JNTUHCOLLEGEOFENGINEERINGHYDERABAD
(AUTONOMOUS)
B.TECH.FOURYEARDEGREECOURSE
(CIVILENGINEERING)
COURSE STRUCTURE

I YEAR **ISEMESTER**

S.No.	Course Code	Course Title	L	T	P/D	Credits
1.	BSC	Matrix Algebra and Calculus	3	1	0	4
2.	BSC	Engineering Physics	3	1	0	4
3.	ESC	Programming for Problem Solving	3	0	0	3
4.	ESC	Engineering Graphics	1	0	3	2.5
5.	BSC -LC	Engineering Physics Lab	0	0	3	1.5
6.	ESC -LC	Programming for Problem Solving Lab	0	0	3	1.5
7	*MC	Induction Programme	0	0		0
Total Credits						16.5

IYEAR **IISEMESTER**

S.No.	Course Code	Course Title	L	T	P/D	Credits
1.	BSC	Applied and Multivariable Calculus	3	1	0	4
2.	BSC	Engineering Chemistry	3	1	0	4
3.	ESC	Engineering Mechanics	3	1	0	4
4.	HSMC	English	2	0	0	2
5.	BSC -LC	Engineering Chemistry Lab	0	0	2	1
6.	ESC- LC	Engineering Workshop Practice	0	0	3	
7.	HSMC	English Language and Communication Skills Lab	0	0	2	1
8	ESC-LC	Applied Python programming Lab	0	1	2	2
Total Credits						19.5

JNTUHCOLLEGEOFENGINEERINGHYDERABAD
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COURSE STRUCTURE

IIYEAR **ISEMESTER**

S.No.	CourseCode	Course Title	L	T	P/D	Credits
1	BSC	Probability and Statistics	3	1	0	4
2	PCC-1	Building Materials, Construction and Planning	3	0	0	3
3	PCC-2	Engineering Geology	2	0	0	2
4	PCC-3	Strength of Materials-I	3	1	0	4
5	PCC-4	Fluid Mechanics	3	1	0	4
6	ESC-LC	Computer aided Civil Engineering Drawing	0	0	3	1.5
7	LC-1	Strength of Materials Lab	0	0	3	1.5
8	LC-2	Engineering Geology lab	0	0	2	1
9	*MC	Environmental Science	2	0	0	0
Total Credits						**21**

IIYEAR **IISEMESTER**

S.No	CourseCode	Course Title	L	T	P	Credits
1.	ESC	Basics of Electrical & Electronics Engineering	3	0	0	3
2.	ESC	Basics of Mechanical Engineering	2	0	0	2
3.	PCC-5	Surveying	3	0	0	3
4.	PCC-6	Strength of Materials-II	3	0	0	3
5.	PCC-7	Hydraulics and Hydraulic Machinery	3	0	0	3
6.	PCC-8	Structural Analysis –I	3	0	0	3
7.	LC-3	Surveying Lab	0	1	2	2
8.	ESC-LC	Basic Electrical & Electronics Lab	0	0	2	1
9.	LC-4	Fluid Mechanics & Hydraulic Machinery Lab	0	0	2	1
10	*MC	Indian Constitution	2	0	0	0
Total Credits						**21**

Note:* MC- Mandatory Course (Non credit course)

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COURSESTRUCTURE

IIIYEAR ISEMESTER

S.No.	Course Code	Course Title	L	T	P/ D	Credits
1.	PCC-9	Structural Analysis-II	3	0	0	3
2.	PCC-10	Geotechnical Engineering	3	0	0	3
3.	PCC-11	Structural Engineering –I(RCC)	3	0	2	4
4.	PCC-12	Transportation Engineering	3	0	0	3
5.	PEC-1	Professional Elective-I	3	0	0	3
6.	HSMC	Economics and Financial Analysis	3	0	0	3
7.	LC-5	Concrete Tech and Highway Engineering. Lab	0	0	2	1
8.	LC-6	Geotechnical Engineering Lab	0	0	2	1
9.	HSMC- LC	Advanced Communications skills Lab	0	0	2	1
10	*MC	Introduction to Artificial Intelligence	2	0	0	0
Total Credits						**22**

IIIYEAR IISEMESTER

S.No	CourseCode	CourseTitle	L	T	P/D	Credits
1	PCC-13	Environmental Engineering	3	0	0	3
2	PCC-14	Foundation Engineering	3	0	0	3
3	PCC-15	Structural Engineering –II(Steel)	3	0	2	4
4	PCC-16	Hydrology & Water Resources Engineering	3	1	0	4
5	PEC-2	Profession Elective - II	3	0	0	3
6	OEC-I	Open Elective –I	3	0	0	3
7	LC-7	Environmental Engineering Lab	0	0	2	1
8	LC-8	Computer Aided Design Lab	0	0	2	1
9	*MC	Introduction to Cyber security	2	0	0	0
	Total Credits					**22**

Note: * MC- Mandatory Course (Non - credit course)

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COURSESTRUCTURE

IVYEAR ISEMESTER

S.No	Course Code	Course Title	L	T	P/D	Credits
1	PCC-17	Estimation, Costing and Project Management	3	0	0	
2	PEC-3	Professional Elective -III	3	0	0	3
3	PEC-4	Professional Elective -IV	3	0	0	3
4	OEC-II	Open Elective-II	3	0	0	3
5	HMSC	Management Fundamentals for Engineers	3	0	0	3
6	MINI PROJ	Mini Project/Summer Internship	0	0	4*	2
7	PROJ	Project Stage-I	0	0	6	3
8	SEMINAR	Seminar	0	0	2	1
TotalCredits						**21**

*Credits shall be completed in the preceding summer vacation

IVYEAR IISEMESTER

S.No.	Course Code	Course Title	L	T	P/D	Credits
1.	PEC-5	Professional Elective -V	3	0	0	3
2.	PEC-6	Professional Elective -VI	3	0	0	3
3.	OEC-III	Open Elective-II	3	0	0	3
4.	PROJ	Project Stage-II	0	0	16	8
Total Credits						**17**

Professional Elective –I

1. Concrete Technology
2. Rock Mechanics
3. Theory of Elasticity

Professional Elective –II

1. Prestressed Concrete
2. Advanced Structural Analysis
3. Finite Element Methods for Civil Engineering

Professional Elective -III

1. Irrigation and Hydraulic Structures
2. Pipeline Engineering
3. Ground water Hydrology

Professional Elective-IV

1. Geomatics & GIS
2. Urban Transportation Planning
3. Advanced Structural Design

Professional Elective –V

1. Solid Waste Management
2. Environmental Impact Assessment
3. Air pollution

Professional Elective -VI

1. Airports, railways and water ways
2. Ground Improvement Techniques
3. Elements of Earth Quake Engineering

Open Elective -I
Disaster Management

Open Elective -II
Geomatics & GIS

Open Elective - III
Environmental Impact Assessment

MATRIX ALGEBRA AND CALCULUS

I Year B.Tech. I-Sem

L	T	P	C
3	1	0	4

Pre-requisites: Mathematical Knowledge of 12th /intermediate level

Course Objectives**:** To learn

- Types of matrices and their properties.
- Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
- Concept of Eigenvalues and Eigenvectors and to reduce the quadratic form to canonical form
- Methods of solving the differential equations of first and higher order.
- Geometrical approach to the mean value theorems and their application to the mathematical problems
- Evaluation of surface areas and volumes of revolutions of curves.

Course Outcomes:

After learning the contents of this paper, the student must be able to

- Write the matrix representation of a set of linear equations and to analyse the solution of the system of equations
- Find the Eigenvalues and Eigenvectors
- Reduce the quadratic form to canonical form using orthogonal transformations.
- Identify whether the given differential equation of first order is exact or not
- Solve higher differential equation and apply the concept of differential equation to real world problems
- Solve the applications on the mean value theorems.
- Evaluate the improper integrals using Beta and Gamma functions

Evaluation of improper integrals using Beta and Gamma functions.

UNIT-I: Matrices

Matrices: Rank of a matrix: Echelon form, Normal form.System of linear equations: solving system of Homogeneous and Non-Homogeneous equations, Gauss-elimination method, LU Decomposition method. Linear Transformation and Orthogonal Transformation: Eigenvalues and Eigenvectors and their properties, Eigenvalues and Eigenvectors of Symmetric, Hermitian, Skew-Symmetric, Skew-Hermitian, Orthogonal and Unitary matrices.

UNIT-II: Diagonalization of a Matrix

Diagonalization of a matrix. Cayley - Hamilton Theorem (without proof), Finding inverse and power of a matrix by Cayley - Hamilton Theorem. Quadratic forms and Nature of the Quadratic Forms: Reduction of Quadratic form to canonical forms by Orthogonal Transformation

UNIT-III: Mean value theorems and Beta, Gamma functions

Mean value theorems: Rolle's Theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem, Taylor's Series. (All Theorems without proof).

Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates), Definition of Improper Integral: Beta and Gamma functions and their applications.

UNIT-IV: First Order ODE

Exact differential equations, converting non-exact equations to exact equations, Linear and Bernoulli's differential equations. Applications: Newton's law of cooling, Law of natural growth and decay, orthogonal trajectories and electrical circuits. First order equations with higher degree: solvable for the differential coefficient, dependent variable and Independent variable.

UNIT-V: Ordinary Linear Differential Equations of Higher Order

Second order linear differential equations with constant coefficients - Non-Homogeneous terms of the type $e^{ax}, \sin ax, \cos ax,$ polynomials in$x$, $e^{ax}V(x)$ and $x\,V(x)$ - method of variation of parameters, Equations

reducible to linear ODE with constant coefficients, Legendre's equation, Cauchy-Euler equation. Applications: Bending of beams, Electrical circuits and simple harmonic motion.

Text Books

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

References

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition, Pearson, Reprint, 2002.
2. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
3. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010

ENGINEERING PHYSICS

L	T	P	C
3	1	0	4

I Year B.Tech. I-Sem

Course Objectives:

The course should enable the students to:

1. Understand the concepts of interference and diffraction.
2. Learn the basic principles of laser and optical fiber.
3. Know about the classification of materials into three groups.
4. Exposed to present generation engineered materials and their properties.
5. Have knowledge about principles of wave mechanics.

Course Outcomes**:**

The student will able to:

1. Analyze and get knowledge about interferometers and grating.
2. Justify applications and principles of laser and how the graded index optical fiber is more efficient than step index optical fiber in fiber optic communication system.
3. Gain clear knowledge about Fermi level and energy band diagram
4. Get clear knowledge about fabrication and characterization of nanomaterials and also will have knowledge about quantum wells and quantum dots.
5. Learn about completeness of Newton's laws and their applications.

UNIT-I: Wave Optics

Huygen's principle, Superposition of waves and interference of light by wave front splitting and amplitude splitting, Young's double slit experiment, Newton's rings, Michelson's interferometer, Mach-Zehnder interferometer, Fraunhofer diffraction from a single slit and circular aperture, Diffraction grating: Grating spectrum and resolving power.

UNIT-II: Lasers and Fibre Optics

Lasers: Interaction of radiation with matter: Spontaneous and Stimulated emission and absorption, Einstein coefficients, Characteristics of lasers: Resonating cavity, Active medium, pumping, population inversion, Construction and working of laser: Ruby laser, He-Ne laser, applications of lasers.

Fibre Optics: Introduction, Principle and Construction of an optical fibre, Acceptance angle, Numerical aperture, Types of Fibres, losses associated with optical fibres, Basic components in optical fiber communication system, Applications of optical fibres.

UNIT-III: Introduction to solids

Free electron theory of metals, Classical and quantum free electron theory, Estimation of Fermi energy, Dependence of Fermi level on temperature, Density of states, Bloch's theorem, Kronig – Penny modal and origin of energy bands, Classification of materials on the basis of energy bands, E – K diagram, Direct and Indirect band gaps, Effective mass.

UNIT-IV: Engineered semiconductor materials

Nanomaterials: Introduction, quantum confinement, surface to volume ratio, density of states in 2D, 1D and 0D (qualitatively), Practical examples of low-dimensional systems such as quantum wells, wires and dots: design, fabrication and characterization techniques, Heterojunctions and associated band-diagrams.

UNIT-V: Introduction to Mechanics

Introduction, Space and Time, Newton's laws of motion, Inertial frames, Gravitational mass, Mechanics of a particle: Conservation of linear momentum, Conservation of angular momentum, Conservation of energy.

Mechanics of a system of particles: External and Internal forces, Centre of mass, Conservation linear momentum, Conservation of angular momentum and conservation of energy.

Text Books:

1. A Textbook of Engineering Physics, Dr. M.N. Avadhanulu, Dr. P.G Kshirsagar – S.Chand
2. Haliday and Resnick, Physics – wiley

References:

1. Classical Mechanics by J.C. Upadyaya, Himalaya Publishing House, 2005.
2. Introduction to Solid State Physics by Charles Kittel, Wiley Student Edition
3. O. Svelto, “Principles of Lasers”.
4. Ajoy Ghatak, “Optics”, Mc Graw-Hill Education, 2012

PROGRAMMING FOR PROBLEM SOLVING

I Year B.Tech. I-Sem

L	T	P	C
3	0	0	3

Prerequisites: Nil

Course Objectives:
1. To learn the fundamentals of computers.
2. To understand the various steps in Program development.
3. To learn the syntax and semantics of C Programming Language.
4. To learn the usage of structured programming approach in solving problems.

Course Outcomes:
The student will learn
1. To write algorithms and to draw flowcharts for solving problems.
2. To translate the algorithms/flowcharts to programs (in C language).
3. To code and test, a given logic in C programming language.
4. To formulate simple algorithms for arithmetic and logical problems.
5. To decompose a problem into functions and to develop modular reusable code.
6. To use arrays, pointers, strings and structures to formulate algorithms and programs. Searching and sorting problems.

UNIT – I:

Introduction to Computers: Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Software Development Method, Algorithms, Pseudo code, flow charts, applying the software development method.

Introduction to C Language: Background, Simple C programs, Identifiers, Basic data types, Variables, Constants, Input / Output, Operators. Expressions, Precedence and Associatively, Expression Evaluation, Type conversions, Bit wise operators, Statements, Simple C Programming examples.

UNIT – II:

Statements: if and switch statements, Repetition statements – while, for, do-while statements, Loop examples, other statements related to looping – break, continue, go to, Simple C Programming examples.

Designing Structured Programs: Functions, basics, user defined functions, inter function communication, Scope, Storage classes-auto, register, static, extern, scope rules, type qualifiers, recursion- recursive functions, Preprocessor commands, example C programs

UNIT – III:

Arrays and Strings: Concepts, using arrays in C, inter function communication, array applications, two – dimensional arrays, multidimensional arrays, C program examples. Concepts, C Strings, String Input / Output functions, arrays of strings, string manipulation functions, string / data conversion, C program examples.

UNIT – IV:

Pointers: Introduction (Basic Concepts), Pointers for inter function communication, pointers to pointers, compatibility, memory allocation functions, array of pointers, programming applications, pointers to void, pointers to functions, command –line arguments.

Input and Output: Concept of a file, streams, standard input / output functions, formatted input / output functions, text files and binary files, file input / output operations, file status functions (error handling), C program examples.

UNIT – V:

Derived types: Structures – Declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, unions, typedef, bit fields, enumerated types, C programming examples.

SortingandSearching: Selection sort, Bubble sort, Insertion sort, Linear search and Binary search methods.

Text Books:

1. C Programming & Data Structures by B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
2. Problem Solving and Program Design in Cby J.R. Hanly and E.B. Koffman, Fifth Edition, Pearson Education.
3. The C Programming Language by B.W. Kernighan and Dennis M.Ritchie, PHI/Pearson Education

Reference Books:

1. C for Engineers and Scientists by H.Cheng, Mc.Graw-Hill International Edition
2. Data Structures using C by A. M.Tanenbaum, Y.Langsam, and M.J. Augenstein, Pearson Education, PHI
3. C Programming & Data Structures by P. Dey, M Ghosh R Thereja, Oxford University Press

ENGINEERING GRAPHICS

I Year B.Tech. I-Sem

L	T	P	C
1	0	3	2.5

Pre-requisites:
Nil

Course objectives:

- To provide basic concepts in engineering drawing
- To impart knowledge about standard principles of orthographic projection of objects
- To draw sectional views and pictorial views of solids

Outcomes:

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

- Prepare working drawings to communicate the ideas and information.
- Read, understand and interpret engineering drawings.

UNIT–I:

INTRODUCTION TO ENGINEERING DRAWING:

Principles of Engineering Graphics and their Significance, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Involute. Scales – Plain, Diagonal and Vernier Scales.

UNIT-II:

ORTHOGRAPHIC PROJECTIONS:

Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures. —Auxiliary Planes.

UNIT–III:

Projections of Regular Solids – Auxiliary Views.

UNIT–IV:

Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views – Sections of Sphere. Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone

UNIT–V:

ISOMETRIC PROJECTIONS:

Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa – Conventions Auto CAD: Basic principles only

TEXT BOOKS:

1. Engineering Drawing by N.D. Bhatt, Charotar
2. Engineering Drawing and Graphics by Rane and Shah, Pearson Edu.

REFERENCE BOOKS:

1. A Text Book of Engineering Drawing by Dhawan R K, S. Chand
2. Engineering Graphics with Auto CAD by James D Bethune, Pearson Edu.
3. Engineering Graphics by K R Mohan, Dhanpat Rai.
4. Text book on Engineering Drawingby KL Narayana, P Kannaih, Scitech

ENGINEERING PHYSICS LAB

I Year B.Tech. I-Sem

L	T	P	C
0	0	3	1.5

Course Objectives:

1. To help students understand the role of direct observation in physics and to distinguish between inferences based on theory and the outcomes of experiments.
2. To introduce the concepts and techniques which have a wide application in experimental science, but have not been introduced in the standard courses.
3. To teach how to write a technical report which communicates scientific information in a clear and concise manner.

Course Outcomes:

By the end of the course students will be able:

1. To make careful experimental observations and draw conclusions from such data.
2. To distinguish between inferences based on theory and the outcomes of experiments.
3. To write a technical report which communicates scientific information in a clear and concise manner.

List of Experiments

1. Melde's experiment: To determine the frequency of a vibrating bar or turning fork using Melde's arrangement.
2. Torsional pendulum: To determine the rigidity modulus of the material of the given wire using torsional pendulum.
3. Newton's rings: To determine the radius of curvature of the lens by forming Newton's rings.
4. Diffraction grating: To determine the number of lines per inch of the grating.
5. Dispersive power: To determine the dispersive power of prism by using spectrometer.
6. Coupled Oscillator: To determine the spring constant by single coupled oscillator.
7. LCR Circuit: To determine quality factor and resonant frequency of LCR circuit.
8. LASER: To study the characteristics of LASER sources.
9. Optical fibre: To determine the bending losses of Optical fibres.
10. Optical fibre: To determine the Numerical aperture of a given fibre.
11. Sonometer: To determine the AC frequency.
12. Stewart – Gee's experiment: Determination of magnetic field along the axis of A current carrying coil

Note: Any 8 experiments are to be performed by each student

PROGRAMMING FOR PROBLEM SOLVING LAB

I Year B.Tech. I-Sem

L	T	P	C
0	0	3	1.5

Course Objectives

1. To learn the fundamentals of computers.
2. To understand the various steps in Program development.
3. To learn the syntax and semantics of C Programming Language.
4. To learn the usage of structured programming approach in solving problems.

Course Outcomes

The student will learn

1. To write algorithms and to draw flowcharts for solving problems.
2. To translate the algorithms/flowcharts to programs (in C language).
3. To code and test a given logic in C programming language.
4. To formulate simple algorithms for arithmetic and logical problems.
5. To decompose a problem into functions and to develop modular reusable code.
6. To use arrays, pointers, strings and structures to formulate algorithms and programs.
7. Searching and sorting problems.

Week 1:

1. Write a C program to find the sum of individual digits of a positive integer.
2. Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
3. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
4. Write a C program to find the roots of a quadratic equation.

Week 2:

5. Write a C program to find the factorial of a given integer.
6. Write a C program to find the GCD (greatest common divisor) of two given integers.
7. Write a C program to solve Towers of Hanoi problem.
8. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

Week 3:

9. Write a C program to find both the largest and smallest number in a list of integers. 10.Write a C program that uses functions to perform the following:
   i) Addition of Two Matrices
   ii) Multiplication of Two Matrices

Week 4:

11. Write a C program that uses functions to perform the following operations:
    i) To insert a sub-string in to a given main string from a given position.
    ii) To delete n Characters from a given position in a given string.
12. Write a C program to determine if the given string is a palindrome or not
13. Write a C program that displays the position or index in the string S where the string T begins, or – 1 if S doesn't contain T.
14. Write a C program to count the lines, words and characters in a given text.

Week 5:

15. Write a C program to generate Pascal's triangle.
16. Write a C program to construct a pyramid of numbers.
17. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression: $1+x+x^2+x^3+.....+x^n$

For example: if n is 3 and x is 5, then the program computes 1+5+25+125.

Print x, n, the sum

Perform error checking. For example, the formula does not make sense for negative exponents – if n is less than 0. Have your program print an error message if n<0, then go back and read in the next pair of numbers of without computing the sum. Are any values of x also illegal? If so, test for them too.

Week 6:

18. 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.
19. Write a C program to convert a Roman numeral to its decimal equivalent.

Week 7:

20. Write a C program that uses functions to perform the following operations:
    i) Reading a complex number
    ii) Writing a complex number
    iii) Addition of two complex numbers
    iv) Multiplication of two complex numbers
    (Note: represent complex number using a structure.)

Week 8:

21. i) Write a C program which copies one file to another.
ii) Write a C program to reverse the first n characters in a file. (Note: The file name and n are specified on the command line.)

22. i)Write a C program to display the contents of a file.
ii) Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file)

Week 9:

i) Write a C program that implements the following sorting methods to sort a given list of integers in ascending order i) Bubble sort ii) Selection sort iii) Insertion sort

Week 10:

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

TEXT BOOKS:

1. C Programming & Data Structures by B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
2. Problem Solving and Program Design in Cby J.R. Hanly and E.B. Koffman, Fifth Edition, Pearson Education.
3. The C Programming Language by B.W. Kernighan and Dennis M.Ritchie, PHI, Pearson Education

REFERENCE BOOKS:

1. C for Engineers and Scientists by H.Cheng, Mc.Graw-Hill International Edition
2. Data Structures using C by A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein, Pearson Education, PHI
3. C Programming & Data Structures by P. Dey, M Ghosh R Thereja, Oxford University Press.

APPLIED AND MULTI VARIABLE CALCULUS

I Year B.Tech. II-Sem

L	T	P	C
3	1	0	4

Pre-requisites: Mathematical Knowledge of 12th / Intermediate level

Course Objectives: To learn

- Concept, properties of Laplace transforms
- Solving ordinary differential equations using Laplace transforms techniques.
- Partial differentiation, concept of total derivative
- Finding maxima and minima of function of two and three variables.
- Evaluation of multiple integrals and their applications
- The physical quantities involved in engineering field related to vector valued functions
- The basic properties of vector valued functions and their applications to line, surface and volume integrals.

Course Outcomes**:**

After learning the contents of this paper the student must be able to

- Use the Laplace transforms techniques for solving ODE's.
- Find the extreme values of functions of two variables with/ without constraints.
- Evaluate the multiple integrals and apply the concept to find areas, volumes, centre of mass and gravity for cubes, sphere and rectangular parallel piped
- Evaluate the line, surface and volume integrals and converting them from one to another

UNIT-I: Laplace transforms:

Laplace Transforms; Laplace Transform of standard functions, first shifting theorem,Laplace transforms of functions when they are multiplied and divided by 't', Laplace transforms of derivatives and integrals of function, Evaluation of integrals by Laplace transforms, Laplace transform of periodic functions,Inverse Laplace transform by different methods, convolution theorem (without proof), solving Initial value problems by Laplace Transform method.

UNIT-II: Partial Derivatives and applications

Definitions of Limit and continuity. Partial Differentiation, Euler's Theorem, Total derivative, Jacobian, Functional dependence & independence, Maxima and minima of functions of two variables and three variables, method of Lagrange multipliers.

UNIT-III: Multiple Integration

Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (only Cartesian form). Evaluation of Triple Integrals, Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals.

Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals), Centre of mass and Gravity (constant and variable densities) by double and triple integrals (applications involving cubes, sphere and rectangular parallel piped).

UNIT-IV: Vector Differentiation

Vector point functions and scalar point functions. Gradient, Divergence and Curl, Directional derivatives, Tangent plane and normal line, Vector Identities, Scalar potential functions, Solenoidal and Irrotational vectors.

UNIT-V: Vector Integration

Line, Surface and Volume Integrals, Theorems of Green, Gauss and Stokes (without proofs) and their applications.

Text Books

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006
3. M Apostol , Calculus vol-2, John Wiley & Sons

References

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition,Pearson, Reprint, 2002
2. Paras Ram, Engineering Mathematics, 2nd Edition, CBS Publishes
   S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984

ENGINEERING CHEMISTRY

I Year B.Tech. II-Sem

L	T	P	C
3	1	0	4

Course Objectives**:**

1. To bring adaptability to the concepts of chemistry and to acquire the required skills to become a perfect engineer.
2. To acquire the knowledge of water treatment, electrochemistry and corrosion which are essential for the Engineers and in industry.
3. To acquire the skills pertaining to Polymers and Energy sources to apply them for various engineering fields etc.
4. To impart then knowledge of Engineering materials and their aspects useful for understanding material chemistry.

Course Outcomes: The basic concepts included in this course will help the student to gain:

1. Differentiate hard and soft water; solve the related problems on water purification and its significance in industry and daily life.
2. Understand the principles, concepts of electrochemistry and causes of corrosion, its consequences and methods to minimize corrosion to improve industrial designs.
3. The required skills to get clear concepts on polymers and energy sources and their applications to various engineering fields etc.
4. The knowledge of engineering materials such as Portland cement, white cement, concrete and lubricants etc

Unit-1: Water And Its Treatment:

Introduction – hardness of water – Causes of hardness. Types of hardness: temporary and permanent. Expression and units of hardness. Estimation of hardness of water by complexometric method. Potable water and its specifications. Steps involved in treatment of water – Disinfection of water by chlorination, breakpoint chlorination, Ozonisation. Boiler troubles - Scale, Sludge, Priming, Foaming and Caustic embrittlement. Treatment of boiler feed water by Calgon conditioning, Phosphate conditioning and Colloidal conditioning. External treatment of water- Ion exchange process. Desalination of water – Reverse osmosis. Numerical problems based on Determination of hardness of water.

Unit-2: Electrochemistry And Corrosion:

Introduction – hardness of water – Causes of hardness . Types of hardness: temporary and permanent. Expression and units of hardness. Estimation of hardness of water by complexometric method. Potable water and its specifications. Steps involved in treatment of water – Disinfection of water by chlorination and ozonization. Boiler feed water and its treatment. Calgon conditioning, Phosphate conditioning and Colloidal conditioning. External treatment of water. Ion exchange process. Desalination of water – Reverse osmosis. Numerical problems.

Unit-3: Polymeric Materials:

Polymers: Definition, Monomer, functionality and degree of polymerisation. Classification – Types of Polymerisation - Addition & Condensation – Mechanisms of Polymerisation. Plastics: Definition, characteristics - Compounding and fabrication- Methods of Moulding - Thermoplastics and Thermosets – Preparation, properties and applications– PVC, Teflon and Bakelite. Fibres: Definition, Characteristics. Preparation, Properties and applications of Terylene, Nylon 6:6. Elastomers: Definition and characteristics. Natural rubber- structure, processing of latex, Vulcanisation. Preparation, properties and applications of BuNa-S and Butyl rubber. Conducting Polymers- Definition, Classification. Mechanism of conduction in Polyacetylene, Polyaniline & Applications. Biodegradable polymers - Concept, Synthetic and Natural polymers, Polylactic acid, Poly Vinyl alcohol, Nylon-2 and Nylon – 6. Applications and advantages of biodegradable polymers.

Unit-4: Energy Sources:

Fuels: Definition, classification with examples. Calorific value. Determination of calorific value by Junker's gas Calorimeter. Characteristics of good fuel. Coal: Types- Analysis of coal- proximate analysis. Petroleum-Refining- Fractional distillation- composition, properties and uses of petrol, diesel and kerosene. Cracking-types, Moving bed catalytic cracking. Knocking - Octane and Cetane rating, Composition, characteristics and uses of LPG, CNG. Biodiesel-Transesterification. Advantages. Hydrogen fuel- Production, storage, advantages and limitations. Combustion - Definition, Calculation of air required for the combustion of fuel, numerical problems related to calorific value and combustion

Unit-5: Engineering Materials:

Portland cement: Composition and constituents. Setting and hardening of cement, special cements-properties and uses of High alumina cement, White cement and water proof cement. RCC, Decay of Concrete. Refractories: Classification, Properties - Refractoriness, RUL, Chemical inertness and porosity. Characteristics of a good refractory. Engineering Applications. Failure of a refractory. Lubricants: functions of lubricants, Classification, Mechanism of Lubrication, Properties - Viscosity, Acid value, Flash & Fire point, Cloud & Pour point, Aniline point.

Text Books:

1. Engineering Chemistry – PC Jain and M Jain – Dhanpath Rai and Sons, New Delhi.

Reference Books:

1. Text book of Engineering Chemistry by Ramadevi, Venkata Ramana Reddy & Prashanth Rath, Cengage learning publications.
2. A text book of Engineering Chemistry by Thirumala Chary, Laxminarayana, Shashikala. Pearson Publications.

ENGINEERING MECHANICS

I Year B.Tech. II-Sem

L	T	P	C
3	1	0	4

Pre-Requisites: **NIL**

Course Objectives:

During this course, students should develop the ability to:

1. Work comfortably with basic engineering mechanics concepts required for analyzing static structures
2. Identify an appropriate structural system to studying a given problem and isolate it from its environment.
3. Model the problem using good free-body diagrams and accurate equilibrium equations
4. Identify and model various types of loading and support conditions that act on structural systems.
5. Apply pertinate mathematical, physical and engineering mechanical principles to the system to solve and analyze the problem.
6. Understand the meaning of centers of gravity (mass)/centroids and moments of Inertia using integration methods.
7. Communicate the solution to all problems in an organized and coherent manner and elucidate the meaning of the solution in the context of the problem.

UNIT – I: INTRODUCTION OF ENGINEERING MECHANICS

Basic concepts System of Forces-Coplanar Forces–Components in Space–Resultant- Moment of Forces and its Application – Couples and Resultant of Force System-Equilibrium of System of Forces-Free body diagrams-Direction of Force Equations of Equilibrium of Coplanar Systems and Spatial Systems – Vector cross product- Support reactions different beams for different types of loading – concentrated, uniformly distributed and uniformly varying loading.

UNIT – II: FRICTION

Types of friction – Limiting friction – Laws of Friction – static and Dynamic Frictions – Angle of Friction –Cone of limiting friction– Friction of wedge, block and Ladder – Screw jack – Differential screw jack - Motion of Bodies**.**

UNIT – III: CENTROID AND CENTER OF GRAVITY

Centrods – Theorem of Pappus- Centroids of Composite figures – Centre of Gravity of Bodies – Area moment of Inertia:–polar Moment of Inertia–Transfer–Theorems - Moments of Inertia of Composite Figures.

MOMENT OF INERTIA: Moment of Inertia of Areas and Masses – Transfer Formula for Moments of Inertia- Moment of inertia of composite areas and masses.

UNIT – IV: KINEMATICS

Introduction – Rectilinear motion – Motion with uniform and variable acceleration–Curvilinear motion– Components of motion– Circular motion – Projectiles- Instantaneous centre.

UNIT – V: KINETICS

Kinetics of a particle – D'Alembert's principle – Motion in a curved path – work, energy and power. Principle of conservation of energy – Kinetics of a rigid body in translation, rotation – work done – Principle of work-energy – Impulse-momentum.

Textbooks:

1. EngineeringMechanicsbyshames&Rao-PearsonEducation.
2. Engineering Mechanics by M.V. Seshagiri rao and Durgaih; UniversityPress.
3. Engineering Mechanics – B. Bhattacharya - Oxford University Publications.

References:

1. Engineering Mechanics (Statics and Dynamics) byHibbler; Pearson Education.
2. Engineering Mechanics by Fedrinand L. Singer – Harper Collings Publishers.
3. EngineeringMechanicsbyA.K.Tayal,UmeshPublication.
4. EngineeringMechanics–G.S.Sawhney,PrinticeHallofIndia.
5. A textbook of engineering mechanics by R. K. Bansal; Laxmi publications.
6. EngineeringMechanicsbyR.S.Khurmi;S.Chand&Co.

Course Outcomes:

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

1. Solve problems dealing with forces in a plane or in space and equivalent forceSystems.
2. Solve beam and cable problems and understand distributed force systems.
3. Solve friction problems and determine moments of Inertia and centroid using intergrationmethods.
4. Understand and know how to solve three-dimension force and momentproblems.
5. Understand and know how to us evectorterminology.

ENGLISH

I Year B.Tech. II-Sem

L	T	P	C
2	0	0	2

INTRODUCTION

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire language skills, the syllabus of English has been designed to develop linguistic, communicative and critical thinking competencies of Engineering students.

In English classes, the focus should be on the skills development in the areas of vocabulary, grammar, reading and writing. For this, the teachers should use the prescribed text for detailed study. The students should be encouraged to read the texts leading to reading comprehension and different passages may be given for practice in the class. The time should be utilized for working out the exercises given after each excerpt and for supplementing the exercises with authentic materials of a similar kind, for example, newspaper articles, advertisements, promotional material etc. The focus in this syllabus is on skill development in the areas of Vocabulary, Grammar, Reading and Writing Skills, fostering ideas and practice of language skills in various contexts.

Course Objectives

The course will help students to

a. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.

b. Equip students to study academic subjects more effectively and critically using the theoretical and practical components of English syllabus.

c. Develop study skills and communication skills in formal and informal situations.

Course Outcomes

Students should be able to

1. Use English Language effectively in spoken and written forms.
2. Comprehend the given texts and respond appropriately.
3. Communicate confidently in various contexts and different cultures.
4. The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

SYLLABUS

(Note: As the syllabus of English given in AICTE Model Curriculum-2018 for B.Tech First Year is Open-ended, it is required to prepare teaching/learning materials by the teachers collectively in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning and timesaving in the class.)

Unit –I

Vocabulary Building: The Concept of Word Formation --The Use of Prefixes and Suffixes. Grammar: Identifying Common Errors in Writing with Reference to Articles and Prepositions. Reading: Reading and Its Importance- Techniques for Effective Reading.

Basic Writing Skills: Sentence Structures -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for Writing Precisely – Paragraph writing – Types, Structures and Features of a Paragraph - Creating Coherence.

Unit –II

Vocabulary: Synonyms and Antonyms.

Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

Reading: Improving Comprehension Skills – Techniques for Good Comprehension.

Writing: Format of a Formal Letter-Writing Formal Letters E.g.., Letter of Complaint, Letter of Requisition, Job Application with Resume.

Unit –III

Vocabulary: Acquaintance with Prefixes and Suffixes from Foreign Languages in English to form Derivatives-Words from Foreign Languages and their Use in English.

Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

Reading: Sub-skills of Reading- Skimming and Scanning

Writing: Writing Introduction and Conclusion - Essay Writing.

Unit –IV

Vocabulary: Standard Abbreviations in English

Grammar: Redundancies and Clichés in Oral and Written Communication.

Reading: Comprehension- Intensive Reading and Extensive Reading.

Writing: Writing Practices---Précis Writing.

Unit –V

Vocabulary: Technical Vocabulary and their usage

Grammar: Common Errors in English

Reading: Reading Comprehension-Exercises for Practice

Writing: Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.

Note: Listening and Speaking skills which are given under Unit-6 are covered in the syllabus of ELCS Lab Course.

References:

i. Practical English Usage. Michael Swan. OUP. Fourth Edition 2016.

ii. Communication Skills. Sanjay Kumar and Pushp Lata. Oxford University Press. 2018.

iii. English: Context and Culture by Board of Editors published by Orient BlackSwan Pvt. Ltd.

iv. Remedial English Grammar. F.T. Wood. Macmillan.2007.

v. On Writing Well. William Zinsser. Harper Resource Book. 2001

vi. Study Writing. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006.

vii. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. Oxford University Press

ENGINEERING CHEMISTRY LAB

I Year B.Tech. II-Sem

L	T	P	C
0	0	2	1

I. Volumetric Analysis:

1. Estimation of Ferrous iron by Dichrometry method.
2. Estimation of Ferrous iron by Permanganometry method.
3. Estimation of Hardness of water by EDTA Complexometry method.

II. Conductometry:

1. Estimation of the concentration of an acid by Conductometry.

III. Potentiometry:

1. Estimation of the amount of Fe^{+2} by Potentiomentry.

IV. *p*H Metry:

1. Determination of an acid concentration using *p*H meter.

V. Preparations:

1. Preparation of Bakelite.
2. Preparation Nylon-6.

VI. Lubricants:

1. Estimation of acid value of given lubricant oil.
2. Estimation Saponification value of a lubricant oil.
3. Estimation of Viscosity of lubricant oil using Ostwald's Viscometer.

VII. Corrosion:

1. Determination of rate of corrosion of mild steel in the presence and absence of inhibitor.

Recommended Books:

1. Inorganic Quantitative analysis by A.I. Vogel, ELBS Publications.
2. Laboratory Manual of Engineering Chemistry by Y. Bharathi Kumari & Jyotsna C, VGS Booklinks, Vijayawada, 2009.
3. College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi (2007).
4. Engineering Chemistry Lab Manual by Cengage Publications.

ENGINEERING WORKSHOP PRACTICE

I Year B.Tech. II-Sem

L	T	P	C
0	0	3	1.5

Pre-requisites: Practical skill

Course Objectives: The objectives of this course is to acquire knowledge on the

i. To impart hands-on practice on Carpentry trade and skills.
ii. To impart hands-on practice on Fitting trade and skills
iii. To impart hands-on practice on Black Smithy trade and skills
iv. To impart hands-on practice on House Wiring trade and skills
v. To impart hands-on practice on Tin Smithy trade and skills
vi. To impart hands-on practice on Plumbing trade and skills

Note: At least two exercises to be done from each trade.

A. Carpentry
1. T-Lap Joint
2. Cross Lap Joint
3. Dovetail Joint

B. Fitting
1. Vee Fit
2. Square Fit
3. Half Round Fit

C. Black Smithy
1. Round rod to Square
2. S-Hook
3. Round Rod to Flat Ring

D. House Wiring
1. Parallel / Series Connection of three bulbs
2. Stair Case wiring
3. Florescent Lamp Fitting

E. Tin Smithy
1. Taper Tray
2. Open Scoop
3. Funnel

F. Plumbing
1. Coupling Joint
2. Elbow Joint
3. T Joint

TEXT BOOKS:

1. Workshop Practice by B.L.Juneja Cengage Learning
2. Elements of Workshop Technology–S. K.Hajra Choudhury and A. K. Hajra Choudhury.

ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

I Year B.Tech. II-Sem

L	T	P	C
0	0	2	1

The **Language Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

Course Objectives

 To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning

 To sensitize students to the nuances of English speech sounds, word accent, intonation and rhythm

 To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking

 To improve the fluency of students in spoken English and neutralize their mother tongue influence

 To train students to use language appropriately for public speaking and interviews

Course Outcomes

Students will be able to attain

 Better understanding of nuances of English language through audio- visual experience and group activities

 Neutralization of accent for intelligibility

 Speaking skills with clarity and confidence which in turn enhances their employability skills

Syllabus

English Language and Communication Skills Lab (ELCS) shall have two parts:

a. Computer Assisted Language Learning (CALL) Lab

b. Interactive Communication Skills (ICS) Lab

Listening Skills

Objectives

1. To enable students, develop their listening skills so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation

2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions

Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right

- Intonation in sentences.
- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

Speaking Skills

Objectives

1. To involve students in speaking activities in various contexts

2. To enable students express themselves fluently and appropriately in social and professional contexts

- Oral practice: Just A Minute (JAM) Sessions
- Describing objects/situations/people
- Role play – Individual/Group activities

 The following course content is prescribed for the English Language and Communication Skills Lab based on Unit-6 of AICTE Model Curriculum 2018 for B.Tech First English. As the syllabus is very limited, it is required to prepare teaching/learning materials by the teachers collectively in the

form of handouts based on the needs of the students in their respective colleges for effective teaching/learning and timesaving in the Lab**)**

Exercise – I:

CALL Lab:

Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers of Listening. Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants.

ICS Lab:

Understand: Communication at Work Place- Spoken vs. Written language.

Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

Exercise – II:

CALL Lab:

Understand: Structure of Syllables – Word Stress and Rhythm– Weak Forms and Strong Forms in Context. Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms in Context.

ICS Lab:

Understand: Features of Good Conversation – Non-verbal Communication.

Practice: Situational Dialogues – Role-Play- Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette.

Exercise – III:

CALL Lab:

Understand: Intonation-Errors in Pronunciation-the Influence of Mother Tongue (MTI).

Practice: Common Indian Variants in Pronunciation – Differences in British and American Pronunciation.

ICS Lab:

Understand: How to make Formal Presentations. Practice: Formal Presentations.

Exercise – IV:

CALL Lab:

Understand: Listening for General Details. Practice: Listening Comprehension Tests. **ICS Lab**:

Understand: Public Speaking – Exposure to Structured Talks. Practice: Making a Short Speech – Extempore.

Exercise – V:

CALL Lab:

Understand: Listening for Specific Details. Practice: Listening Comprehension Tests.

ICS Lab:

1. Introduction to Interview Skills.
2. Common errors in speaking.

Minimum Requirement of infrastructural facilities for ELCS Lab:

1. Computer Assisted Language Learning (CALL) Lab:

The Computer Assisted Language Learning Lab has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self- study by students.

System Requirement (Hardware component):

Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:

i) Computers with Suitable Configuration

ii) High Fidelity Headphones

2. Interactive Communication Skills (ICS) Lab:

The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public-Address System, a LCD and a projector etc.

APPLIED PYTHON PROGRAMMING LAB

I Year B.Tech. II-Sem

L	T	P	C
0	1	2	2

Cycle - 1

1. **Downloading and Installing Python and Modules**
   a) **Python 3 on Linux**
   Follow the instructions given in the URL https://docs.python-guide.org/starting/install3/linux/
   b) **Python 3 on Windows**
   Follow the instructions given in the URL https://docs.python.org/3/using/windows.html
   (Please remember that Windows installation of Python is harder!)
   c) **pip3 on Windows and Linux**
   Install the Python package installer by following the instructions given in the URL
   https://www.activestate.com/resources/quick-reads/how-to-install-and-use-pip3/
   d) **Installing numpy and scipy**
   You can install any python3 package using the command pip3 install <packagename>
   e) **Installing jupyterlab**
   Install from pip using the command pip install jupyterlab
2. **Introduction to Python3**
   a) Printing your biodata on the screen
   b) Printing all the primes less than a given number
   c) Finding all the factors of a number and show whether it is a *perfect* number, i.e., the sum of all its factors (excluding the number itself) is equal to the number itself
3. **Defining and Using Functions**
   a) Write a function to read data from a file and display it on the screen
   b) Define a boolean function *is palindrome*(<input>)
   c) Write a function *collatz(x)* which does the following: if x is odd, $x = 3x + 1$; if x is even, then $x = x/2$. Return the number of steps it takes for $x = 1$
   d) Write a function $N(m, s) = exp(-(x-m)^2/(2s^2))/sqrt(2\pi)s$ that computes the Normal distribution
4. **The package** numpy
   a) Creating a matrix of given order $m \times n$ containing *random numbers* in the range 1 to 99999
   b) Write a program that adds, subtracts and multiplies two matrices. Provide an interface such that, based on the prompt, the function (addition, subtraction, multiplication) should be performed
   c) Write a program to solve a system of n linear equations in n variables using matrix inverse
5. **The package** scipy **and** pyplot
   a) Finding if two sets of data have the same *mean* value
   b) Plotting data read from a file
   c) Fitting a function through a set a data points using *polyfit* function
   d) Plotting a histogram of a given data set
6. **The** strings **package**
   a) Read text from a file and print the number of lines, words and characters
   b) Read text from a file and return a list of all n letter words beginning with a vowel
   c) Finding a secret message hidden in a paragraph of text
   d) Plot a histogram of words according to their length from text read from a file

Cycle -2

7. Installing OS on Raspberry Pi
   a) Installation using PiImager
   b) Installation using image file
      - Downloading an Image
      - Writing the image to an SD card
        - using Linux
        - using Windows
      - Booting up

   Follow the instructions given in the URL
   https://www.raspberrypi.com/documentation/computers/getting-started.html
8. Accessing GPIO pins using Python
   a) Installing GPIO Zero library.
      First, update your repositories list:

      sudo apt update

      Then install the package for Python 3:

      sudo apt install python3-gpiozero

   b) Blinking an LED connected to one of the GPIO pin

   c) Adjusting the brightness of an LED

      Adjust the brightness of an LED (0 to 100, where 100 means maximum brightness) using the in-built PWM wavelength.

9. Collecting Sensor Data
   a) DHT Sensor interface
   - Connect the terminals of DHT GPIO pins of Raspberry Pi.
   - Import the DHT library using ***import Adafruit_DHT***
   - Read sensor data and display it on screen.

II Year B.Tech. I-Sem PROBABILITY AND STATISTICS

Pre-requisites: Mathematics courses of first year of study.

Objectives: To learn

- The theory of Probability, and probability distributions of single and multiple random variables
- The sampling theory and testing of hypothesis and making inferences

UNIT-I: : Probability **10 L**

Sample Space, Events, Counting Sample Points, Probability of an Event, Additive Rules, Conditional Probability, Independence, and the Product Rule, Bayes' Rule.

Random Variables and Probability Distributions: Concept of a Random Variable, Discrete Probability Distributions,Continuous Probability Distributions, Joint Probability Distribution.

UNIT-II: Expectation and discrete distributions **10 L**

Mean of a Random Variable, Variance and Covariance of Random Variables, Means and Variances of Linear Combinations of Random Variables, Chebyshev's Theorem.

Discrete Probability Distributions: Introduction and Motivation, Binomial Distribution, Poisson distribution and the poison process.

UNIT-III: Continuous Distributions and sampling **10 L**

Continuous Uniform Distribution, Normal Distribution, Areas under the Normal Curve, Applications of the Normal Distribution, Normal Approximation to the Binomial Distributions.

Fundamental Sampling Distributions: Random Sampling, Some Important Statistics, Sampling Distributions, Sampling Distribution of Means and the Central Limit Theorem, t –Distribution, F-Distribution.

UNIT-IV: Estimation & Tests of Hypotheses **10 L**

Introduction, Statistical Inference, Classical Methods of Estimation, Single Sample: Estimating the mean, standard error of a point estimate, prediction interval. Two sample: Estimating the difference between two means, Single sample: Estimating a proportion, Two samples: Estimating the difference between two proportions, Single sample: Two samples: Estimating the ratio of two variances.

Statistical Hypotheses: General Concepts, Testing a Statistical Hypothesis, Single sample: Tests concerning a single mean, Two samples: tests on two means, One sample: test on a single proportion. Two samples: tests on two proportions, Two- sample tests concerning variances.

UNIT-V: Applied Statistics **8 L**

Curve fitting by the method of least squares, fitting of straight lines, second degree parabolas and more general curves, Correlation and regression, Rank correlation.

Course outcomes:

After learning the contents of this paper the student must be able to

- Apply the concepts of probability and distributions to some case studies
- Correlate the material of one unit to the material in other units

Text Books

1. Ronald E. Walpole,Raymond H. Myers,Sharon L. Myers,Keying Ye, Probability & Statistics For Engineers & Scientists, 9th Ed. Pearson Publishers.
2. S C Gupta and V K Kapoor, Fundamentals of Mathematical statistics, Khanna publications.

References

1. T.T. Soong, Fundamentals Of Probability And Statistics For Engineers, John Wiley & Sons, Ltd, 2004. .
2. Sheldon M Ross, Probability and statistics for Engineers and scientists, academic press.

BUILDING MATERIALS, CONSTRUCTION AND PLANNING

II Year B.Tech. I-Sem

Pre Requisites: NIL

Course Objectives: The objectives of the course is to

- **List** the construction material.
- **Explain** different construction techniques
- **Understand** the building bye-laws
- **Highlight the**smart building materials

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.

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.

UNIT – II

Cement & Admixtures: Ingredients of cement – manufacture – Chemical composition – Hydration - field & lab tests.

Admixtures – mineral & chemical admixtures – uses.

UNIT - III

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.

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 Harzards – Classification of fire resistant materials and constructions

UNIT - IV

Mortars, Masonry and Finishing's

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.

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

UNIT – V

Building Planning: Principles of Building Planning, Classification of buildings and Building by laws.

Course Outcomes

After the completion of the course student should be able to

- **Define** the Basic terminology that is used in the industry
- **Categorize** different building materials , properties and their uses
- **Understand** the Prevention of damage measures and good workmanship
- **Explain** different building services

TEXT BOOKS:

1. Building Materials and Construction – Arora &Bindra, Dhanpat Roy Publications.
2. Building Construction by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi.

REFERENCES:

1. Building Materials and Construction by G C Sahu, Joygopal Jena McGraw hill Pvt Ltd 2015.
2. Building Materials by Duggal, New Age International.
3. Building Materials by P. C. Varghese, PHI.
4. Building Construction by PC Varghese PHI.
5. Construction Technology – Vol – I & II by R. Chubby, Longman UK.
6. Alternate Building Materials and Technology, Jagadish, Venkatarama Reddy and others; New Age Publications.

ENGINEERING GEOLOGY

I I Year B.Tech. I-Sem

Pre Requisites: NIL

Course Objectives: The objective of this Course is

- To give the basics knowledge of Geology that is required for constructing various Civil Engineering Structures, basic Geology, Geological Hazardous and Environmental Geology
- To focus on the core activities of engineering geologists – site characterization and geologic hazard identification and mitigation. Planning and construction of major Civil Engineering projects

UNIT - I

Introduction: Importance of geology from Civil Engineering point of view. Brief study of case histories of failure of some Civil Engineering constructions due to geological draw backs. Importance of Physical geology, Petrology and Structural geology.

Weathering of Rocks : Its effect over the properties of rocks importance of weathering with reference to dams, reservoirs and tunnels weathering of common rock like "Granite"

UNIT - II

Mineralogy: Definition of mineral, Importance of study of minerals, Different methods of study of minerals. Advantages of study of minerals by physical properties. Role of study of physical properties of minerals in the identification of minerals. Study of physical properties of following common rock forming minerals: Feldsper, Quartiz, Flint, Jasper, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc, Calcite. Study of other common economics minerals such as Pyrite, Hematite, Magnetite, Chrorite , Galena , Pyrolusite, Graphite, Magnesite, and Bauxite.

Petrology: Definition of rock: Geological classification of rocks into igneous, Sedimentary and metamorphic rocks. Dykes and sills, common structures and textures of igneous. Sedimentary and metamorphic rocks. Their distinguishing features, Megascopic and microscopic and microscopic study of Granite, Dolerite, Basalt, Pegmatite, Laerite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.

UNIT - III

Structural Geology: Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults unconformities, and joints - their important types and case studies. Their importance Insitu and drift soils, common types of soils, their origin and occurrence in India, Stabilization of soils.

UNIT - IV

Earth Quakes: Causes and effects, shield areas and seismic belts. Seismic waves, Richter scale, precautions to be taken for building construction in seismic areas. Landslides, their causes and effect; measures to be taken to prevent their occurrence.

Importance of Geophysical Studies: Principles of geophysical study by Gravity methods. Magnetic methods, Electrical methods. Seismic methods, Radio metric methods and geothermal method. Special importance of Electrical resistivity methods, and seismic refraction methods.

UNIT - V

Geology of Dams, Reservoirs, and Tunnels: Types of dams and bearing of Geology of site in their selection, Geological Considerations in the selection of a dam site. Analysis of dam failures of the past. Geological factors influencing water Lightness and life of reservoirs - Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations (i.e. Lithological, structural and ground water) in tunneling over break and lining in tunnels.

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

- Site characterization and how to collect, analyze, and report geologic data using standards in engineering practice
- The fundamentals of the engineering properties of Earth materials and fluids.
- Rock mass characterization and the mechanics of planar rock slides and topples

TEXT BOOKS:

1. Engineering Geology by N. Chennakesavulu, McMillan, India Ltd. 2005
2. Engineering Geology by S K Duggal, H K Pandey Mc Graw Hill Education Pvt Ltd 2014

REFERENCES:

1. Rutley's elements of Mineralogy , C.D. Gribble , publisher Springer science
2. Engineering Methods by D. Venkat Reddy; Vikas Publishers 2015.
3. Principles of Engineering Geology by K.V.G.K. Gokhale – B.S publications
4. F.G. Bell, Fundamental of Engineering B.S. Publications, 2005.
5. Krynine& Judd, Principles of Engineering Geology &Geotechnics, CBS Publishers & Distribution
6. Engineering Geology by SubinoyGangopadhyay, Oxford university press.
7. Engineering Geology for Civil Engineers – P.C. Varghese PHI

STRENGTH OF MATERIALS - I

II Year B.Tech. I-Sem
Pre Requisites: Engineering Mechanics

Course Objectives: The objective of this Course is

- To understand the nature of stresses developed in simple geometries such as bars, cantilevers and beams for various types of simple loads
- To calculate the elastic deformation occurring in simple members for differenttypes of loading.
- To show the plane stress transformation with a particular coordinate system for different orientation of the plane.
- To know different failure theories adopted in designing of structural members

UNIT – I
SIMPLE STRESSES AND STRAINS:
Concept of stress and strain- St. Venant's Principle-Stress and Strain Diagram - 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 – Pure shear and Complementary shear - Elastic modulii, Elastic constants and the relationship between them – Bars of varying section – composite bars – Temperature stresses.
STRAIN ENERGY – Resilience – Gradual, sudden, and impact loadings – simple applications.

UNIT – II
SHEAR FORCE AND BENDING MOMENT:
Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported including overhanging beams subjected to point loads, uniformly distributed load, uniformly varying load, couple and combination of these loads – Point of contraflexure – Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT – III
FLEXURAL STRESSES:
Theory of simple bending – Assumptions – Derivation of bending equation- Section Modulus Determination of flexural/bending stresses of rectangularand circular sections (Solid and Hollow), I,T, Angle and Channel sections – Design of simple beam sections.

SHEAR STRESSES:
Derivation of formula for shear stress distribution – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle and channel sections.
UNIT –I V
PRINCIPAL STRESSES:
Introduction – Stresses on an oblique plane 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 –Principal stresses – Mohr's circle of stresses – ellipse of stress - Analytical and graphical solutions.

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 (Von Mises 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.

CONJUGATE BEAM METHOD: Introduction – Concept of conjugate beam method - Difference between a real beam and a conjugate beam - Deflections of determinate beams with constant and different moments of inertia.

Course Outcome:

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

- Describe the concepts and principles, understand the theory of elasticity includingstrain/displacement and Hooke's law relationships; and perform calculations, related tothe strength of structured and mechanical components.
- Recognize various types loadsapplied on structural components of simple framing geometries and understand the nature of internalstresses that will develop within the components.
- to evaluate the strains and deformation that will result due to theelastic stresses developed within the materials for simple types of loading
- Analyze various situations involving structural members subjected to plane stressesby application of Mohr's circle of stress;
- Frame an idea to design a system, component, or process

TEXT BOOKS:

1) Strength of Materials by R.K Rajput, S.Chand& Company Ltd.
2) Strength of Materials by T.D.Gunneswara Rao and M.Andal, Cambridge Publishers

REFERENCES:

1) Mechanics of material by R.C.Hibbeler, Printice Hall publications
2) Engineering Mechanics of Solids by EgorP.Popov,Printice Hall publications
3) Strength of Materials by B.S.Basavarajaiah and P. Mahadevappa, 3rd Edition,
4) Universities Press
5) Strength of Materials by R.K.Bansal, Lakshmi Publications House Pvt. Ltd.
6) Strength of Materials by R. Subramanian, Oxford University Press
7) Mechanics of Materials by Dr.B.CPunmia, Dr. Ashok Kumar Jain and Dr. Arun Kumar Jain

FLUID MECHANICS

II Year B.Tech. I-Sem

Pre Requisites: Engineering Mechanics

Course Objectives: The objectives of the course are to

- Introduce the concepts of fluid mechanics useful in Civil Engineering applications
- Provide a first level exposure to the students to fluid statics, kinematics and dynamics.
- learn about the application of mass, energy and momentum conservation laws for fluid flows
- train and analyse engineering problems involving fluids with a mechanistic perspective is essential for the civil engineering students
- To obtain the velocity and pressure variations in various types of simple flows
- to prepare a student to build a good fundamental background useful in the application-intensive courses covering hydraulics, hydraulic machinery and hydrology

UNIT – I

Properties of Fluid

Distinction between a fluid and a solid;
Density,Specificweight,Specificgravity,Kinematicanddynamicviscosity;variation of viscositywithtemperature, Newton law of viscosity; vapourpressure, boiling point, cavitation, surfacetension, capillarity,Bulkmodulusofelasticity,compressibility.

Fluid Statics

FluidPressure:Pressureatapoint,Pascal'slaw,pressurevariationwithtemperature, density andaltitude. Piezometer, U-Tube Manometer, SingleColumn Manometer, U-Tube Differential Manometer, Micro-manometers. Pressure gauges.Hydrostaticpressureandforce:horizontal,verticalandinclinedsurfaces. Buoyancy and stability of floating bodies.

UNIT - II

Fluid Kinematics

Classificationoffluidflow:steadyandunsteadyflow;uniformandnon-uniform flow;laminarandturbulentflow; rotational and irrotationalflow; compressibleandincompressibleflow;idealandrealfluidflow; one,twoandthreedimensionalflows;Streamline,pathline, streak lineand streamtube;streamfunction, velocity potential function. One,two and three dimensionalcontinuity equations in Cartesiancoordinates.

Fluid Dynamics

Surface and Body forces -Euler's and Bernoulli's equation; Energy correction factor; Momentum equation. Vortex flow – Free and Forced. Bernolli's equation to real fluid flows.

UNIT - III

Flow Measurement in Pipes

Practical applications of Bernoulli's equation: venture meter, orifice meter and pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend.

Flow Over Notches & Weirs

Flow through rectangular; triangular and trapezoidal notches and weirs; End contractions; Velocity of approach. Broad crested weir.

UNIT – IV

Flow through Pipes

Reynolds experiment, Reynolds number**,** Lossofheadthroughpipes,Darcy-Wiesbatchequation, minorlosses,totalenergyline,hydraulicgradeline,Pipesinseries,equivalentpipes, pipesinparallel,siphon,branchingofpipes,threereservoirproblem, powertransmissionthrough pipes.,waterhammerinpipesandcontrolmeasures, Principal of Hardy Cross method for pipe distribution network

UNIT - V

Laminar & Turbulent Flow

Laminarflowthrough:circularpipes,annulusandparallelplates.

Boundary Layer Concepts

Boundary Layer Analysis-Assumption and concept of boundary layer theory.Boundary-layer thickness, displacement, momentum & energy thickness, laminar and Turbulent boundary layers on a flat plate; Laminar sub-layer, smooth and rough boundaries. Local and average friction coefficients. Separation and Control.Definition of Drag and Lift and types drag, Magnus effect.

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Course Outcomes (COs): Upon completion ofthiscourse,studentsshouldbeable to:

- Understand the broad principles of fluid statics, kinematics and dynamics
- Understand definitions of the basic terms used in fluid mechanics and characteristics of fluids and its flow
- Understand classifications of fluid flow
- Be able to apply the continuity, momentum and energy principles

Text Books

1. Fluid Mechanics by Modi and Seth ,Standard Book House.
2. Fluid Mechanics and Hydraulic machines by Manish Kumar Goyal, PHI learning Private Limited,2015.

References.

1. TheoryandApplicationsofFluidMechanics,K.Subramanya,TataMcGrawHill
2. Introduction to Fluid Mechanics and Fluid Machines by SK Som, Gautam Biswas, Suman Chakraborthy, Mc Graw Hill Education (India) Private Limited
3. Fluid MechanicsandMachinery,C.S.P.Ojha,R.BerndtssonandP.N.Chadramouli, OxfordUniversityPress, 2010
4. Fluid mechanics & Hydraulic Machines, Domkundwar&DomkundwarDhanpatRai&Co
5. Fluid Mechanics and Hydraulilc Machines, R.K. Bansal, Laxmi Publication Pvt Ltd.
6. Fluid Mechanics by R.C.Hibbeler, Pearson India Education Services Pvt. Ltd

COMPUTER AIDED CIVIL ENGINEERING DRAWING LAB

II Year B.Tech. I-Sem

Pre Requisites: Building materials and Building Construction

Course Objectives: The objective of this lab is to teach the student usage of Auto cad and basic drawing fundamentals in various civil engineering applications, Specially in building drawing.

List of Experiments:

1. Introduction to computer aided drafting and different coordinate system
2. Drawing of Regular shapes using Editor mode
3. Introduction GUI and drawing of regular shapes using GUI
4. Exercise on Draw tools
5. Exercise on Modify tools
6. Exercise on other tools (Layers, dimensions, texting etc.)
7. Drawing of building components like walls, lintels, Doors, and Windows. using CAD software
8. Drawing a plan of Building and dimensioning
9. Drawing a plan of a residential building using layers
10. Developing a 3-D plan from a given 2-D plan
11. Developing sections and elevations for given
    a) Single storied buildings b) multi storied buildings
12. Auto CAD applications in surveying, mechanics etc.

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

- Use the Autocad commands for drawing 2D & 3D building drawings required for different civil engg applications.
- Plan and draw Civil Engineering Buildings as per aspect and orientation.
- Presenting drawings as per user requirements and preparation of technical report

TEXT BOOKS:

1. Computer Aided Design Laboratory by M. N. SeshaPraksh& Dr. G. S. Servesh –Laxmi Publications.
2. Engineering Graphics by P. J. Sha – S. Chand & Co.

STRENGTH OF MATERIALS LAB

II Year B.Tech. I-Sem
Pre Requisites: Strength of Materials – Theory

Course Objectives:

- Make measurements of different strains, stress and elastic properties of materials used in Civil Engineering.
- Provide physical observations to complement concepts learnt
- Introduce experimental procedures and common measurement instruments,equipment, devices.
- Exposure to a variety of established material testing procedures and techniques
- Different methods of evaluation and inferences drawn from observations

List of Experiments:

1. Tension test
2. Bending test on (Steel / Wood) Cantilever beam.
3. Bending test on simple support beam.
4. Torsion test
5. Hardness test
6. Spring test
7. Compression test on wood or concrete
8. Impact test
9. Shear test
10. Verification of Maxwell's Reciprocal theorem on beams.
11. Use of electrical resistance strain gauges
12. Continuous beam – deflection test.
13. Unsymmetrical bending, & Shear centre

Course Outcomes:

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

- Configure &Operate a data acquisition system using various testing machines of solid materials
- Compute and Analyze engineering values (e.g. stress or strain) from laboratory measurements.
- Write a technical laboratory report

ENGINEERING GEOLOGY LAB

II Year B.Tech. I-Sem

Pre Requisites: Engineering Geology- Theory

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

List of Experiments

1. Study of physical properties of minerals.
2. Study of different group of minerals.
3. Study of Crystal and Crystal system.
4. Identification of minerals: Silica group: Quartz, Amethyst, Opal; Feldspar group: Orthoclase, Plagioclase; Cryptocrystalline group: Jasper; Carbonate group: Calcite; Element group: Graphite; Pyroxene group: Talc; Mica group: Muscovite; Amphibole group: Asbestos, Olivine, Hornblende, Magnetite, Hematite, Corundum, Kyanite, Garnet, Galena, Gypsum.
5. Identification of rocks (Igneous Petrology): Acidic Igneous rock: Granite and its varieties, Syenite, Rhyolite, Pumice, Obsidian, Scoria, Pegmatite, Volcanic Tuff. Basic rock: Gabbro, Dolerite, Basalt and its varieties, Trachyte.
6. Identification of rocks (Sedimentary Petrology): Conglomerate, Breccia, Sandstone and its varieties, Laterite, Limestone and its varieties, Shales and its varieties.
7. Identification of rocks (Metamorphic Petrolody): Marble, slate, Gneiss and its varieties, Schist and its varieties. Quartzite, Phyllite.
8. Study of topographical features from Geological maps. Identification of symbols in maps.
9. Simple structural Geology Problems(Folds, Faults & Unconformities)

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

- Understands the method and ways of investigations required for Civil Engg projects
- Identify the various rocks, minerals depending on geological classifications
- Will able to learn to couple geologic expertise with the engineering properties of rock and unconsolidated materials in the characterization of geologic sites for civil work projects and the quantification of processes such as rock slides and settlement.
- Write a technical laboratory report

LAB EXAMINATION PATTERN:

1. Description and identification of SIX minerals
2. Description and identification of Six (including igneous, sedimentary and metamorphic rocks)
3. Interpretation of a Geological map along with a geological section.
4. Simple strike and Dip problems.
5 Microscopic identification of rocks.

BASICS OF ELECTRICAL & ELECTRONICS ENGINEERING

II Year B.Tech. II-Sem

Course Objectives: Objectives of this course are

- To introduce the concept of electrical circuits and its components
- To introduce the concepts of diodes and transistors, and
- To impart the knowledge of various configurations, characteristics and applications.

Course Outcomes: After this course, the student will be able

- To analyze and solve problems of electrical circuits using network laws and theorems.
- To identify and characterize diodes and various types of transistors.

UNIT- I

Electrical Circuits: R-L-C Parameters, Voltage and Current, Independent and Dependent Sources,Source Transformation – V-I relationship for passive elements, Kirchhoff's Laws, Network reduction techniques – series, parallel, series-parallel, star-to-delta, delta-to-star transformation, Nodal Analysis,

Single Phase AC Circuits: R.M.S. and Average values, Form Factor, steady state analysis of series,parallel and series-parallel combinations of R, L and C with sinusoidal excitation,concept of reactance, impedance, susceptance and admittance – phase and phase difference,Concept of power factor, j-notation, complex and polar forms of representation.

UNIT-II

Resonance: Series resonance and Parallel resonance circuits, concept of bandwidth and Q factor,Locus Diagrams for RL, RC and RLC Combinations for Various Parameters.Network Theorems: Thevenin's, Norton's, Maximum Power Transfer, Superposition, Reciprocity,Tellegen's, Millman's and Compensation theorems for DC and AC excitations.

UNIT- III

P-N Junction Diode: Diode equation, Energy Band diagram, Volt-Ampere characteristics,Temperature dependence, Ideal versus practical, Static and dynamic resistances, Equivalent circuit,Load lineanalysis, Diffusion and Transition Capacitances.Rectifiers and Filters: P-N junction as a rectifier – Half Wave Rectifier, Ripple Factor – Full WaveRectifier, Bridge Rectifier, Harmonic components in Rectifier Circuits, Filters – Inductor Filters,Capacitor Filters, L- section Filters, p- section Filters.

UNIT- IV

Bipolar Junction Transistor (BJT): Construction, Principle of Operation, Symbol, AmplifyingAction, Common Emitter, Common Base and Common Collector configurations. Transistor BiasingAnd Stabilization – Operating point, DC and AC load lines, Biasing – Fixed Bias, Emitter FeedbackBias, Collector to Emitter feedback bias, Voltage divider bias, Biasstability, Stabilization against variations in VBE and ß, Bias Compensation using Diodes andTransistors.

Transistor Configurations: BJT modeling, Hybrid model, Determination of h-parameters fromtransistor characteristics, Analysis of CE, CB and CC configurations using h-parameters, Comparison of CE, CB and CC configurations.

UNIT- V

Junction Field Effect Transistor: Construction, Principle of Operation, Symbol, Pinch-Off Voltage,Volt-Ampere Characteristic, Comparison of BJT and FET, Small Signal Model, Biasing FET.

Special Purpose Devices: Breakdown Mechanisms in Semi-Conductor Diodes, Zener diodecharacteristics, Use of Zener diode as simple regulator, Principle of operation and Characteristics ofTunnel Diode (With help of Energy band diagram) and Varactor Diode, Principle of Operation ofSCR.

Text books:

1. Basic Electrical and electronics Engineering –M S Sukija TK Nagasarkar Oxford University
2. Basic Electrical and electronics Engineering-D P Kothari. I J Nagarath Mc Graw Hill Education

References:

1. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.
2. Millman's Electronic Devices and Circuits – J. Millman and C. C. Halkias, Satyabratajit, TMH,2/e, 1998.
3. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, Mc Graw Hill Company,6th edition.
4. Linear circuit analysis (time domain phasor and Laplace transform approaches)- 2nd edition byRaymond A. DeCarlo and Pen-Min-Lin, Oxford University Press-2004.
5. Network Theory by N. C. Jagan and C. Lakshminarayana, B.S. Publications.
6. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.

BASICS OF MECHANICAL ENGINEERING

II Year B.Tech. II-Sem **L T P C**
2 0 0 2

Instructional Objectives

To familiarize civil engineering students with the

- Basic machine elements,
- Sources of Energy and Power Generation,
- Various manufacturing processes,
- Power transmission elements, material handling equipment

UNIT I:

Machine Elements: Cams: Types of cams andfollowers

Introduction to engineering materials-Metals, ceramics, composites-Heat treatment of metals

Riveted joints- methods of failure of riveted joints-strength equations-efficiency of riveted joints-eccentrically loaded riveted joints.

UNIT-II:

Power Transmission Elements: Gears terminology of spur, helical and bevel gears, gear trains. Belt drives(types). Chain drives.

Material handling equipment: Introduction toBelt conveyors, cranes, industrial trucks, bull dozers,

UNIT-III:

Energy:

Power Generation: External and internal combustion engines (layouts, element/component description, advantages, disadvantages, applications).

REFRIGERATION: Mechanical Refrigeration and types – units of refrigeration – Air Refrigeration system, details and principle of operation –calculation of COP

Modes and mechanisms of heat transfer – Basic laws of heat transfer –General discussion about applications of heat transfer.

UNIT IV:

Manufacturing Processes: Sheet Metal Work: Introduction – Equipments – Tools and accessories – Various processes(applications, advantages / disadvantages).

Welding: Types – Equipments –Techniques employed –welding positions-defects-applications, advantages / disadvantages – Gas cutting – Brazing and soldering.

Casting: Types, equipments, applications

UNIT V:

Machine Tools: Introduction to lathe, drilling machine, milling machine, grinding machine-Operations performed

Text Books:

1. Kumar, T., LeenusJesu Martin and Murali, G., Basic Mechanical Engineering, Suma Publications, Chennai,2007

References:

1. Prabhu, T. J., Jai Ganesh, V. and Jebaraj, S., Basic Mechanical Engineering, Scitech Publications, Chennai, 2000.
2. HajraChoudhary, S.K. and HajraChoudhary, A. K., Elements of Workshop TechnologyVols.I& II, Indian Book Distributing Company Calcutta, 2007.
3. Nag, P.K., Power Plant Engineering, Tata McGraw-Hill, New Delhi, 2008.
4. Rattan, S.S., Theory of Machines, Tata McGraw-Hill, New Delhi, 2010.

SURVEYING

II Year B.Tech. II-Sem

Course Objectives:

The object of the course student should have the capability to:

- Know the principle and methods of surveying.
- Measure horizontal and vertical- distances and angles
- Recording of observation accurately
- Perform calculations based on the observation
- Identification of source of errors and rectification methods
- Apply surveying principles to determine areas and volumes and setting out curves
- Use modern surveying equipment's for accurate results

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.
Prismatic Compass- Bearings, included angles, Local Attraction, Magnetic Declination, and dip.

UNIT - II

Leveling- Types of levels and levelling staves, temporary adjustments, methods of levelling, booking and Determination of levels, Effect of Curvature of Earth and Refraction.
Contouring- Characteristics and uses of Contours, methods of contour surveying.
Areas - Determination of areas consisting of irregular boundary and regular boundary.
Volumes -Determination of volume of earth work in cutting and embankments for level section, volume of borrow pits, capacity of reservoirs.

UNIT - III

Theodolite Surveying: Types of Theodolites, Fundamental Lines, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometrical levelling when base is accessible and inaccessible.
Traversing: Methods of traversing, traverse computations and adjustments, Omitted measurements.

UNIT - IV

Tacheometric Surveying: Principles of Tacheometry, stadia and tangential methods of Tacheometry, Determination of Horizontal distances and Elevations.

UNIT - V

Curves: Types of curves and their necessity, elements of simple, compound, reverse, transition and vertical curves.
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, Global Positioning System- Principle and Applications.

Course Outcomes: Course will enable the student to:

- Apply the knowledge to calculate angles, distances and levels
- Identify data collection methods and prepare field notes
- Understand the working principles of survey instruments, measurement errors and corrective measures
- Interpret survey data and compute areas and volumes, levels by different type of equipment and relate the knowledge to the modern equipment and methodologies.

TEXT BOOKS:

1. Chandra A M, "Plane Surveying and Higher Surveying", New age International Pvt. Ltd., Publishers, New Delhi.
2. Duggal S K, "Surveying (Vol – 1 & 2), Tata McGraw Hill Publishing Co. Ltd. New Delhi.

REFERENCES:

1. Arthur R Benton and Philip J Taety, Elements of Plane Surveying, McGraw Hill.
2. Surveying and levelling by R. Subramanian, Oxford university press, New Delhi
3. Arora K R "Surveying Vol 1, 2 & 3), Standard Book House, Delhi.
4. Surveying (Vol – 1, 2 & 3), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi.

STRENGTH OF MATERIALS – II

II Year B.Tech. II-Sem

Pre Requisites: Strength of Materials -I

Course Objectives: The objective of this Course is

- To understand the nature of stresses developed in simple geometries shafts, springs, columns &cylindrical and spherical shells for various types of simple loads
- To calculate the stability and elastic deformation occurring in various simple geometries for different types of loading.
- To understand the unsymmetrical bending and shear center importance for equilibrium conditions in a structural members of having different axis of symmetry.

UNIT – I

TORSION OF CIRCULAR SHAFTS:

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

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

UNIT – II

COLUMNS AND STRUTS:

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

BEAM COLUMNS: Laterally loaded struts – subjected to uniformly distributed and concentrated loads.

UNIT - III

DIRECT AND BENDING STRESSES:

Stresses under the combined action of direct loading and bending moment, core of a section – determination of stresses in the case of retaining walls, chimneys and dams – conditions for stability-Overturning and sliding – stresses due to direct loading and bending moment about both axis.

UNIT – IV

THIN CYLINDERS:

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

THICK CYLINDERS:

Introduction - Lame's theory for thick cylinders – Derivation of Lame's formulae – distribution of hoop and radial stresses across thickness – design of thick cylinders – compound cylinders – Necessary difference of radii for shrinkage.

UNIT – V

UNSYMETRICAL BENDING:

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

SHEAR CENTRE: Introduction - Shear centre for symmetrical and unsymmetrical (channel, I, T and L) sections

Course Outcome:

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

- Describe the concepts and principles, understand the theory of elasticity, and perform calculations, relative tothe strength of structures and mechanical components in particular to torsion and direct compression;
- to evaluate the strains and deformation that will result due to theelastic stresses developed within the materials for simple types of loading
- Analyze strength and stability of structural members subjected to Direct, and Directand Bending stresses;
- Understand and evaluate the shear center and unsymmetrical bending.
- Frame an idea to design a system, component, or process

Text Books:

1) Strength of Materials by R.K Rajput, S.Chand& Company Ltd.
2) Mechanics of Materials by Dr.B.CPunmia, Dr. Ashok Kumar Jain and Dr. Arun Kumar Jain

References:

1) Strength of Materials by R.Subramanian, Oxford University Press.
2) Mechanics of Materials by R.C.Hibbeler, Pearson Education
3) Engineering Mechanics of Solids by Popov E.P. Printice-Hall Ltd
4) Strength of Materials by T.D.Gunneswara Rao and M.Andal, Cambridge Publishers
5) Strength of Materials by R.K.Bansal, Lakshmi Publications House Pvt. Ltd.
6) Fundamentals of Solid Mechancis by M.L.Gambhir, PHI Learning Pvt. Ltd

HYDRAULICS & HYDRAULIC MACHINERY

II Year B.Tech. II-Sem

Pre Requisites:

Course Objectives:

- **To Define** the fundamental principles of water conveyance in open channels.
- **To Discuss**and analyze the open channels in uniform and Non-uniform flow conditions.
- To Study the characteristics of hydroelectric power plant and its components.
- To analyze and design of hydraulic machinery and its modeling

UNIT-I

Dimensional Analysis and Hydraulic Similitude

Dimensional homogeneity – Rayleigh's method and Buckingham's pi methods – Dimensionless groups. Similitude, Model studies, Types of models. Application of dimensional analysis and model studies to fluid flow problems. Distorted models.

Basics of Turbo Machinery

Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, Jet striking centrally and at tip, Velocity triangles at inlet and outlet, expressions for work done and efficiency – Angular

UNIT-II

Hydraulic Turbines – I

Elements of a typical Hydropower installation – Heads and efficiencies – Classification of turbines – Pelton wheel – Francis turbine – Kaplan turbine – working, working proportions, velocity diagram, work done and efficiency, hydraulic design. Draft tube – Classification, functions and efficiency.

Hydraulic Turbines – II

Governing of turbines – Surge tanks – Unit and specific turbines – Unit speed – Unit quantity – Unit power – Specific speed – Performance characteristics – Geometric similarity – Cavitation. Selection of turbines.

UNIT-III

Centrifugal Pumps

Pump installation details – classification – work done – Manometric head – minimum starting speed – losses and efficiencies – specific speed. Multistage pumps – pumps in parallel – performance of pumps – characteristic curves – NPSH – Cavitation.

Hydropower Engineering: Classification of Hydropower plants – Definition of terms – load factor, utilization factor, capacity factor, estimation of hydropower potential.

UNIT-IV

Open Channel Flow – Uniform Flow

Introduction to Open channel flow-Comparison between open channel flow and pipe flow, Classification of open channels, Classification of open channel flows, Velocity distribution. Uniform flow – Characteristics of uniform flow, Chezy's, Manning's and Bazin formulae for uniform flow – FactorsaffectingManning'sRoughnessCoefficient. Most economical sections. Computation of Uniform flow, Normal depth.

Critical Flow: Specific energy – critical depth - computation of critical depth – critical, sub critical and super critical flows-Channel transitions.

UNIT-V

Open Channel Flow – Non-Uniform flow

Non uniform flow – Gradually Varied Flow - Dynamic equation for G.V.F; Classification of channel bottom slopes – Classification and characteristics of Surface profiles – Computation of water surface profiles by Numerical and Analytical approaches. Direct step method.

Rapidly varied flow: Elements and characteristics (Length and Height) of Hydraulic jump in rectangular channel– Types, applications and location of hydraulic jump, Energy dissipation and other uses – Positive and Negative Surges (Theory only).

Course Outcomes:

At the end of the course the student will able to

- Applytheirknowledgeoffluidmechanicsinaddressingproblemsinopenchannels and hydraulic machinery.
- Understand and solveproblemsinuniform,graduallyandrapidlyvariedflows in open channel in steadystateconditions.
- apply dimensional analysis and to differentiate the model, prototype and similitude conditions for practical problems.
- Get the knowledge on different hydraulic machinery devices and its principles that will be utilized in hydropower development and for other practical usages

Text Books

1. Fluid Mechanics by Modi and Seth ,Standard Book House.
2. Fluid Mechanics and Hydraulic machines by Manish Kumar Goyal, PHI learning Private Limited,2015

REFERENCES

1. Fluid mechanics & Hydraulic Machines, Domkundwar&DomkundwarDhanpatRai&C
2. Fluid Mechanics by R.C.Hibbeler, Pearson India Education Servieces Pvt. Ltd
3. Fluid Mechanic & Fluid Power Engineering by D.S.Kumar (Kataria& Sons Publications Pvt. Ltd.).
4. Open channel flow by V.T.Chow (Mc.Graw Hill Book Company).
5. Introduction to Fluid Mechanics and Fluid Machines by SK Som, Gautam Biswas, SumanChakraborthy, Mc Graw Hill Education (India) Private Limited
6. Hydraulic Machines by Banga& Sharma (Khanna Publishers).

STRUCTURAL ANALYSIS – I

II Year B.Tech. II-Sem
Pre Requisites: Strength of Materials –I

Course Objectives: The objective of the course is to

- **Differentiate** the statically determinate and indeterminate structures.
- To understand the nature of stresses developed in perfect frames and three hinged archesfor various types of simple loads
- **Analyse**the statically indeterminate members such as fixed bars, continuous beams and for various types of loading.
- Understand the energy methods used to derive the equations to solve engineering problems
- **Evaluate** the Influence on a beam for different static & moving loading positions

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
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 ,uniformly distributed load longer than the span, uniformly distributed load shorter than the span, two point loads with fixed distance between them and several point loads-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- Influence lines for forces in members of Pratt and Warren trusses - Equivalent uniformly distributed load -Focal length.

UNIT – III
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 - Geometrical properties of parabolic and circular arches - Three hinged parabolic circular archeshaving supports at different levels - Absolute maximum bending moment diagram for a three hinged arch.

UNIT-IV
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, effect of rotation of a support.

UNIT – V

CONTINUOUS BEAMS: Introduction-Continuous beams - Clapeyron's theorem of three moments-Analysis of continuous beams- Shear force and bending moment diagramsand Elastic curve 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 indeterminaciesfor frames- Analysis of Single Bay, Single storey Portal Frames by Slope Deflection Method iincluding Side Sway - Shear force and bending moment diagrams and Elastic curve.

Course Outcomes:

At the end of the course the student will able to

- An ability to apply knowledge of mathematics, science, and engineering
- Analyse the statically indeterminate bars and continuous beams
- Draw strength behavior of members for static and dynamic loading.
- Calculatethe stiffness parameters in beams and pin jointed trusses.
- Understand the indeterminacy aspects to consider for a total structural system.
- Identify, formulate, and solve engineering problems with real time loading

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.

References:

1) Structural analysis T.S Thandavamoorthy, Oxford university Press
2) Structural Analysis by R.C.Hibbeler, Pearson Education
3) Basic Structural Analysis by K.U.Muthu*et al.*,I.K.International Publishing House Pvt.Ltd
4) Mechanics of Structures Vol – I and II by H.J.Shah and S.B.Junnarkar, Charotar Publishing House Pvt. Ltd.
5) Basic Structural Analysis by C.S.Reddy., Tata McGraw Hill Education Pvt. Ltd.
6) Fundamentals of Structural Analysis by M.L.Gamhir, PHI Learning Pvt. Ltd

SURVEYING LAB

II Year B.Tech. II-Sem

Pre Requisites: Surveying Theory

Course Objectives:

- To impart the practical knowledge in the field- measuring distances, directions, angles,
- To determining R.L.'s areas and volumes
- To set out Curves
- To stake out points
- To traverse the area
- To draw Plans and Maps

List of Experiments

1. Surveying of an area by chain, and compass survey (closed traverse) & plotting.
2. Determine of distance between two inaccessible points with compass
3. Radiation method, intersection methods by plane table survey.
4. Levelling – Longitudinal and cross-section and plotting
5. Measurement of Horizontal and vertical angle by theodolite
6. Trigonometric leveling using theodolite
7. Height and distances using principles of tachometric surveying
8. Determination of height, remote elevation, distance between inaccessible points using total station
9. Determination of Area using total station and drawing map
10. Traversing using total station for drawing contour map
11. Stake out using total station
12. Setting out Curve using total station

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

- Apply the principle of surveying for civil Engineering Applications
- Calculation of areas, Drawing plans and contour maps using different measuring equipment at field level
- Write a technical laboratory report

BASIC ELECTRICAL & ELECTRONICS LAB

Basic Electrical Engineering Laboratory-I

List of Experiments:

1. Characteristics of Fluorescent lamps
2. Characteristics of Tungsten and Carbon filament lamps
3. (a) Verification of Thevenin's theorem.
(b) Verification of Norton's theorems.
4. Verification of Maximum power theorem.
5. Verification of Superposition theorem
6. Study of R-L-C Series circuit
7. Study of R-L-C parallel circuit

Basic Electronics Engineering Laboratory-I

- There will be a couple of familiarization lectures before the practical classes are undertakenwhere basic concept of the instruments handled Eg: CRO, Multimetersetc will be given.Lectures on measurement techniques and error calculation will also have to be organized.
- 3 hours per week must be kept, initially for practical lectures, and later for tutorials.

List of Experiments:

1. Familiarisation with passive and active electronic components such as Resistors, Inductors, Capacitors, Diodes, Transistors (BJT) and electronic equipment like DC power supplies, multimeters etc.
2. Familiarisation with measuring and testing equipment like CRO, Signal generators etc.
3. Study of I-V characteristics of Junction diodes.
4. Study of I-V characteristics of Zener diodes.
5. Study of Half and Full wave rectifiers with Regulation and Ripple factors.
6. Study of I-V characteristics of BJTs.

FLUID MECHANICS & HYDRAULIC MACHINERY LAB

II Year B.Tech. II-Sem
Pre Requisites: FM & HHM Theory

Course Objectives

- To **identify** the behavior of analytical models introduced in lecture to the actual behavior of real fluid flows.
- To **explain** the standard measurement techniques of fluid mechanics and their applications.
- To **illustrate** the students with the components and working principles of the Hydraulic machines- different types of Turbines, Pumps, and other miscellaneous hydraulics machines.
- To **analyze** the laboratory measurements and to document the results in an appropriate format.

List of Experiments

1. Verification of Bernoulli's equation
2. Determination of Coefficient of discharge for a small orifice by a constant head method
3. Calibration of Venturimeter / Orifice Meter
4. Calibration of Triangular / Rectangular/Trapezoidal Notch
5. Determination of Minor losses in pipe flow
6. Determination of Friction factor of a pipe line
7. Determination of Energy loss in Hydraulicjump
8. Determination of Manning's and Chezy's constants for Open channel flow.
9. Impact of jet on vanes
10. Performance CharacteristicsofPelton wheel turbine
11. Performance Characteristics of Francis turbine
12. Performance characteristics of Keplan Turbine
13. Performance Characteristics of a single stage / multi stage Centrifugal Pump

Course Outcomes

Students who successfully complete this course will have demonstrated ability to:

- **Describe** the basic measurement techniques of fluid mechanics and its appropriate application.
- **Interpre**t the results obtained in the laboratory for various experiments.
- **Discover** the practical working of Hydraulic machines- different types of Turbines, Pumps, and other miscellaneous hydraulics machines.
- **Compare** the results of analytical models introduced in lecture to the actual behavior of real fluid flows and draw correct and sustainable conclusions.
- Write a technical laboratory report.

Department of Civil Engineering
Minor Programme – Construction technology and management

S.N.o	Name of the Course	L	T	P	Credits
1	Project Management	3	0	1.5	4.5
2	Construction methods and Equipment	3	0	0	3.0
3	Construction Economics and Finance	3	0	0	3.0
4	Lean Construction	3	0	0	3.0
5	Facility, Quality and Safety management	3	0	1.5	4.5

Department of Civil Engineering
HonorsProgramme – Civil Engineering

S.N.o	Name of the Course	L	T	P	Credits
1	Water Resources Systems analysis	3	0	0	3.0
2	Advanced Reinforced Concrete Design	3	0	2	4.0
3	Structural Dynamics	3	0	0	3.0
4	Ground improvement Engineering	3	0	2	4.0
5	intelligent Transport Systems	3	0	0	3.0
6	Advanced surveying	2	0	2	3.0

Note: The BOS of Civil Engineering feels that the motive/idea of implementing Minor programme ofdifferent discipline is to increase placement potential of a student. Keeping in view of this the civil engineeringminor can also offered to the UG students of the Department. Further B.Tech(Honors) in the correspondingfaculty is to be implemented by considering the advance courses in the different specializations (strengths)existing in the departmentand has to be given the nomenclature as B.Tech (honors) only not with anysuperlatives. If you add any superlative it won't give sense of honorsin the corresponding faculty.