. Robert M. Koerner, “Designing with Geosynthetics”, Prantice Hall, Eaglewood cliffs, NJ 07632.
2. Robert M. Koerner and Josoph P. Welsh, “Construction and Geotechnical Engineering Using Synthetic Fabries”, John Willey and Sons, New York.

REFERENCE BOOKS:

1. G. Venkatappa Rao and G V S SuryanarayanaRaju, “Engineering with Geosynthetics”, Tata McGraw Hill Publishing Company Limited, New Delhi.
2. J.E. Bowles, “Foundation Analysis and Design”, McGraw Hill Publications.