COURSE STRUCTURE

AND

DETAILED SYLLABUS

CIVIL ENGINEERING

For

B.TECH. DEGREE PROGRAMME
(Applicable for the batches admitted from 2022-2023)

VAAGDEVI COLLEGE OF ENGINEERING
(Autonomous)
Bollikunta, Warangal – 506 005
Telangana State, India

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

DEPARTMENT OF CIVIL ENGINEERING

B. Tech - CIVIL ENGINEERING

COURSE STRUCTURE

(R22 Regulations applicable for the batches admitted from Academic Year 2022 - 2023)

I YEAR I – SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1.	B22MA01	Matrices and Calculus	3	1	0	4
2.	B22PH01	Applied Physics	3	1	0	4
3.	B22CS06	C Programming and Data Structures	3	0	0	3
4.	B22ME01	Engineering Workshop	0	1	3	2.5
5.	B22EN01	English for Skill Enhancement	2	0	0	2
6.	B22CE01	Elements of Civil Engineering	0	0	2	1
7.	B22PH02	Applied Physics Laboratory	0	0	3	1.5
8.	B22CS07	C Programming and Data Structures Laboratory	0	0	2	1
9.	B22EN02	English Language and Communication Skills Laboratory	0	0	2	1
10.	B22CH03	Environmental Science	3	0	0	0
		Induction Programme				
Total			**14**	**3**	**12**	**20**

I YEAR II – SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1.	B22MA02	Ordinary Differential Equations and Vector Calculus	3	1	0	4
2.	B22CH01	Engineering Chemistry	3	1	0	4
3.	B22ME03	Computer Aided Engineering Graphics	1	0	4	3
4.	B22CE02	Applied Mechanics	3	0	0	3
5.	B22CE04	Surveying	2	0	0	2
6.	B22CS04	Python Programming Laboratory	0	1	2	2
7.	B22CH02	Engineering Chemistry Laboratory	0	0	2	1
8.	B22CE05	Surveying Laboratory - I	0	0	2	1
Total			**12**	**3**	**10**	**20**

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II YEAR I - SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1.	B22MA03	Probability and Statistics	3	1	0	4
2.	B22CE06	Building Materials, Construction and Planning	3	0	0	3
3.	B22CE07	Engineering Geology	3	0	0	3
4.	B22CE08	Strength of Materials – I	3	0	0	3
5.	B22CE09	Fluid Mechanics	3	0	0	3
6.	B22CE10	Surveying Laboratory - II	0	1	2	2
7.	B22CE11	Strength of Materials Laboratory	0	0	2	1
8.	B22CE12	Computer Aided Drafting Laboratory	0	0	2	1
9.	B22MC08	Logical Reasoning and Quantitative Aptitude	3	0	0	0
Total			**18**	**2**	**6**	**20**

II YEAR II - SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1.	B22EE19	Basic Electrical and Electronics Engineering	3	0	0	3
2.	B22CE13	Concrete Technology	3	0	0	3
3.	B22CE14	Strength of Materials – II	3	0	0	3
4.	B22CE15	Hydraulics and Hydraulics Machinery	3	0	0	3
5.	B22CE16	Structural Analysis - I	3	0	0	3
6.	B22CE17	Fluid Mechanics and Hydraulics Machinery Laboratory	0	0	2	1
7.	B22EE20	Basic Electrical and Electronics Engineering Laboratory	0	0	2	1
8.	B22CE18	Concrete Technology Laboratory	0	0	2	1
9.	B22CE19	Real-time Research Project/ Field-Based Project	0	0	4	2
10.	B22MC07	Gender Sensitization Laboratory	0	0	2	0
Total			**15**	**0**	**12**	**20**

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COURSE STRUCTURE

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III YEAR I - SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1.	B22CE20	Structural Analysis - II	3	0	0	3
2.	B22CE21	Geotechnical Engineering	3	0	0	3
3.	B22CE22	Structural Engineering -I (RCC)	3	0	0	3
4.	B22MB01	Business Economics and Financial Analysis	3	0	0	3
5.	B22CE23	Transportation Engineering	3	0	0	3
6.	B22CE24	Hydrology and Water Resources Engineering	3	0	0	3
7.	B22CE25	Transportation Engineering Laboratory	0	0	2	1
8.	B22CE26	Geotechnical Engineering Laboratory	0	0	2	1
9.	B22MB06	Intellectual Property Rights	3	0	0	0
		Total Credits	**21**	**0**	**4**	**20**

III YEAR II - SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1.	B22CE27	Environmental Engineering	3	0	0	3
2.	B22CE28	Foundation Engineering	3	0	0	3
3.	B22CE29	Structural Engineering -II (Steel Structures)	3	0	0	3
4.	B22CE30 B22CE31 B22CE32	**Professional Elective – I** Design of Hydraulic Structures Advanced Water Resources Engineering Ground Water Hydrology	3	0	0	3
5.		Open Elective - I	3	0	0	3
6.	B22CE33	Environmental Engineering Laboratory	0	0	2	1
7.	B22CE34	Computer Aided Design Laboratory	0	0	2	1
8.	B22EN03	Advanced English Communication Skills Laboratory	0	0	2	1
9.	B22CE35	Industry Oriented Mini Project/ Internship	0	0	4	2
10.	B22CH03	Environmental Science	3	0	0	0
		Total Credits	**18**	**0**	**10**	**20**

*** Environmental Science in III Year II Semester should be Registered by Lateral Entry Students Only.**

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COURSE STRUCTURE

(R22 Regulations applicable for the batches admitted from Academic Year 2022-2023)

IV YEAR I - SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1.	B22CE36	Quantity Survey & Valuation	2	0	0	2
2.	B22CE37	Project Management	2	0	0	2
3.	B22CE38 B22CE39 B22CE40	**Professional Elective – II** Prestressed Concrete Earth Retaining Structures Repair and Rehabilitation of Structures	3	0	0	3
4.	B22CE41 B22CE42 B22CE43	**Professional Elective – III** Design of Bridges Elements of Earthquake Engineering Ground Improvement Techniques	3	0	0	3
5.	B22CE44 B22CE45 B22CE46	**Professional Elective – IV** Building Information Modelling Green Building Technologies Remote Sensing & Geographical Information System	3	0	0	3
6.		Open Elective - II	3	0	0	3
7.	B22CE47	Civil Engineering Software Laboratory	0	0	2	1
8.	B22CE48	Project Stage - I	0	0	6	3
		Total Credits	**16**	**0**	**8**	**20**

IV YEAR II - SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1.	B22CE49 B22CE50 B22CE51	**Professional Elective – V** Solid Waste Management Smart Cities Planning and Management Air pollution	3	0	0	3
2.	B22CE52 B22CE53 B22CE54	**Professional Elective – VI** Airports, Railways and Waterways Pavement Analysis & Design Pavement Asset Management	3	0	0	3
3.		Open Elective - III	3	0	0	3
4.	B22CE55	Project Stage – II including seminar	0	0	22	11
		Total Credits	**9**	**0**	**22**	**20**

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B.Tech. in CIVIL ENGINEERING

COURSE STRUCTURE - (R22 Regulations) - III & IV YEAR

Applicable from Academic Year 2022-2023 admitted batch

OPEN ELECTIVES OFFERED BY THE DEPARTMENT

S. No.	Course Code	Course Title	L	T	P	Credits
1.	B22CE56	Disaster Preparedness & Planning Management	3	0	0	3
2.	B22CE57	Building Technology	3	0	0	3
3.	B22CE58	Environmental Impact Assessment	3	0	0	3
4.	B22CE59	Sustainable Infrastructure Development	3	0	0	3
5.	B22CE60	Environmental Pollution and Control	3	0	0	3
6.	B22CE61	Energy Efficient Buildings	3	0	0	3

VAAGDEVI COLLEGE OF ENGINEERING

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(B22MA01) MATRICES AND CALCULUS

B.Tech - I Year I – Semester

L	T	P	C
3	1	0	4

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 eigen values and eigenvectors and to reduce the quadratic form to canonical form
- Geometrical approach to the mean value theorems and their application to the mathematical problems
- Evaluation of surface areas and volumes of revolutions of curves.
- Evaluation of improper integrals using Beta and Gamma functions.
- Partial differentiation, concept of total derivative
- Finding maxima and minima of function of two and three variables.
- Evaluation of multiple integrals and their applications

UNIT - I: Matrices

Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Gauss Seidel Iteration Method.

UNIT - II: Eigen values and Eigen vectors

Linear Transformation and Orthogonal Transformation: Eigen values, Eigenvectors and their properties, Eigen values and Vectors with reference to Symmetric, Skew-symmetric, Hermitian, Skew- Hermitian, orthogonal and Unitary Matrices. Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem,

Quadratic Forms: Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms.

UNIT - III: Calculus

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. Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates),

Beta and Gamma Functions: Introduction to Improper Integrals, Definition of Beta and Gamma functions, properties and other forms. Relation between Beta and Gamma functions. Evaluation of Improper integrals using Beta and Gamma functions

UNIT - IV: Multivariable Calculus (Partial Differentiation and applications)

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

UNIT-V: Multivariable Calculus (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.

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 Eigen values and Eigen vectors
- Reduce the quadratic form to canonical form using orthogonal transformations.
- Solve the applications on the mean value theorems.
- Evaluate the improper integrals using Beta and Gamma functions
- Find the extreme values of functions of two variables with/ without constraints.
- Evaluate the multiple integrals and apply the concept to find areas, volumes

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Editon, 2016.

REFERENCE BOOKS:

1. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.

VAAGDEVI COLLEGE OF ENGINEERING

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(B22PH01) APPLIED PHYSICS

B.Tech - I Year I – Semester

L	T	P	C
3	1	0	4

Course Objectives: The objectives of this course for the student are to:

- Understand the basic principles of quantum physics and band theory of solids.
- Understand the underlying mechanism involved in construction and working principles of various semiconductor devices.
- Study the fundamental concepts related to the dielectric, magnetic and energy materials.
- Identify the importance of nanoscale, quantum confinement and various fabrications techniques.
- Study the characteristics of lasers and optical fibres.

UNIT - I: QUANTUM PHYSICS AND SOLIDS

QUANTUM MECHANICS: Introduction To Quantum Physics - Blackbody Radiation – Stefan-Boltzmann's Law, Wein's And Rayleigh-Jean's Law, Planck's Radiation Law (qualitative) - Photoelectric Effect- waves and particles – de Broglie hypothesis – properties of matter waves- Davisson And Germer Experiment –Heisenberg Uncertainty Principle - Born Interpretation Of The Wave Function – Time Independent Schrodinger Wave Equation - Particle in One Dimensional Potential Box – **SOLIDS:** Free Electron Theory (Drude & Lorentz, Sommerfeld) - Fermi-Dirac Distribution - Bloch's Theorem - Kronig-Penney Model (qualitative) - E-K Diagram- Effective Mass Of electron- Origin Of Energy Bands- Classification Of Solids.

UNIT - II: SEMICONDUCTORS AND DEVICES

Intrinsic And Extrinsic Semiconductors – Hall Effect - Direct And Indirect Band Gap Semiconductors - Construction, Principle , Operation And Characteristics Of P-N Junction Diode, Zener Diode And Bipolar Junction Transistor (BJT)–LED, PIN Diode, Avalanche Photo Diode (APD) And Solar Cells, Their Structure, Materials, Working Principle And Characteristics.

UNIT - III: DIELECTRIC, MAGNETIC AND ENERGY MATERIALS

DIELECTRIC MATERIALS: Basic Definitions- Types of Polarizations (Qualitative) - Ferroelectric, Piezoelectric, and Pyroelectric Materials – Applications – Liquid Crystal Displays (LCD) And Crystal Oscillators. **MAGNETIC MATERIALS:** Hysteresis - Soft And Hard Magnetic Materials - Magnetostriction, Magnetoresistance - Applications - Bubble Memory Devices, Magnetic Field Sensors And Multi-Ferroics. **ENERGY MATERIALS**: Conductivity of Liquid and Solid Electrolytes-Superionic Conductors - Materials Andelectrolytes for Super Capacitors - Rechargeable Ion Batteries, Solid Fuel Cells.

UNIT - IV: NANOTECHNOLOGY

Nanoscale, Quantum Confinement, Surface to Volume Ratio, Bottom-Up Fabrication: Sol-Gel, Precipitation, Combustion Methods – Top-Down Fabrication: Ball Milling - Physical Vapor Deposition (PVD) - Chemical Vapor Deposition (CVD) - Characterization Techniques - XRD, SEM &TEM - Applications of Nano materials.

UNIT - V: LASER AND FIBER OPTICS

LASERS: Laser Beam Characteristics-Three Quantum Processes-Einstein Coefficients And Their Relations- Lasing Action - Pumping Methods- Ruby Laser, He-Ne Laser, Nd: YAG Laser-Semiconductor Laser-Applications Of Laser. **FIBER OPTICS**: Introduction To Optical Fiber-Advantages Of Optical Fibers - Total Internal Reflection construction of Optical Fiber - Acceptance Angle - Numerical Aperture- Classification Of Optical Fibers losses in Optical Fiber - Optical Fiber For Communication System - Applications.

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

- Understand physical world from fundamental point of view by the concepts of Quantum
- Mechanics and visualize the difference between conductor, semiconductor, and an insulator by classification of solids.
- Identify the role of semiconductor devices in science and engineering Applications.
- Explore the fundamental properties of dielectric, magnetic materials and energy for their applications.
- Appreciate the features and applications of Nanomaterials.
- Understand various aspects of Lasers and Optical fibre and their applications in diverse fields.

TEXT BOOKS:

1. M. N. Avadhanulu, P.G. Kshirsagar& TVS Arun Murthy" A Text book of Engineering Physics"-S. Chand Publications, 11th Edition 2019.
2. Engineering Physics by Shatendra Sharma and Jyotsna Sharma, Pearson Publication,2019
3. Semiconductor Physics and Devices- Basic Principle – Donald A, Neamen, Mc Graw Hill,4thEdition,2021.
4. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2nd Edition,2022.
5. Essentials of Nanoscience & Nanotechnology by Narasimha Reddy Katta, Typical Creatives NANO DIGEST, 1st Edition, 2021.

REFERENCE BOOKS:

1. Quantum Physics, H.C. Verma, TBS Publication, 2nd Edition 2012.
2. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley &Sons, 11th Edition, 2018.
3. Introduction to Solid State Physics, Charles Kittel, Wiley Eastern, 2019.
4. Elementary Solid State Physics, S.L. Gupta and V. Kumar, PragathiPrakashan, 2019.
5. A.K. Bhandhopadhya - Nano Materials, New Age International, 1stEdition, 2007.
6. Energy Materials a Short Introduction to Functional Materials for Energy Conversion and Storage Aliaksandr S. Bandarenka, CRC Press Taylor & Francis Group
7. Energy Materials, Taylor & Francis Group, 1st Edition

VAAGDEVI COLLEGE OF ENGINEERING

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(B22CS06) C PROGRAMMING AND DATA STRUCTURES

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

3 0 0 3

Course Objectives:

Introduce the importance of programming, C language constructs, programdevelopment, data structures, searching and sorting.

UNIT - I

Introduction to Computers – Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Software Development

Introduction to C Language – Background, Simple C programs, Identifiers, Basic data types, Variables, Constants, Input / Output

Structure of a C Program – Operators, Bit-wise operators, Expressions, Precedence and Associatively, Expression Evaluation, Type conversions, Statements.

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, Recursion.

Designing Structured Programs- Functions, basics, user defined functions, inter function communication, standard functions.

Arrays – Concepts, using arrays in C, inter function communication, array applications, two – dimensional arrays, multidimensional arrays.

UNIT - III

Pointers – Introduction, Pointers for inter function communication, pointers to pointers, compatibility,

Pointer Applications – Passing an array to a function, Memory allocation functions, array of pointers

Strings – Concepts, C Strings, String Input / Output functions, arrays of strings, string manipulation functions, string / data conversion.

UNIT - IV

Derived types – The Typedef, enumerated types, Structures – Declaration, definition and initialization of structures, accessing structures, operations on structures, complex structures. Unions – Referencing unions, initializers, unions and structures.

Input and Output – Text vs Binary streams, standard library functions for files, converting file types, File programs – copy, merge files.

UNIT – V

Sorting- selection sort, bubble sort, insertion sort,

Searching-linear and binary search methods.

Data Structures – Introduction to Data Structures, abstract data types, Stack Operations using arrays, stack applications, Queue operations using arrays.

Course Outcomes:

CO-1: Understand the various steps in Program development.
CO-2: Explore the concepts of control statements and functions in C Programming Language.
CO-3: Understand the concepts of pointers and its applications.
CO-4: Ability to design and implement different types of file structures.
CO-5: Apply data structures such as stacks, queues in problem solving and analyze various searching and sorting algorithms.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. C & Data structures – P. Padmanabham, 3rd Edition, B.S. Publications.
2. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press
3. Programming in C – Stephen G. Kochan, III Edition, Pearson Education.
4. C for Engineers and Scientists, H. Cheng, McGraw-Hill International Edition
5. Data Structures using C – A. M. Tanenbaum, Y. Langsam, and M.J. Augenstein, Pearson Education / PHI
6. C Programming & Data Structures, E. Balagurusamy, TMH.
7. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press
8. C & Data structures – E V Prasad and N B Venkateswarlu, S. Chand & Co.

VAAGDEVI COLLEGE OF ENGINEERING

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(B22ME01) ENGINEERING WORKSHOP

B.Tech - I Year I – Semester	**L**	**T**	**P**	**C**
	0	**1**	**3**	**2.5**

Pre-requisites: Practical skill

Course Objectives:

- To Study of different hand operated power tools, uses and their demonstration.
- To gain a good basic working knowledge required for the production of various engineering products.
- To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.
- To develop a right attitude, team working, precision and safety at work place.
- It explains the construction, function, use and application of different working tools, equipment and machines.
- To study commonly used carpentry joints.
- To have practical exposure to various welding and joining processes.
- Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.

1. TRADES FOR EXERCISES:

At least two exercises from each trade:

I. Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
II. Fitting – (V-Fit, Dovetail Fit & Semi-circular fit)
III. Tin-Smithy – (Square Tin, Rectangular Tray & Conical Funnel)
IV. Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)
V. Welding Practice – (Arc Welding & Gas Welding)
VI. House-wiring – (Parallel & Series, Two-way Switch and Tube Light)
VII. Black Smithy – (Round to Square, Fan Hook and S-Hook)

2. TRADES FOR DEMONSTRATION & EXPOSURE:

Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools in construction and Wood Working.

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

CO 1: Study and practice on machine tools and their operations

CO 2: Practice on manufacturing of components using workshop trades including pluming, fitting, carpentry, foundry, house wiring and welding.

CO 3: Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.

CO 4: Apply basic electrical engineering knowledge for house wiring practice.

TEXT BOOKS:

1. Workshop Practice /B. L. Juneja / Cengage
2. Workshop Manual / K. Venugopal / Anuradha.

REFERENCE BOOKS:

1. Work shop Manual - P. Kannaiah/ K.L. Narayana/ Scitech
2. Workshop Manual / Venkat Reddy/ BSP

VAAGDEVI COLLEGE OF ENGINEERING

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(B22EN01) ENGLISH FOR SKILL ENHANCEMENT

B. Tech.. (Common to all)

L	T	P	C
2	0	0	2

Course Objectives: This course will enable the students to:

1. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Develop study skills and communication skills in various professional situations.
3. To study engineering subjects more effectively and critically using the theoretical and practical components of the syllabus.

UNIT - I

Chapter entitled '**Toasted English' by R. K. Narayan** from **"English: Language, Context and Culture"** published by Orient Black Swan, Hyderabad.2022

Vocabulary: The Concept of Word Formation -The Use of Prefixes and Suffixes - Acquaintance with Prefixes and Suffixes from Foreign Languages to form Derivatives - Synonyms and Antonyms

Grammar: Identifying Common Errors in Writing with Reference to Articles and Prepositions.

Reading: Reading and Its Importance- Techniques for Effective Reading.

Writing: Sentence Structures -Use of Phrases and Clauses in Sentences- Simple, Compound & Complex Sentences - Importance of Proper Punctuation- Techniques for Writing precisely – Paragraph Writing – Types, Structures and Features of a Paragraph - Creating Coherence- Organizing Principles of Paragraphs in Documents.

UNIT - II

Chapter entitled **'Appro JRD' by Sudha Murthy** from **"English: Language, Context and Culture" published** by Orient BlackSwan, Hyderabad. 2022. Print.

Vocabulary: Words Often Misspelt - Homophones, Homonyms and Homographs

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

Reading: Sub-Skills of Reading – Skimming and Scanning – Exercises for Practice

Writing: Nature and Style of Writing- Defining /Describing People, Objects, Places and Events – Classifying- Providing Examples or Evidence.

UNIT - III

Chapter entitled **'Lessons from Online Learning' by F. Haider Alvi, Deborah Hurst et al** from **"English: Language, Context and Culture"** published by Orient Black Swan, Hyderabad. 2022. Print.

Vocabulary: Words Often Confused - 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 – Intensive Reading and Extensive Reading – Exercises for Practice.

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

UNIT - IV

Chapter entitled **'Art and Literature' by Abdul Kalam** from **"English: Language, Context and Culture"** published by Orient Black Swan, Hyderabad. 2022. Print.

Vocabulary: Standard Abbreviations in English, Idioms & Phrasal Verbs.

Grammar: Redundancies and Clichés in Oral and Written Communication. **Reading**: Survey, Question, Read, Recite and Review (SQ3R Method) - Exercises for Practice

Writing: Writing Practices- Essay Writing-Writing Introduction and Conclusion -Précis Writing.

UNIT - V

Chapter entitled **'Go, Kiss the World' by Subroto Bagchi** from **"English: Language, Context and Culture"** published by Orient Black Swan, Hyderabad. 2022. Print.

Vocabulary: Technical Vocabulary and their Usage

Grammar: Common Errors in English (Covering all the other aspects of grammar which were not covered in the previous units)

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 in AICTE Model Curriculum are covered in the syllabus of ELCS Lab Course.

Note: 1. As the syllabus of English given in AICTE Model Curriculum-2018 for B. Tech First Year is **Open-ended**, besides following the prescribed textbook, 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 in the class.

Note: **2**.Based on the recommendations of NEP2020, teachers are requested to be flexible to adopt Blended Learning in dealing with the course contents .They are advised to teach 40 percent of each topic from the syllabus in blended mode.

Course Outcomes: Students will be able to:

CO1: Understand the importance of vocabulary and sentence structures.

CO2: Choose appropriate vocabulary and sentence structures for their oral and written communication.

CO3: Demonstrate their understanding of the rules of functional grammar.

CO4: Develop comprehension skills using known and unknown passages.

CO5: Take an active part in drafting paragraphs, letters, essays, abstracts, précis and reports in various contexts.

TEXTBOOK:

1. **English: Language, Context and Culture** by Orient Black Swan Pvt. Ltd, Hyderabad. 2022. Print.

REFERENCE BOOKS:

1. Effective Academic Writing (Second Edition)by Rhonda Liss and Jason Davis Oxford University Press
2. Richards, Jack C. (2022) Interchange Series. Introduction, 1, 2, 3. Cambridge University Press
3. Wood, F.T. (2007). Remedial English Grammar. Macmillan.
4. Chaudhuri, Santanu Sinha. (2018). Learn English: A Fun Book of Functional Language, Grammar and Vocabulary. (2^{nd} ed.,). Sage Publications India Pvt. Ltd.
5. Technical Communication. Wiley India Pvt. Ltd, (2019).
6. Vishwamohan, Aysha. (2013). English for Technical Communication for Engineering Students. Mc Graw-Hill Education India Pvt. Ltd.
7. Swan, Michael.(2016).Practical English Usage. Oxford University Press.4^{th} Edition.

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE01) ELEMENTS OF CIVIL ENGINEERING

B.Tech - I Year I – Semester

L	T	P	C
0	0	2	1

Pre-requisites: Nil

Course objectives:

- To provide practical knowledge about physical properties of minerals and rocks.
- To determine the characteristics of cement**,** Coarse & Fine aggregates.

List of Experiments:

1. **Identification of Minerals** – Silica Group, Feldspar Group, Crystalline Group, Carbonate Group, Pyroxene Group, Mica Group, Amphibole Group.
2. **Identification of Rocks –** Igneous Petrology, Sedimentary Petrology, Metamorphic Petrology.
3. 1. Study of topographical features from Geological maps. Identification of symbols in maps.
   2. Simple structural Geology Problems (Folds, Faults & Unconformities)
4. **Tests on Cement**
   a. Fineness test & Normal Consistency test.
   b. Specific gravity test, Initial and Final setting time of cement.
5. **Tests on Fine Aggregates**
   a. Specific Gravity test.
   b. Bulking of sand & Fineness modulus of Fine aggregate.
6. **Tests on Coarse Aggregate**
   a. Specific Gravity test.
   b. Fineness modulus of Coarse aggregate.

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

CO1: Understands the method and ways of investigations required for Civil Engineering projects
CO2: Identify the various rocks, minerals depending on geological classifications
CO3: Evaluate the properties of cement, fine and coarse aggregates
CO4: Determine the properties and suitability of the materials for construction

REFERENCE BOOKS:

1. N. Chenna kesavulu, "Engineering Geology", Mc-Millan, India Ltd., 2nd Edition, 2018.
2. A.R. Santha Kumar, "Concrete Technology", Oxford university Press, 2nd Edition,2018
3. IS 383 :1993 "Specification for Coarse and Fine Aggregates from Natural Sources for Concrete".

ONLINE RESOURCES:

1. https://mg-nitk.vlabs.ac.in/mining-geology/List%20of%20experiments.html
2. https://cs-iitd.vlabs.ac.in/List%20of%20experiments.html

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22PH02) APPLIED PHYSICS LABORATORY

B.Tech - I Year I – Semester	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

Course Objectives: The objectives of this course for the student to

1. Capable of handling instruments related to the Hall effect and photoelectric effect experiments and their measurements.
2. Understand the characteristics of various devices such as PN junction diode, Zener diode, BJT, LED, solar cell, lasers and optical fibre and measurement of energy gap and resistivity of semiconductor materials.
3. Able to measure the characteristics of dielectric constant of a given material.
4. Study the behavior of B-H curve of ferromagnetic materials.
5. Able to measure the time Constant of RC Circuit.

LIST OF EXPERIMENTS:

1. Determination of work function and Planck's constant using photoelectric effect.
2. Determination of Hall co-efficient and carrier concentration of a given semiconductor.
3. Characteristics of series and parallel LCR circuits.
4. V-I characteristics of a p-n junction diode and Zener diode.
5. Input and output characteristics of BJT (CE, CB & CC configurations).
6. a) V-I and L-I characteristics of light emitting diode (LED)
   b) V-I Characteristics of solar cell
7. Determination of Energy gap of a semiconductor.
8. Determination of the resistivity of semiconductor by two probe method.
9. Study B-H curve of a magnetic material.
10. Determination of dielectric constant of a given material.
11. a) Determination of the beam divergence of the given LASER beam.
    b) Determination of Acceptance Angle and Numerical Aperture of an optical fiber.
12. Study of Decay Charge and Determination of Time Constant of RC Circuit

Note: Any 8 experiments are to be performed.

Course Outcomes: The students will be able to:

1. Know the determination of the Planck's constant using Photo electric effect and identify the material whether it is n-type or p-type by Hall experiment.
2. Appreciate quantum physics in semiconductor devices and optoelectronics.
3. Gain the knowledge of applications of dielectric constant.
4. Understand the variation of magnetic field and behavior of hysteresis curve.
5. Gain the knowledge of decay of charge and determine time constant of RC circuit

REFERENCE BOOK:

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics" S Chand Publishers, 2017.

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CS07) C PROGRAMMING AND DATA STRUCTURES LABORATORY

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

0 0 2 1

Course Objectives: Introduce the importance of programming, C language constructs, programdevelopment, data structures, searching and sorting.

List of Experiments:

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.
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)
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
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.
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 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.)

18.

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.)

19.

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)

20. Write C programs that implement stack (its operations) using Arrays
21. Write C programs that implement Queue (its operations) using Arrays
22. 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
23. Write C programs that use recursive functions to perform the following searching operations for a Key value in a given list of integers:
    i) Linear search ii) Binary search
24. Write C programs that use 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

Course Outcomes:

CO-1: Develop modular and readable C Programs

CO-2: Solve problems using strings, functions. Handle data in files.

CO-3: Implement stacks, queues using arrays.

CO-4: To understand and analyze various searching and sorting algorithms.

TEXT BOOKS:

1. C Programming & Data Structures, B.A. Forouzan and R. F. Gilberg, Third Edition, Cengage Learning.
2. Let us C, Yeswanth Kanitkar
3. C Programming, Balaguruswamy.

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22EN02) ENGLISH LANGUAGE AND COMMUNICATION SKILLS LABORATORY

B. Tech. (Common to all)

L	T	P	C
0	0	2	1

The **English Language and Communication Skills (ELCS) 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 the 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 the impact of dialects.
- To train students to use language appropriately for public speaking, group discussions and interviews

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 the role in the LSRWskills 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
3. 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
- Describing objects/situations/people
- Role play – Individual/Group activities
- Just A Minute (JAM) Session

The following course content is prescribed for the **English Language and Communication Skills Lab**.

Exercise –I

CALL Lab:

Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers- Effective Listening. Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants – Minimal Pairs-Consonant Clusters- Past Tense Marker and Plural Marker- Testing Exercises

ICS Lab:

Understand: Spoken vs. Written language- Formal and Informal English.

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– Weak Forms and Strong Forms – Stress pattern in sentences – Intonation.

Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms- Stress pattern in sentences – Intonation - Testing Exercises

ICS Lab:

Understand: Features of Good Conversation – Strategies for Effective Communication.

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

Exercise - III

CALL Lab:

Understand: Errors in Pronunciation-Neutralising Mother Tongue Interference (MTI). Practice: Common Indian Variants in Pronunciation – Differences between British and American Pronunciation -Testing Exercises

ICS Lab:

Understand: Descriptions- Narrations- Giving Directions and Guidelines – Blog Writing Practice: Giving Instructions – Seeking Clarifications – Asking for and Giving Directions – Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

Exercise – IV
CALL Lab:
Understand: Listening for General Details.
Practice: Listening Comprehension Tests - Testing Exercises
ICS Lab:
Understand: Public Speaking – Exposure to Structured Talks - Non-verbal Communication- Presentation Skills.
Practice: Making a Short Speech – Extempore- Making a Presentation.

Exercise – V
CALL Lab:
Understand: Listening for Specific Details.
Practice: Listening Comprehension Tests -Testing Exercises
ICS Lab:
Understand: Introduction to Group Discussion, Interview Skills.
Practice: Group Discussion/Mock Interview.

Minimum Requirement of infrastructural facilities for ELCS Lab:

1. **Computer Assisted Language Learning (CALL) Lab:**

The Computer Assisted Language Learning Lab has to accommodate 30 students with 30 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 30 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, LCD and camcorder.

Source of Material (Master Copy):

- Exercises in Spoken English. Part 1, 2, 3. CIEFL and Oxford University Press

Note: Teachers are requested to make use of the master copy and get it tailor-made to suit the contents of the syllabus.

Suggested Software:

- Cambridge Advanced Learners' English Dictionary with CD.
- Grammar Made Easy by Darling Kindersley.
- Punctuation Made Easy by Darling Kindersley.
- Oxford Advanced Learner's Compass, 10^{th} Edition.
- English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.

- English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- English Vocabulary in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).
- Digital All
- Orell Digital Language Lab (Licensed Version)

Course Outcomes: Students will be able to:

CO1:Understand the nuances of English language through audio- visual experience and group activities

CO2:Neutralize their accent for intelligibility

CO3:Develop their listening skills so that they may appreciate its role in developing LSRW skills of language and improve their pronunciation.

CO4:Involve in speaking activities in various contexts.

CO5:Speak with clarity and confidence which in turn enhance their employability skills

REFERENCE BOOKS:

1. English Language Communication Skills – Lab Manual cum Workbook. Cengage Learning India Pvt. Ltd, (2022).
2. Shobha, KN & Rayen, J. Lourdes. (2019). Communicative English – A workbook.
3. Cambridge University Press
4. Kumar, Sanjay & Lata, Pushp. (2019). Communication Skills: A Workbook. Oxford University Press
5. ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities. Orient Black Swan Pvt. Ltd, (2016).
6. Mishra, Veerendra et al. (2020). English Language Skills: A Practical Approach.
7. Cambridge University Press.
8. https://www.wix.com//

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CH03) ENVIRONMENTAL SCIENCE

B.Tech - I Year I – Semester

L	T	P	C
3	0	0	0

Course Objectives:

- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures.
- Understanding the environmental policies and regulations

UNIT - I

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

UNIT - II

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

UNIT - III

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

UNIT - IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its

management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation.

Global Environmental Issues and Global Efforts: Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions /Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

UNIT - V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

Course Outcomes:

- Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHILearning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications.

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22MA02) ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

B.Tech - I Year II – Semester

L	T	P	C
3	1	0	4

Course Objectives: To learn

- Methods of solving the differential equations of first and higher order.
- Concept, properties of Laplace transforms
- Solving ordinary differential equations using Laplace transforms techniques.
- 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

UNIT-I: First Order ODE

Exact differential equations, Equations reducible to exact differential equations, linear and Bernoulli's equations, Orthogonal Trajectories (only in Cartesian Coordinates). Applications: Newton's law of cooling, Law of natural growth and decay.

UNIT-II: Ordinary 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 $x, e^{axy}V(x)$ and $xV(x)$ method of variation of parameters, Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation. Applications: Electrical Circuits (Both first and second order).

UNIT-III: Laplace transforms

Laplace Transforms: Laplace Transform of standard functions, First shifting theorem, Second shifting theorem, Unit step function, Dirac delta function, 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). Applications: solving differential equations with constant coefficients with give conditions by Laplace Transform method.

UNIT-IV: Vector Differentiation

Vector point functions and scalar point functions, Gradient, Divergence and Curl, Directional derivatives, Vector Identities (without proofs) Tangent plane and normal line, 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.

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

CO1: Identify whether the given differential equation of first order is exact or not

CO2: Solve higher differential equation and apply the concept of differential equation to real world problems.

CO3: Extend the basic concepts of differential calculus to vector functions in a simple and natural fashion.

CO4: Extend the basic concepts of differential calculus to vector functions in a simple and natural fashion.

CO5: Evaluate the line, surface and volume integrals and converting them from one to another

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition, 2016.

REFERENCE BOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
3. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CH01) ENGINEERING CHEMISTRY

B.Tech - I Year II – Semester

L	T	P	C
3	1	0	4

Pre-requisites: Chemistry Knowledge at pre-university level

Course Objectives:

- To bring adaptability to new developments in Engineering Chemistry and to acquire the skillsrequired to become a perfect engineer.
- To include the importance of water in industrial usage, fundamental aspects of battery chemistry, significance of corrosion it's control to protect the structures.
- To imbibe the basic concepts of petroleum and its products.
- To acquire required knowledge about engineering materials like cement, smart materials andLubricants.

UNIT - I: Water and its treatment:

Introduction to hardness of water – Estimation of hardness of water by complexometric method and related numerical problems. Potable water and its specifications - Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and break - point chlorination. Defluoridation of water by Nalgonda technique.

Boiler troubles: Sludges, Scales and Caustic embrittlement. Internal treatment of Boiler feed water - Calgon conditioning - Phosphate conditioning - Colloidal conditioning, External treatment methods - Softening of water by ion- exchange processes. Desalination of water – Reverse osmosis.

UNIT – II Battery Chemistry & Corrosion:

Introduction - Classification of batteries- primary, secondary and reserve batteries with examples. Characteristics of batteries. Construction, working and applications of: Zn-air and Lithium ion battery, Applications of Li-ion battery to electrical vehicles. Fuel Cells- Differences between battery and a fuel cell, Construction and applications of Methanol Oxygen fuel cell and Solid oxide fuel cell. Solar cells - Introduction and applications of Solar cells.

Corrosion: Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current methods.

UNIT - III: Polymeric materials:

Definition – Classification of polymers with examples – Types of polymerization – addition (free radical addition) and condensation polymerization with examples – Nylon 6:6, Terylene.

Plastics: Definition and characteristics- thermoplastic and thermosetting plastics, Preparation, Properties and engineering applications of PVC and Bakelite, Teflon.

Rubbers: Natural rubber and its vulcanization.

Elastomers: Characteristics –preparation – properties and applications of Buna-S, Butyl and Thiokolrubber.

Conducting polymers: Characteristics and Classification with examples-mechanism of conduction intrans-polyacetylene and applications of conducting polymers.

Biodegradable polymers: Concept and advantages - Polylactic acid and poly vinyl alcohol and their applications.

UNIT - IV: Energy Sources:

Introduction, Calorific value of fuel – HCV, LCV- Dulongs formula. Classification- solid fuels: coal – analysis of coal – proximate and ultimate analysis and their significance. Liquid fuels – petroleum and its refining, cracking types – moving bed catalytic cracking. Knocking – octane and cetane rating, synthetic petrol - Fischer-Tropsch's process; Gaseous fuels – composition and uses of natural gas, LPG and CNG, Biodiesel – Transesterification, advantages.

UNIT - V: **Engineering Materials:**

Cement: Portland cement, its composition, setting and hardening.

Smart materials and their engineering applications

Shape memory materials- Poly L- Lactic acid. Thermo response materials- Polyacryl amides, Poly vinyl amides

Lubricants: Classification of lubricants with examples-characteristics of a good lubricants - mechanism of lubrication (thick film, thin film and extreme pressure)- properties of lubricants: viscosity, cloud point, pour point, flash point and fire point.

Course Outcomes:

1. Students will acquire the basic knowledge of electrochemical procedures related to corrosion and its control.
2. The students are able to understand the basic properties of water and its usage in domestic and industrial purposes.
3. They can learn the fundamentals and general properties of polymers and other engineeringmaterials.
4. They can predict potential applications of chemistry and practical utility in order to becomegood engineers and entrepreneurs.

TEXT BOOKS:

1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010
2. Engineering Chemistry by Rama Devi, Venkata Ramana Reddy and Rath, Cengage learning,2016
3. A text book of Engineering Chemistry by M. Thirumala Chary, E. Laxminarayana and K. Shashikala, Pearson Publications, 2021.
4. Textbook of Engineering Chemistry by Jaya Shree Anireddy, Wiley Publications.

REFERENCE BOOKS:

1. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi (2015)
2. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22ME03) COMPUTER AIDED ENGINEERING GRAPHICS

B.Tech - I Year II – Semester

L	T	P	C
1	0	4	3

Course Objectives: The objectives of this course are to

- To develop the ability of visualization of different objects through technical drawings.
- To acquire computer drafting skill for communication of concepts, ideas in the design of engineering products.

UNIT - I:

Introduction to Engineering Graphics: Principles of Engineering Graphics and their Significance, Scales – Plain & Diagonal, Conic Sections – General method only. Cycloid, Epicycloid and Hypocycloid, Introduction to Computer aided drafting – views, commands and conics

UNIT- II:

Orthographic Projections: Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures. Computer aided orthographic projections – points, lines and planes

UNIT – III:

Projections of Regular Solids - Sections or Sectional views of Right Regular Solids –Prism, Cylinder, Pyramid, Cone – Computer aided projections of solids – sectional views

UNIT – IV:

Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Development of surfaces using computer aided drafting

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. Conversion of Isometric Views to Orthographic Views and Vice-versa –Conventions. Conversion of orthographic projection into isometric view using computer aided drafting.

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

CO1: Apply computer aided drafting tools to create 2D and 3D objects sketch conics and different types of solids

CO2: Appreciate the need of Sectional views of solids and Development of surfaces of solids

CO3: Read and interpret engineering drawings

CO4: Conversion of orthographic projection into isometric view and vice versa manually and by using computer aided drafting

TEXT BOOKS:

1. Engineering Drawing N.D. Bhatt / Charotar
2. Engineering Drawing and graphics Using AutoCAD Third Edition, T. Jeyapoovan, Vikas: S.Chand and company Ltd.

REFERENCE BOOKS:

1. Engineering Drawing, Basant Agrawal and C M Agrawal, Third Edition McGraw Hill
2. Engineering Graphics and Design, WILEY, Edition 2020
3. Engineering Drawing, M. B. Shah, B.C. Rane / Pearson.
4. Engineering Drawing, N. S. Parthasarathy and Vela Murali, Oxford
5. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers

ONLINE RESOURCES:

1. NPTEL Course on "Engineering Graphics and Design" by Prof. Naresh Varma Datla, Prof. S. R. Kale, IIT Delhi.
2. NPTEL Course on "Engineering Drawing and Computer Graphics" by Prof. Rajaram Lakkaraju, IIT Kharagpur.

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE02) APPLIED MECHANICS

B.Tech - I Year II – Semester

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are to

- Explain the resolution of a system of forces, compute their resultant and solve problems using equations of equilibrium
- Perform analysis of bodies lying on rough surfaces.
- Locate the centroid of a body and compute the area moment of inertia and mass moment of inertia of standard and composite sections
- Explain kinetics and kinematics of particles, projectiles, curvilinear motion, centroidal motion and plane motion of rigid bodies.
- Explain the concepts of work-energy method and its applications to translation, rotation and plane motion and the concept of vibrations

UNIT - I

Introduction to Engineering Mechanics-Force Systems: Basic concepts, Particle equilibrium in 2-D & 3-D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent 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, Equations of Equilibrium of Coplanar Systems and Spatial Systems; Static Indeterminacy.

UNIT - II

Friction: Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, ladder friction

Centroid and Centre of Gravity - Centroid of Lines, Areas and Volumes from first principle, centroid of composite sections; Centre of Gravity and its implications. – Theorem of Pappus.

UNIT - III

Area moment of inertia- Definition, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections; Product of Inertia, Parallel Axis Theorem, Perpendicular Axis Theorem.

Mass Moment of Inertia: Moment of Inertia of Masses - Transfer Formula for Mass Moments of Inertia – Mass moment of inertia of composite bodies.

UNIT - IV

Kinematics of Particles: Kinematics of particles – Rectilinear motion – Curvilinear motion – Projectiles. Kinetics of Particles: Kinetics of particles – Newton's Second Law – Differential equations of rectilinear and curvilinear motion – Dynamic equilibrium – Inertia force – D. Alembert's Principle applied for rectilinear and curvilinear motion.

UNIT - V

Work - Energy Principle: Equation of translation, principle of conservation of energy, work - energy principle applied to particle motion and connected systems, fixed axis rotation. Impulse – Momentum Principle: Introduction, linear impulse momentum, principle of conservation of linear momentum, elastic impact and types of impact, loss of kinetic energy, co efficient of restitution.

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

CO1: Understand concepts of resultant force and moment Systems.
CO2: Analyze problems related to friction developed in motion of bodies.
CO3: Calculate centroid and moment of inertia for simple and composite sections.
CO4: Apply concepts of mechanics to solve problems of rigid body motion
CO5: Understand the application of Work Energy method for plane motion problems

TEXT BOOKS:

1. Shames and Rao, Engineering Mechanics, Pearson Education,2006
2. Reddy Vijay Kumar K. and J. Suresh Kumar (2010), Singer's Engineering Mechanics – Statics &Dynamics
3. Timoshenko S.P and Young D.H.,"Engineering Mechanics", Mc Graw Hill International Edition, 1983.
4. Timoshenko S , Young D.H , Rao J. V , Sukumar Pati Engineering Mechanics, 5th Edition, McGraw Hill Education , 2017

REFERENCE BOOKS:

1.Ferdinand. L. Singer, Engineering Mechanics - Statics and Dynamics, 3rd Edition, Harper International Edition, 1994.
2.James L. Meriam, L. G. Kraige, Engineering Mechanics, John Wiley & Sons, 7th Edition, 2012.
3. Andrew Pytel, Jaan Kiusalaas, "Engineering Mechanics", Cengage Learning,2014.
4. Beer F.P& Johnston E.R Jr. Vector, "Mechanics for Engineers", TMH,2004.
5. Hibbeler R. C & Ashok Gupta, "Engineering Mechanics", Pearson Education, 2010.
6. Tayal A.K., "Engineering Mechanics – Statics & Dynamics", Umesh Publications,2011.
7. Basudeb Bhattacharyya, "Engineering Mechanics", Oxford University Press,2008.
8. Meriam. J. L., "Engineering Mechanics", Volume-II Dynamics, John Wiley & Sons,2008.

ONLINE RESOURCES:

https://nptel.ac.in/courses/112106286

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE04) SURVEYING

B.Tech - I Year II – Semester

L	T	P	C
2	0	0	2

Course Objectives: The first step in engineering practice is surveying and the soundness of any civil engineering work is dependent on the reliability and accuracy of surveying. Therefore, it is imperative that a student of engineering should have good knowledge of surveying. To impart the knowledge of surveying and latest technologies in surveying it is necessary to introduce this subject in the curriculum.

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, indirect methods- optical methods- E.D.M. method.

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

UNIT - II

Levelling and Contouring Leveling-Basics definitions, types of levels and levelling staves, temporary adjustments, methods of levelling, booking and Determination of levels- HI Method-Rise and Fall method, Effect of Curvature of Earth and Refraction.

Contouring- Characteristics and uses of Contours, Direct & Indirect methods of contour surveying, interpolation and sketching of Contours.

Computation of Areas and Volumes

Areas - Determination of areas consisting of irregular boundary and regular boundary (coordinates, MDM, DMD methods), Planimeter.

Volumes - Computation of areas for level section and two-level sections with and without transverse slopes, determination of volume of earth work in cutting and embankments, 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, Gale's traverse table, Omitted measurements.

UNIT - IV

Tacheometric Surveying: Principles of Tacheometry, stadia and tangential methods of Tacheometry.

Curves: Types of curves and their necessity, elements of simple curve, setting out of simple Curves,

UNIT - V

Modern Surveying Methods: Total Station and Global Positioning System: Basic principles, classifications, applications, comparison with conventional surveying. Electromagnetic wave theory - electromagnetic distance measuring system - principle of working and EDM instruments, Components
of GPS – space segment, control segment and user segment, reference systems, satellite orbits, GPS observations. Applications of GPS.

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

CO1: Understand the working principles of survey instruments
CO2: Identify data collection methods and prepare field notes
CO3: Calculate angles, distances and levels and compute areas using theodolite
CO4: Calculate the horizontal and vertical angle using Tacheometric surveying
CO5: Understand the principles of Total station and GPS surveying.

TEXT BOOKS:

1. R. Subramanian, Surveying and levelling, Oxford university press, New Delhi, 2012.
2. Chandra AM, "Higher Surveying", New age International Pvt. Ltd., Publishers, New Delhi,2002.
3. Hoffman. B, H. Lichtenegga and J. Collins, Global Positioning System - Theory and Practice, Springer -Verlag Publishers,2001.

REFERENCE BOOKS:

1. Arthur R Benton and Philip J Taety, Elements of Plane Surveying, McGraw Hill –2000.
2. Arora K R "Surveying Vol 1, 2 & 3), Standard Book House, Delhi, 2004.
3. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Surveying (Vol – 1, 2 & 3), Laxmi Publications (P) ltd., New Delhi.2012
4. Chandra A M, "Plane Surveying", New Age International Pvt. Ltd., New Delhi,2002.
5. Duggal S K, "Surveying (Vol – 1 & 2), Tata McGraw Hill Publishing Co. Ltd. New Delhi,2004.

ONLINE RESOURCES:

1. https://nptel.ac.in/courses/105104101
2. https://nptel.ac.in/courses/105107158
3. https://nptel.ac.in/courses/105103176

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CS04) PYTHON PROGRAMMING LABORATORY

B.Tech - I Year II – Semester

L	T	P	C
2	1	2	2

Course Objectives:

- To install and run the Python interpreter
- To learn control structures.
- To Understand Lists, Dictionaries in python
- To Handle Strings and Files in Python

Lecture- 1: Introduction to Python, Write and Execute a simple python Program, Basic Commands,
Variables, Statements, Input /Output, Keywords, Standard Data Types, Strings, Operands and operators.

Lecture-2: Understanding the Decision Control Structures: The if Statement, A Word on Indentation, The if … else Statement, The if … elif … else Statement.

Lecture- 3: Loop Control Statements: The while Loop, The for Loop, Infinite Loops, Nested Loops. The break Statement, The continue Statement.

Lecture- 4: Function Definition and Execution, Scoping, Arguments, Argument Calling by Keywords, Default Arguments, Function Rules, Return Values.

Lecture- 5: Lists: List, Creating List, Updating the Elements of a List, Sorting the List Elements. Storing Different Types of Data in a List, Nested Lists, Nested Lists as Matrices.

Lecture-6: Tuples: Creating and Accessing the Tuple Elements, Basic Operations on Tuples, Functions to Nested Tuples, Inserting, Modifying and Deleting Elements from a Tuple.

Lecture- 7: Exceptions : What is an Exception? Exception Handling: try..except..else.., try..finally.., Exceptions Nest, Raising Exceptions, Built-In Exceptions.

Lecture- 8: Files: Working with Files and Directories, File Processing, reading from files, writing to files, merging file contents, Controlling File I/O.

Lecture- 9: Python Classes and Objects. Inheritance in Python. Types of inheritance Python.

Lecture- 10: numpy, Plotpy and Scipy libraries of python and their functionalities. Basic GUI programming using these libraries: text labels and buttons.

Week -1: **(Lecture-** 1)

1. i) Use a web browser to go to the Python website http://python.org. This page contains information about Python and links to Python-related pages, and it gives you the ability to search the Python documentation.
   ii) Start the Python interpreter and type help () to start the online helputility.
2. Start a Python interpreter and use it as a Calculator.

3. i) Write a program to calculate compound interest when principal, rate and number of periods is given.
   ii) Given coordinates (x1, y1), (x2, y2) find the distance between two points
4. Read name, address, email and phone number of a person through keyboard and print the details.

Week - 2: *(Lecture-* ***2 & 3)***

1. Print the below triangle using for loop.5
   4 4
   3 3 3
   2 2 2 2
   1 1 1 1 1
2. Write a program to check whether the given input is digit or lowercase character or uppercase character or a special character (use 'if-else-if' ladder)
3. Python Program to Print the Fibonacci sequence using while loop
4. Python program to print all prime numbers in a given interval (use break)

Week - 3: *(Lecture-* ***5)***

1. i) Write a program to convert a list and tuple into arrays.
   ii) Write a program to find common values between two arrays.
2. Write a function called gcd that takes parameters a and b and returns their greatest common divisor.
3. Write a function called palindrome that takes a string argument and returns True if it is a palindrome and False otherwise. Remember that you can use the built-in function len to check the length of a string.

Week - 4: *(Lecture-* ***4)***

1. Write a function called is_sorted that takes a list as a parameter and returns True if the list is sorted in ascending order and False otherwise.
2. Write a function called has_duplicates that takes a list and returns True if there is any element that appears more than once. It should not modify the original list.
   i) Write a function called remove_duplicates that takes a list and returns a new list with only the unique elements from the original. Hint: they don't have to be in the same order.
   ii). The wordlist I provided, words.txt, doesn't contain single letter words. So, you might want to add "I", "a", and the empty string.

iii). Write a python code to read dictionary values from the user. Construct a function to invert its content. i.e., keys should be values and values should be keys.

3. i) Add a comma between the characters. If the given word is 'Apple', it should become 'A,p,p,l,e'
   ii) Remove the given word in all the places in a string?
   iii) Write a function that takes a sentence as an input parameter and replaces the first letterof every word with the corresponding upper case letter and the rest of the first in the word by corresponding letters in lower case without using a built-in function?
4. Writes a recursive function that generates all binary strings of n-bit length

Week - 5: *(Lecture-* ***5)***

1. i) Write a python program that defines a matrix and prints
   ii) Write a python program to perform addition of two square matrices
   iii)Write a python program to perform multiplication of two square matrices
2. How do you make a module? Give an example of construction of a module using different geometrical shapes and operations on them as its functions.

Week-6: *(Lecture-* ***10)***

1. a. Write a function called draw_rectangle that takes a Canvas and a Rectangle as arguments and draws a representation of the Rectangle on the Canvas.
   b. Add an attribute named color to your Rectangle objects and modify draw_rectangleso that it uses the color attribute as the fill color.
   c. Write a function called draw_point that takes a Canvas and a Point as arguments anddraws a representation of the Point on the Canvas.
   d. Define a new class called Circle with appropriate attributes and instantiate a few Circle objects. Write a function called draw_circle that draws circles on the canvas.
2. Write a Python program to demonstrate the usage of Method Resolution Order (MRO) in multiple levels of Inheritances.
3. Write a python code to read a phone number and email-id from the user and validate it for correctness.

Week- 7: *(Lecture-* ***7)***

1. Use the structure of exception handling for all general purpose exceptions.

Week - 8: *(Lecture-* ***8)***

1. Write a Python code to merge two given file contents into a third file.
2. Write a Python code to open a given file and construct a function to check for given words present in it and display on found.
3. Write a Python code to Read text from a text file, find the word with most number of occurrences
4. Write a function that reads a file *file1* and displays the number of words, number ofvowels, blank spaces, lower case letters and uppercase letters.

Week - 9: *(Lecture-* ***9)***

1. Import numpy, Plotpy and Scipy and explore their functionalities.
2. a) Install NumPy package with pip and explore it.
3. Write a program to implement Digital Logic Gates – AND, OR,NOT, EX-OR.
4. Write a program to implement Half Adder, Full Adder, and ParallelAdder.
5. Write a GUI program to create a window wizard having two text labels, two text fields andtwo buttons as Submit and Reset.

Course Outcomes: On successful completion of this course, students will be able to:

CO-1: Develop the application specific codes using python.
CO-2: Understand Strings, Lists, Tuples and Dictionaries in Python.
CO-3: Understand the structure of exception handling for all general purpose exceptions.
CO-4: Verify programs using modular approach, file I/O, Python standard library. Implement DigitalSystems using Python.

TEXT BOOKS:

1. Supercharged Python: Take your code to the next level, Overland
2. Learning Python, Mark Lutz, O'reilly

REFERENCE BOOKS:

1. Python for Data Science, Dr. Mohd. Abdul Hameed, Wiley Publications - 1st Ed. 2021.
2. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
3. Python Programming A Modular Approach with Graphics, Database, Mobile, and Web Applications, Sheetal Taneja, Naveen Kumar, Pearson
4. Programming with Python, A User's Book, Michael Dawson, Cengage Learning, IndiaEdition
5. Think Python, Allen Downey, Green Tea Press
6. Core Python Programming, W. Chun, Pearson
7. Introduction to Python, Kenneth A. Lambert, Cengage

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CH02) ENGINEERING CHEMISTRY LABORATORY

B.Tech - I Year II – Semester

L	T	P	C
0	0	2	1

Course Objectives: The course consists of experiments related to the principles of chemistry required for engineering student. The student will learn:

- Estimation of hardness and chloride content of water to check its suitability for drinking purpose.
- Students are able to perform estimations of acids and bases using conductometry, potentiometry methods.
- Students will learn to prepare polymers such as Bakelite and nylon-6,6 in the laboratory.
- Students will learn skills related to the lubricant properties such as saponification value and viscosity of oils.

List of Experiments:

I. **Volumetric Analysis:** Estimation of Hardness of water by EDTA Complexometry method.

II. **Conductometry:** Estimation of the concentration of an acid by Conductometry.

III. **Potentiometry:** Estimation of the amount of Fe^{+2} by Potentiomentry.

IV. **Determination of P^H**: Determination of P^H of unknown acid solution by using Quinhydrone electrode.

V. **Preparations:**

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

VI. **Lubricants:**

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

VII. Determination of surface tension of a given liquid using Stalagmometer.

VIII. **Virtual lab experiments**

1. Construction of Fuel cell and it's working.
2. Smart materials for Biomedical applications
3. Batteries for electrical vehicles.
4. Functioning of solar cell and its applications.

Course Outcomes: The experiments will make the student gain skills on:

CO1: Able to determine the hardness of water

CO2: Able to perform methods such as conductometry, and potentiometry in order to find out the concentrations or equivalence points of acid, and P^H of unknown solutions.

CO3: Students are able to prepare polymers like bakelite and nylon-6,6.

CO4: Estimations saponification value, and viscosity of lubricant oils.

REFERENCE BOOKS:

1. Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna, S Chand Publications, New Delhi (2022)
2. Vogel's text book of practical organic chemistry 5th edition
3. Inorganic Quantitative analysis by A.I. Vogel, ELBS Publications.
4. College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi (2007).

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE05) SURVEYING LABORATORY – I

B.Tech - I Year II – Semester

L	T	P	C
0	0	2	1

Pre-requisites: Surveying

Course Objective:

1. Student will be able to learn and understand the various basic concept and principles used in surveying like Chain Surveying, Compass Surveying, Plane Table Surveying, and Levelling Surveying.
2. Student will be able to learn and understand various instrument used in surveying.
3. Student will learn and understand how to calculate Area of plot and Ground.
4. Student will learn and understand about Horizontal Angle, Vertical Angle, Horizontal distance and Vertical distance to study the ground profile.

List of Experiments

1. Chaining of a line using chain, measurements of area by cross staff survey.
2. Measurement of distance between two points when there is an obstacle for both chaining and ranging. Compass survey
3. Traversing by compass and adjustments in included angles and measurement of area – graphical adjustments.
4. Distance between two inaccessible points by compass. Plane Table Surveying
5. Measurement & Plotting of the area by Radiation method.
6. Determination of Positions objects by Intersection Method – Plane Table Survey.
7. Traverse by Plane table Survey.

Leveling

8. Measurement of elevation of various given points.
9. Elevation difference between two given points by reciprocal leveling.
10. Longitudinal Leveling
11. Cross – section Leveling
12. Plotting of Contours by Indirect Method

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

CO1: Student will be able to prepare Map and Plan for required site with suitable scale.

CO2: Student will be able to prepare contour Map and Estimate the Quantity of earthwork required for formation level for Road and Railway Alignment.

CO3: Student will be able to judge which type of instrument to be used for carrying out survey for a Particular Area and estimate the area.

CO4: Student will be able to judge the profile of ground by observing the available existing contour map.

REFERENCE BOOKS:

1. Dr. K.R. Arora, "Surveying Volume I and II", Standard Book House, 15th Edition, 2015.
2. R. Subramanian, "Surveying and Leveling", Oxford University Press, New Delhi,2nd Edition, 2007.
3. B.C. Punmia & Ashok kumar Jain, "Surveying Volume I and II", Laxmi Publications,16th Edition., 2011.

ONLINE RESOURCES:

1. http://sl-iitr.vlabs.ac.in/List%20of%20experiments.html

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22MA03) PROBABILITY AND STATISTICS

B.Tech - II Year I – Semester

L	T	P	C
3	1	0	4

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

Course 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 statistical inferences

UNIT - I: Probability

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

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

UNIT - II: Expectation and discrete distributions

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: Binomial Distribution, Poisson distribution.

UNIT - III: Continuous Distributions and sampling

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

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, 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

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 concepts of one unit to the concepts in other units.

TEXT BOOKS:

1. Probability & Statistics for Engineers & Scientists, Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Pearson Publishers, 9th Edition, 2007.
2. Fundamentals of Mathematical statistics, S C Gupta and V K Kapoor, Khanna publications, 10th Edition, 10th Edition, 2002

REFERENCE BOOKS:

1. Fundamentals of Probability and Statistics for Engineers, T. T. Soong, John Wiley & Sons, Ltd, 2004.
2. Probability and statistics for Engineers and scientists, Sheldon M Ross, academic press. 5th edition, 2014

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE06) BUILDING MATERIALS, CONSTRUCTION AND PLANNING

B.Tech - II Year I – Semester

L	T	P	C
3	0	0	3

Pre-requisites: Nil

Course Objectives: The objectives of the course is to

- Understand the construction materials used in daily practice
- 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 / fiber– reinforced glass bricks, steel & aluminum, Plastics.

UNIT - II

Cement & Admixtures: Ingredients of cement – manufacturing process of cement – 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 Hazards – Classification of fire- resistant materials and constructions.

UNIT - IV

Mortars, Masonry and Finishing's Mortars: Cement Mortar, 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: Classification of buildings ,functional Planning of buildings: Sustainability and concept of Green building, General aspects to consider for planning, bye-laws and regulations, Selection of site for building construction, Principles of planning, Orientation of building and its relation to outside environment

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

CO 1: Comprehend different types of construction material.

CO 2: Understand the manufacturing of Cement and role of Admixtures

CO 3: Identify the concept of building components and services

CO 4: Know the importance of Masonry and formwork.

CO 5: Plan a building based on the factors and principles of planning

TEXT BOOKS:

1. Building Materials and Construction – Arora & Bindra, Dhanpat Roy Publications, Revised Edition,2014.
2. Building Materials and Construction by G C Sahu, Joygopal Jena McGraw hill Pvt Ltd 2015.
3. Building Construction by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) Ltd, 5th Edition 2005.

REFERENCE BOOKS:

1. Building Materials by Duggal, New Age International, 3rd Edition, 2008
2. Building Materials by P. C. Varghese, PHI learning Pvt. Ltd. 3nd edition, 2015
3. Construction Technology – Vol – I & II by R. Chubby, Longman UK, 2nd edition, 1987
4. Alternate Building Materials and Technology, Jagadish, Venkatarama Reddy and others; New Age Publications, revised 2013.

ONLINE REFERENCES:

1. http://nptel.ac.in/courses/105102088/
2. http://nptel.ac.in/courses/105102088/#

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE07) ENGINEERING GEOLOGY

B.Tech - II Year I – Semester

L	T	P	C
3	0	0	3

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: Feldspar, Quartz, Flint, Jasper, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc, Calcite. Study of other common economics minerals such as Pyrite, Hematite, Magnetite, Chlorite, 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, Laterite, 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. Ground water, Water table, common types of ground water, springs, cone of depression, geological controls of ground water movement, ground water exploration.

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. Improvement of competence of sites by grouting etc. Fundamental aspects of Rock mechanics and Environmental Geology.

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. Factors contributing to the success of a reservoir. Geological factors influencing water Lightness and life of reservoirs - Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations (i.e. Tithological, 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:

CO1: Understand the importance of geological knowledge in civil engineering point of view.
CO2: Gain basics knowledge on properties of mineralogy and petrology.
CO3: Gain knowledge about structural geology.
CO4: Understand the effects of earthquakes and importance of geophysical studies.
CO5: Understand the application of geological investigation in projects such as dams, Reservoirs and tunnels

TEXT BOOKS:

1. Engineering Geology by N. Chennakesavulu, McMillan, India Ltd. 2nd Edition, 2018.
2. Engineering Methods by D. Venkat Reddy; Vikas Publishers, Revised Edition 2015.
3. Engineering Geology by S K Duggal, H K Pandey Mc Graw Hill Education Pvt Ltd , 5thedition, 2017
4. Principles of Engineering Geology by K.V.G.K. Gokhale – B.S publications, 3rd Edition,2006

REFERENCE BOOKS:

1. Fundamental of Engineering, F.G. Bell, B.S. Publications, 2nd Edition,2005.
2. Krynine & Judd, Principles of Engineering Geology & Geotechnics, CBS Publishers & Distribution, Revised Edition, 2005.
3. Engineering Geology by Subinoy Gangopadhyay, Oxford university press, 3rd Edition, 2013.
4. Engineering Geology for Civil Engineers – P.C. Varghese PHI, 5th Edition, 2011.

ONLINE REFERENCES

1. https://nptel.ac.in/courses/105/105/105105106/
2. https://nptel.ac.in/courses/105/104/105104191/

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE08) STRENGTH OF MATERIALS – I

B.Tech - II Year I – Semester

L	T	P	C
3	0	0	3

Pre-requisites: Applied 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 different types 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 rectangular and 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 – IV

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.

UNIT – 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).

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

CO1: Determine the stresses and strains in the members.
CO2: Draw shear force and Bending moment diagram for determinate beams.
CO3: Identify the flexural and shear stresses for various sections.
CO4: Evaluate the slope and deflection of determinate beams.
CO5: Identify the concept of principal stresses and theory of failures.

TEXT BOOKS:

1. Timoshenko and Gere, "Mechanics of Materials", PWS Publishing Company, Boston, 4th Edition., 1997.
2. Strength of Materials by R. K Rajput, S. Chand & Company Ltd, 5th edition, 2015
3. Mechanics of Materials by Dr. B.C Punmia, Dr. Ashok Kumar Jain and Dr. Arun Kumar Jain, 10th Edition, 2018
4. Strength of Materials by R. Subramanian, Oxford University Press, 3nd Edition, 2010

REFERENCE BOOKS:

1. Mechanics of material by R.C. Hibbeler, Prentice Hall publications, 8th edition, 2011.
2. Engineering Mechanics of Solids by Egor P. Popov, Prentice Hall publications, 2nd edition, 1998.
3. Strength of Materials by T.D.Gunneswara Rao and M.Andal, Cambridge Publishers, 5th Edition, 2018.
4. Strength of Materials by R.K. Bansal, Lakshmi Publications House Pvt. Ltd. Revised 4th Edition, 2010.

ONLINE RESOURCES:

1. https://nptel.ac.in/courses/112/101/112101095/
2. https://nptel.ac.in/courses/105/105/105105108/

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE09) FLUID MECHANICS

B.Tech - II Year I – Semester

L	T	P	C
3	0	0	3

Pre-requisites: Nil

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.
- Train and analyses 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.

UNIT – I

Properties of Fluid

Distinction between a fluid and a solid; Properties of fluids – Viscosity, Newton law of viscosity; vapour pressure, boiling point, cavitation; surface tension, capillarity, Bulk modulus of elasticity, compressibility.

Fluid Statics

Fluid Pressure: Pressure at a point, Pascals law, Hydrostatic law, Piezometer, U-Tube Manometer, Single Column Manometer, U-Tube Differential Manometer, Micromanometers. Pressure gauges, Hydrostatic pressure and force: horizontal, vertical and inclined surfaces.

UNIT - II

Fluid Kinematics

Classification of fluid flow: steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; One, two- and three-dimensional flows; Streamline, path line, streak line and stream tube; stream function, velocity potential function , flow net , One, two- and three-dimensional continuity equations in Cartesian coordinates applications.

Fluid Dynamics

Surface and Body forces -Euler's and Bernoulli's equation; Momentum equation. correction factors. Bernoulli's equation to real fluid flows.

UNIT - III

Flow Measurement in Pipes

Practical applications of Bernoulli's equation: venturi meter, orifice meter and pitot tube, applications of Momentum equations; Forces exerted by fluid flow on pipe bend, sudden enlargement in pipes.

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**,** Loss of head through pipes, Darcy-Wiesbatch equation, minor losses, total energy line, hydraulic grade line, Pipes in series, equivalent pipes, pipes in parallel, siphon, branching of pipes, three reservoir problem, power transmission through pipes. Analysis of pipe networks: Hardy Cross method and EPA NET, water hammer in pipes and control measures.

UNIT - V

Laminar & Turbulent Flow

Laminar flow through circular pipes, and fixed parallel plates.

Boundary Layer Concepts

Prandtl contribution, Assumption and concept of boundary layer theory. Boundary-layer thickness, displacement, momentum & energy thickness concepts of laminar and turbulent boundary layers on a flat plate; Laminar sub-layer, smooth and rough boundaries. Local and average friction coefficients. Separation and Control. Drag and Lift and types of drag, magnus effect.

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

CO 1: Understand the broad principles of fluid statics,
CO 2: Learn the concept of fluid kinematics and dynamics.
CO 3: Understand the measurement of flow in pipes and notches.
CO 4: Understand classifications of flow losses through pipes.
CO 5: Apply the continuity, momentum and energy principles.

TEXT BOOKS:

1. Fluid Mechanics by Modi and Seth, Standard Book House, 22nd Edition,2019
2. Fluid Mechanics and Hydraulic machines by Manish Kumar Goyal, PHI learning Private Limited, Revised Edition,2015.
3. Fluid Mechanics by R.C. Hibbeler, Pearson India Education Services Pvt. Ltd, 2nd edition, 2011.

REFERENCE BOOKS:

1. Fluid Mechanics – Frank M. White – 8th Edition – Mc Graw Hill Education, 7th Edition, 2011.
2. Theory and Applications of Fluid Mechanics, K.Subramanya, Tata McGraw Hill, 1993.
3. Introduction to Fluid Mechanics and Fluid Machines by SK Som, Gautam Biswas, Suman Chakraborthy, Mc Graw Hill Education (India) Private Limited, 3rd edition, 2011.
4. Fluid Mechanics and Machinery,C.S.P. Ojha, R. Berndtsson and P. N. Chadramouli, Oxford University Press, 2010.

ONLINE RESOURCES:

1. https://nptel.ac.in/courses/112/104/112104118/
2. https://nptel.ac.in/courses/112/105/112105171/

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE10) SURVEYING LABORATORY – II

B.Tech - II Year I – Semester

L	T	P	C
0	1	2	2

Pre-requisites: Surveying

Course Objectives:

- Student will be able to learn and understand about theodolite and total station in surveying.
- Student will learn and understand how to calculate Area of plot and ground.
- Student will learn and understand about Horizontal Angle, Vertical Angle, Horizontal distance and Vertical distance to study the ground profile using total station.

LIST OF EXPERIMENTS:

Theodolite surveying:

1. Measurement of horizontal angles and vertical angles.
2. Distance between two inaccessible points.
3. Measurement of area by theodolite traversing.
4. Determination of tachometer constants.
5. Distance between two inaccessible points using the principles of trigonometric surveying

Total Station:

6. Area Measurement
7. Stake Out
8. Remote Elevation Measurement
9. Missing Line Measurement
10. Contouring
11. Providing a Simple Circular Curve

Course Outcomes: After the completion of the course, students should be able to

CO 1: Calculate area of given plot/points using theodolite survey.

CO 2: Determine the angle/distance of given points using theodolite survey.

CO 3: Find out the area, distance and elevation of the given points using total station

CO 4: Determine the height and plot curve using Total station

REFERENCE BOOKS:

1. Dr. K.R. Arora, "Surveying Volume I and II", Standard Book House, 15th Edition, 2015.
2. R. Subramanian, "Surveying and Leveling", Oxford University Press, New Delhi, 2nd Edition, 2007.
3. B.C. Punmia & Ashok kumar Jain, "Surveying Volume I and II", Laxmi Publications, 16th Edition., 2011.

ONLINE RESOURCES:

1. http://sl-iitr.vlabs.ac.in/List%20of%20experiments.html

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE11) STRENGTH OF MATERIALS LABORATORY

B.Tech - II Year I – Semester

L	T	P	C
0	0	2	1

Pre-requisites: Nil

Course Objectives:

- To conduct the Tension test, Compression test on various materials
- To conduct the Shear test, Bending test on determinate beams
- To conduct the Compression test on spring and Hardness test using various machines
- To conduct the Torsion test, Impact test on various materials

List of Experiments:

1. Tension test
2. Bending test on Cantilever beam.
3. Bending test on simple support beam.
4. Torsion test
5. Hardness test
6. Spring test
7. Compression test on concrete.
8. Impact test
9. Shear test
10. Continuous beam – deflection test

Course Outcomes: After the completion of the course, students will be able to

CO1: Identify the bending behavior of beams using bending test.
CO2: Determine the behavior of material under torsion.
CO3: Determine the hardness of materials using different tests.
CO4: Find out the characteristic of material under compression, impact and shear test.

REFERENCE BOOKS:

1. Rajput.R.K. “Strength of Materials”, S.Chand and Co, New Delhi, 4th Edition, 2018
2. Punmia.B.C., Ashok Kumar Jain and Arun Kumar Jain, SMTS – I Strength of materials, Laxmi Publications, New Delhi, 10th Edition, 2018
3. Bansal. R.K. “Strength of Materials”, Laxmi Publications Pvt. Ltd., New Delhi, 6th Edition, 2018

ONLINE RESOURCES:

1. http://sm-nitk.vlabs.ac.in/List%20of%20experiments.html
2. https://eerc01-iiith.vlabs.ac.in/List%20of%20experiments.html

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE12) COMPUTER AIDED DRAFTING LABORATORY

B.Tech - II Year I – Semester

L	T	P	C
0	0	2	1

Pre-requisites: Nil

Course Objectives:

- To be able to plan buildings as per NBC**.**
- To understand various types of conventional signs and brick bonds.
- To draw the plan section and elevation for doors, trusses and staircases.
- To use AutoCAD tools to draw building plans, sections and elevations from a given line diagram and specifications.

List of Experiments:

1. Planning Aspects of Building systems as per National Building Code (NBC).
2. Brick bonds: English bond & Flemish bond – Odd and Even courses.
3. Developing plan and section of dog-legged staircase.
4. Developing plan of single storied residential building.
5. Developing section and elevation of single storied residential building.
6. Developing plan of single /two storied Residential building as per Building by-laws.
7. Developing plan of public building as per building by-laws.
8. Developing section and elevation of public building.
9. Development of working drawing of building –Electrical Layout.
10. Development of working drawing of building – Plumbing Layout.

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

CO 1: Plan buildings as per NBC.

CO 2: Draw brick bonds, Plan, Section and Elevation of buildings.

CO 3: Develop residential building and public building as per the building by-laws.

CO 4: Draw Electrical layout, Plumbing layout for buildings.

REFERENCE BOOKS:

1. Engineering Graphics by P. J. Sha - S. Chand & Co
2. Civil Engineering Drawing-I by S. Mahaboob Basha – Falcon Publishers
3. Building drawing by M. G. Shah - Tata McGraw-Hill Education
4. Structural Engineering Drawing by S. Mahaboob Basha – Falcon Publishers

ONLINE RESOURCES:

1. https://www.autodesk.in/campaigns/autocad-tutorials

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22MC08) LOGICAL REASONING AND QUANTITATIVE APTITUDE

B.Tech - II Year I – Semester

L	T	P	C
3	0	0	0

Pre-requisites: Mathematics

Objectives:

The purpose of this course ensure the students

- To improve logical thinking with general applications using mathematical concepts likesequences, series, number theory and probability.
- It also features students to analyze data interpretation and able of improve their mathematicalskills in various general aspects like coding and decoding, Time and Work puzzles solving bloodrelations etc.

Unit – I: Logical Reasoning

1. Coding and Decoding
2. Distance and Directions
3. Classifications
4. Odd man out and series
5. Clocks and Calendars etc.

Unit – II: Logical ability

1. Blood relations
2. Seating Arrangements
3. Figure Analysis
4. Puzzles etc.

Unit – III: Number systems

1. LCM and HCF
2. Ratio and proportion
3. Simple interest and compound interest
4. Profit and Loss etc.

Unit – IV: Arithmetic ability

1. Time and work
2. Partnerships
3. Time speed and distance
4. Problems on Trains etc.

Unit – V: Mathematical ability

1. Sequence and series
2. Permutations and combination
3. General probability etc.

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22EE19) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

B.Tech - II Year II – Semester

L	T	P	C
3	0	0	3

Pre-requisites:

Course Objectives:

- To introduce the concepts of electrical circuits and its components
- To understand magnetic circuits, DC circuits and AC single phase & three phase circuits
- To study and understand the different types of DC/AC machines and Transformers.
- To import the knowledge of various electrical installations.
- To introduce the concept of power, power factor and its improvement.
- To introduce the concepts of diodes & transistors, and
- To impart the knowledge of various configurations, characteristics and applications.

UNIT - I:

D.C. Circuits: Electrical circuit elements (R, L and C), voltage and current sources, KVL&KCL, analysis of simple circuits with dc excitation.

A.C. Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits , Three- phase balanced circuits, voltage and current relations in star and delta connections.

UNIT - II:

Electrical Installations: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

UNIT - III:

Electrical Machines: Working principle of Single-phase transformer, equivalent circuit, losses in transformers, efficiency, Three-phase transformer connections. Construction and working principle of DC generators, EMF equation, working principle of DC motors, Torque equations and Speed control of DC motors, Construction and working principle of Three-phase Induction motor, Torques equations and Speed control of Three-phase induction motor. Construction and working principle of synchronous generators.

UNIT - IV:

P-N Junction and Zener Diode: Principle of Operation Diode equation, Volt-Ampere characteristics, Temperature dependence, Ideal versus practical, Static and dynamic resistances, Equivalent circuit, Zener diode characteristics and applications.

Rectifiers and Filters: P-N junction as a rectifier - Half Wave Rectifier, Ripple Factor - Full Wave Rectifier, Bridge Rectifier, Harmonic components in Rectifier Circuits, Filters – Inductor Filters, Capacitor Filters, L- section Filters, π- section Filters.

UNIT - V:

Bipolar Junction Transistor (BJT): Construction, Principle of Operation, Amplifying Action, Common Emitter, Common Base and Common Collector configurations, Comparison of CE, CB and CC configurations.

Field Effect Transistor (FET): Construction, Principle of Operation, Comparison of BJT and FET, Biasing FET.

Course Outcomes:

CO 1: To analyze and solve electrical circuits using network laws and theorems.
CO 2: To understand and analyze basic Electric and Magnetic circuits
CO 3: To study the working principles of Electrical Machines
CO 4: To introduce components of Low Voltage Electrical Installations
CO 5: To identify and characterize diodes and various types of transistors.

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, McGraw Hill Education

REFERENCE BOOKS:

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, Satyabrata Jit, TMH, 2/e, 1998.
3. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6th edition.
4. Linear circuit analysis (time domain phasor and Laplace transform approaches) - 2nd edition by Raymond A. De Carlo and Pen-Min-Lin, Oxford University Press-2004.
5. Network Theory by N. C. Jagan& C. Lakshminarayana, B.S. Publications.
6. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.
7. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
8. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
9. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE13) CONCRETE TECHNOLOGY

B.Tech - II Year II – Semester

L	T	P	C
3	0	0	3

Pre-requisites: Building Materials

Course Objectives: The objectives of the course are to

- Know different types of cement as per their properties for different field applications.
- Understand Design economic concrete mix proportion for different exposure conditions and intended purposes.
- Know field and laboratory tests on concrete in plastic and hardened stage.

UNIT I

Aggregate: Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine, Manufactured sand and coarse Aggregates – Gap graded aggregate – Maximum aggregate size- Properties Recycled aggregate.

UNIT - II

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

UNIT – III

Hardened Concrete: Water / Cement ratio – Abram's Law – Gel/space ratio – Gain of strength of concrete – Maturity concept – Strength in tension and compression – Factors affecting strength – Relation between compression and tensile strength - Curing.

Testing of Hardened Concrete: Compression tests– Tension tests – Factors affecting strength – Flexure tests – Splitting tests – Pull-out test, Non-destructive testing methods – codal provisions for NDT.

UNIT - IV

Elasticity, Creep & Shrinkage – Modulus of elasticity – Dynamic modulus of elasticity – Poisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep - Effects of creep – Shrinkage – types of shrinkage.

UNIT – V

Admixtures: Types of admixtures – mineral and chemical admixtures.

Mix Design: Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by various methods – BIS method of mix design.

Special Concretes: Introduction to Light weight concrete – Cellular concrete – No-fines concrete – High density concrete – Fibre reinforced concrete – Polymer concrete – High performance concrete – Self compacting concrete, Nano silica and Nano Alumina concrete.

Course Outcomes: After the completion of the course student will be able to

CO1: Acquire knowledge on the testing of aggregates and its properties.

CO2 : Understand the properties of concrete in fresh state.

CO3 : Comprehend the properties of concrete in hardened concrete.

CO3 : Ability to know the concept of Elasticity, Creep and Shrinkage.

CO5 : Identify different types of admixtures and special concrete

TEXT BOOKS:

1. Concrete Technology by M.S. Shetty , S. Chand & Co., 8th Edition, 2019.
2. Properties of Concrete by A. M. Neville – Pearson Education Limited, 5th Edition, 2012
3. Concrete Technology by M. L. Gambhir. – Tata Mc. Graw Hill Publishers, 5thEdition, 2009

REFERENCE BOOKS:

1. Concrete: Micro structure, Properties and Materials – P.K. Mehta and J.M. Monteiro, Mc- Graw Hill Publishers, 4th Edition 2017.
2. Concrete Technology, A.M.Neville & J.J.Brooks, Pearson Education Limited, 2nd Edition, 2019
3. Concrete Technology by A.R. Santhakumar, Oxford university Press, New Delhi 2nd Edition, 2018

CODE BOOKS:

1. IS 4031:1988 - Methods of Physical tests for Hydraulic Cement, BIS Publication
2. IS 10262-2019 - Guidelines for concrete mix design proportioning, BIS Publication
3. IS 383 : 2016 –Coarse and Fine aggregate for concrete, BIS Publication
4. IS 516:2018 (Part 1-4) – Hardened Concrete – Method of Test, BIS Publication
5. IS 2386:1963 – Methods of Test for aggregate for concrete, BIS Publication
6. SP 23:1982 – Handbook on concrete mixes, BIS Publication

ONLINE RESOURCES:

1. https://nptel.ac.in/courses/105/102/105102012/
2. https://nptel.ac.in/courses/105/104/105104030/

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE14) STRENGTH OF MATERIALS – II

B.Tech - II Year II – Semester

L	T	P	C
3	0	0	3

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 member 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

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.

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

UNIT – V

Unsymmetrical 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 center for symmetrical and unsymmetrical (channel, I, T and L) sections.

Course Outcomes: After the completion of this course, the students will be able to

CO1: Understand the concept of torsion of circular shafts and springs

CO2: Determine the critical load of columns

CO3: Evaluate the direct and bending stresses of different structures

CO4: Determine the stresses developed in thick and thin cylinders

CO5: Analyze the unsymmetrical bending of beams and shear centre for different section

TEXT BOOKS:

1. Timoshenko and Gere, "Mechanics of Materials", PWS Publishing Company, Boston, 4th Edition., 1997.
2. Rattan.S.S., "Strength of Materials", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2nd Edition, 2011.
3. Punmia B.C., Ashok Kumar Jain and Arun Kumar Jain,"Theory of Structures (SMTS) – II" , Laxmi Publishing Pvt Ltd, New Delhi, 12th Edition, 2017.

REFERENCE BOOKS:

1. Andrew Pytel and Ferdinand L. Singer, "Strength of Materials", Harper and Row Publishers, New York, 4th Edition., 2011.
2. Ferdinand P Beer et al., "Mechanics of Materials", Tata McGraw Hill Education Pvt. Ltd, 6th Edition, 2012.
3. Rajput R.K. "Strength of Materials (Mechanics of Solids)", S.Chand & company Ltd., New Delhi, 5th Edition, 2015.

ONLINE RESOURCES:

1. https://nptel.ac.in/courses/112/101/112101095/
2. https://nptel.ac.in/courses/105/105/105105108/

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE15) HYDRAULICS AND HYDRAULIC MACHINERY

B.Tech - II Year II – Semester

L	T	P	C
3	0	0	3

Pre-requisites: Fluid Mechanics

Course Objectives: The objective of the course is

- 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

Open Channel Flow – I: Introduction to Open channel flow-Comparison between open channel flow and pipe flow, Classification of open channel flows, Velocity distribution. Uniform flow – Characteristics of uniform flow, Chezy's, Manning's and Bazin formulae for uniform flow – Factors affecting Manning's Roughness Coefficient. 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 - II

Open Channel Flow – II: 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).

UNIT - III

Dimensional Analysis and Hydraulic Similitude: Dimensional homogeneity – Rayleigh's method and Buckingham's π 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 - IV

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 - V

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.
Reciprocating pumps – Working, discharge, slip indicator diagrams.

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

CO 1: Apply fundamental knowledge in open-channel hydraulics in Civil Engineering.
CO 2: Describe dimensional analysis and similarity to develop hydraulic model.
CO 3: Understand about the turbo-machines and its efficiency
CO 4: Gain knowledge of hydraulic turbines and their operational design.
CO 5: Evaluate the performance of centrifugal pumps.

TEXT BOOKS:

1. Fluid Mechanics , Modi and Seth, Standard Book House, 22nd Edition,2019
2. Fluid Mechanics and Hydraulic machines, Manish Kumar Goyal, PHI learning Private Limited, Revised Edition, 2015
3. Open Channel flow, K. Subramanya, Tata McGraw-Hill Publishers, 3rd Editrion,2009.

REFERENCE BOOKS:

1. Fluid Mechanics by R. C. Hibbeler, Pearson India Education Services Pvt. Ltd, 2nd edition, 2011.
2. Fluid Mechanic & Fluid Power Engineering by D. S. Kumar (Kataria & Sons Publications Pvt. Ltd.), 9th edition, 2015, reprint 2018.
3. Introduction to Fluid Mechanics and Fluid Machines by SK Som, Gautam Biswas, Suman Chakraborthy, Mc Graw Hill Education (India) Private Limited, 3rd edition, 2011.
4. Hydraulic Machines by Banga& Sharma (Khanna Publishers), 7th edition, 1998

ONLINE RESOURCES:

1. https://nptel.ac.in/courses/105/103/105103096/
2. https://nptel.ac.in/courses/112/104/112104117/

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE16) STRUCTURAL ANALYSIS – I

B.Tech - II Year II – Semester

L	T	P	C
3	0	0	3

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 arches for 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

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

Three Hinged Arches – Introduction – Types of Arches – Comparison between Three hinged and Two hinged Arches - Linear Arch - Eddy's theorem - Analysis of Three hinged arches - Normal Thrust and radial shear and bending moment - Geometrical properties of parabolic and circular arches - Three hinged parabolic circular archeshaving supports at different levels.

UNIT - III

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

UNIT – IV

Continuous Beams: Introduction-Continuous beams - Clapeyron's theorem of three moments- Analysis of continuous beams with constant and variable moments of inertia with one or both ends fixed-continuous beams with overhang - eeffect of sinking of supports.

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

UNIT – V

Moving Loads and Influence Lines: Introduction maximum SF and BM at a given section and absolute maximum shear force and bending moment due to single concentrated load ,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.

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

CO 1: Analyze pin-jointed plane frames by different methods.
CO 2: Analyze three hinged arches and understand the concept of energy theorems.
CO 3: Understand the Indeterminate beams with rotation of a support.
CO 4: Analyze the beams using three moments and slope deflection method.
CO 5: Understand the concept of moving loads and influence lines.

TEXT BOOKS:

1. Structural Analysis Vol –I & II by V.N. Vazirani and M.M. Ratwani, Khanna Publishers, 16th edition, 2015.
2. Structural Analysis Vol I & II by G. S. Pandit and S.P. Gupta, Tata McGraw Hill Education Pvt. Ltd, Revised Edditin, 2011
3. Mechanics of Structures Vol – I and II by H.J. Shah and S.B. Junnarkar, Charotar Publishing House Pvt. Ltd, 3rd Edition.2014

REFERENCE BOOKS:

1. Structural Analysis by R. C. Hibbeler, Pearson Education, 8th edition, 2009
2. Basic Structural Analysis by K.U. Muthu, I.K. International Publishing House Pvt. Ltd, Revised Edition, 2009
3. Structural analysis T. S Thandavamoorthy, Oxford university Press, Revised Edition, 2011
4. Basic Structural Analysis by C. S. Reddy, Tata McGraw Hill Education Pvt. Ltd, 3rd edition, 2010

ONLINE REFERENCES:

1. https://nptel.ac.in/courses/105/105/105105166/
2.https://nptel.ac.in/courses/105/101/105101085/

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE17) FLUID MECHANICS AND HYDRAULICS MACHINERY LABORATORY

B.Tech - II Year II – Semester

L	T	P	C
0	0	2	1

Pre-requisites: Nil

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 Notch
5. Determination of Minor losses in pipe flow
6. Determination of Friction factor of a pipe line
7. Determination of Energy loss in Hydraulic jump
8. Impact of jet on vanes
9. Performance Characteristics of Pelton wheel turbine
10. Performance Characteristics of Francis turbine
11. Performance characteristics of Keplan Turbine
12. Performance Characteristics of a single stage / multi stage Centrifugal Pump

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

CO 1: Describe the basic measurement techniques of fluid mechanics and its application.

CO 2: Demonstrate practical understanding of the minor and friction losses in pipe flows

CO 3: Discover practical working of Hydraulic machines- different types of Turbines, Pumps and other miscellaneous hydraulics machines.

CO 4: Compare results of analytical models with actual behavior of real fluid flows.

REFERENCE BOOKS:

1. D.S. Kumar, "Fluid Mechanics & Fluid Power Engineering", Kataria & Sons, 9th Edition, 2018
2. K, Subramanya, "Fluid Mechanics and Hydraulic Machines", Tata McGraw Hill Education Pvt. Ltd, 2nd Edition, 2019
3. Rajput.R.K. "Fluid Mechanics and Hydraulic Machines", S.Chand and Co, New Delhi, 6th Edition, 2016

ONLINE RESOURCES:

1. http://fm-nitk.vlabs.ac.in/List%20of%20experiments.html
2. https://eerc03-iiith.vlabs.ac.in/List%20of%20experiments.html

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22EE20) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY

B.Tech - II Year II – Semester

L	T	P	C
0	0	2	1

Pre-requisites: Basic Electrical and Electronics Engineering

Course Objectives:

- To introduce the concepts of electrical circuits and its components
- To understand magnetic circuits, DC circuits and AC single phase & three phase circuits
- To study and understand the different types of DC/AC machines and Transformers.
- To introduce the concepts of diodes & transistors
-

List of experiments/demonstrations:

1. Verification of KVL and KCL
2. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer.
3. Magnetization Characteristics of a Separately Excited DC Shunt Generator
4. Swinburn's test on dc shunt machine
5. Performance Characteristics of a Three-phase Induction Motor.
6. Study and operation of
   (i)Multi-meters (ii) Function Generator (iii) Regulated Power Supplies (iv) CRO.
7. PN Junction diode characteristics
8. Zener diode characteristics and Zener as voltage Regulator
9. Input & Output characteristics of Transistor in CB / CE configuration
10. Full Wave Rectifier with & without filters

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

CO 1: To analyze and solve electrical circuits using network laws

CO 2: To understand and analyze basic Electric and Magnetic circuits

CO 3: To study the working principles of Electrical Machines

CO 4: To identify and characterize diodes and various types of transistors.

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, McGraw Hill Education

REFERENCE BOOKS:

1. Electronic Devices and Circuits – R. L. Boylestead and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.
2. Millman's Electronic Devices and Circuits – J. Millman and C. C. Halkias, Satyabrata Jit, TMH, 2/e, 1998.
3. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6th edition.
4. Network Theory by N. C. Jagan& C. Lakshminarayana, B.S. Publications.
5. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.
6. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE18) CONCRETE TECHNOLOGY LABORATORY

B.Tech - II Year II – Semester

L	T	P	C
0	0	2	1

Pre-requisites: Nil

Course Objectives:

1. To know the various procedures to determine the characteristics of cement
2. To understand the test procedures to evaluate the characteristics of aggregates
3. To know the test procedures to find the properties of fresh concrete
4. To understand the test procedures to find mechanical properties of hardened concrete

List of Experiments

1. Tests on Cement:

a) Soundness.

b) Compressive strength.

2. Tests on Aggregates:

a) Water Absorption

b) Impact Test

c) Crushing Test

3. IS method of mix design of normal concrete as per IS: 10262

4. Tests on Fresh Concrete:

a) Slump cone test.

b) Compacting factor test.

c) Vee-Bee consistometer test.

5. Tests on Hardened Concrete:

a) Compressive & Split Tensile strength tests.

b) Flexural Strength Test

c) Modulus of elasticity of concrete.

d) Non-destructive testing of concrete – Rebound and Ultrasonic Pulse Velocity Test

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

CO1: Acquire knowledge on the properties of cement and aggregate

CO2: Evaluate the workability of fresh Concrete

CO3: Determine the strength characteristics of hardened concrete

CO4: Gain knowledge of Non-destructive test on concrete

REFERENCE BOOKS

1. A.M.Neville, "Properties of Concrete"– Pearson Education Limited, 5th Edition, 2012
2. M.S.Shetty, "Concrete Technology", S.Chand & Co., 8th Edition, 2019
3. A.R. Santha Kumar, "Concrete Technology", Oxford university Press, 2nd Edition,2018

IS CODES:

1. IS: 4031 (Part-3) - Methods of Physical tests for Hydraulic Cement.
2. IS: 4031 (Part-6) - Methods of Physical tests for Hydraulic Cement.
3. IS: 383 - Specifications for Coarse and Fine aggregate from Natural Sources for Concrete.
4. IS: 2386 - Methods of Tests for Aggregates for Concrete.
5. IS: 1199 - Methods of Sampling and Analyses of Concrete.
6. IS: 516 - Methods of Tests for Strength of Concrete.
7. IS 13311 – (Part-1 & 2) Non Destructive testing of Concrete – Methods of tests.
8. IS: 456 – Plain and Reinforced Concrete – Code of Practice.
9. IS: 10262 – Concrete mix Proportioning - Guidelines

ONLINE RESOURCES

1. https://cs-iitd.vlabs.ac.in/List%20of%20experiments.html

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE19) REAL - TIME RESEARCH PROJECT/FIELD - BASED PROJECT

B.Tech - II Year II – Semester

L	T	P	C
0	0	4	2

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22MC07) GENDER SENSITIZATION LABORATORY

B.Tech - II Year II – Semester

L	T	P	C
0	0	2	0

COURSE DESCRIPTION

This course offers an introduction to Gender Studies, an interdisciplinary field that asks critical questions about the meanings of sex and gender in society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary. It draws on multiple disciplines – such as literature, history, economics, psychology, sociology, philosophy, political science, anthropology and media studies – to examine cultural assumptions about sex, gender, and sexuality.

This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with race, class, caste, nationality and other social identities. This course also seeks to build an understanding and initiate and strengthen programmes combating gender-based violence and discrimination. The course also features several exercises and reflective activities designed to examine the concepts of gender, gender-based violence, sexuality, and rights. It will further explore the impact of gender-based violence on education, health and development.

Course Objectives:

- To develop students' sensibility with regard to issues of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debates on the politics and economics of work.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

UNIT - I: UNDERSTANDING GENDER

Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender-Construction of Gender-Socialization: Making Women, Making Men
- Preparing for Womanhood. Growing up Male. First lessons in Caste.

UNIT – II: GENDER ROLES AND RELATIONS

Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles- Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences- Declining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary

UNIT – III: GENDER AND LABOUR

Division and Valuation of Labour-Housework: The Invisible Labor- "My Mother doesn't Work." "Share the Load."-Work: Its Politics and Economics -Fact and Fiction. Unrecognized and Unaccounted work. -Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming

UNIT – IV: GENDER - BASED VIOLENCE

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No! -Sexual Harassment, not Eve-teasing-Coping with Everyday Harassment- Further Reading: "Chupulu".

Domestic Violence: Speaking Out Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life…."

UNIT – V: GENDER AND CULTURE

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender and Popular Literature - Just Relationships: Being Together as Equals

Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa Parks- The Brave Heart.

Note: Since it is Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field from engineering departments.

 Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments. Apart from the above prescribed book, Teachers can make use of any authentic materials related to the topics given in the syllabus on "Gender".

 ESSENTIAL READING: The Textbook, "Towards a World of Equals: A Bilingual Textbook on Gender" written by A.Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu published by Telugu Akademi, Telangana Government in 2015.

ASSESSMENT AND GRADING:

- Discussion & Classroom Participation: 20%
- Project/Assignment: 30%
- End Term Exam: 50%

Course Outcomes:

CO 1: Students will have developed a better understanding of important issues related to gender in contemporary India.

CO 2: Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and films.

CO 3: Students will attain a finer grasp of how gender discrimination works in our society and how to counter them.Students will acquire insights into the gendered division of labour and its relation to politics and economics.

CO 4: Students will develop a sense of appreciation of women in all walks of life. Men and women students and professionals will be better equipped to work and live in harmony.

CO 5: Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE20) STRUCTURAL ANALYSIS – II

B.Tech - III Year I – Semester

L	T	P	C
3	0	0	3

Pre-requisites: Structural Analysis – I

Course Objectives:

- Identify the various actions in two hinged arches.
- Understand classical methods of analysis for statically indeterminate structures.
- Differentiate the approximate and numerical methods of analysis for indeterminate structures.
- Find the degree of static and kinematic indeterminacies of the structures.
- Plot the variation of S.F and B.M when a moving load passes on indeterminate structure

UNIT – I

Moment Distribution Method - Analysis of continuous beams with and without settlement of supports using - Analysis of Single Bay Single Storey Portal Frames including side Sway - Analysis of inclined frames - Shear force and Bending moment diagrams, Elastic curve.

Kani's Method: Analysis of continuous beams including settlement of supports - Analysis of single bay single storey and single bay two Storey Frames including Side Sway using Kani's Method - Shear force and bending moment diagrams - Elastic curve.

UNIT – II

Two Hinged Arches: Introduction – Classification of Two hinged Arches – Analysis of two hinged parabolic arches – Secondary stresses in two hinged arches due to temperature and elastic shortening of rib.

Cables and Suspension bridges:

Equilibrium of a Suspension Cable subjected to concentrated loads and uniformly distributed loads - Length of a cable - Cable with different support levels - Suspension cable supports - Suspension Bridges - Analysis of Three Hinged Stiffening Girder Suspension Bridges.

UNIT – III

Matrix Methods -Flexibility Matrix Method: Introduction to Flexibility matrix methods of analysis ;Analysis of continuous beams including settlement of supports ; Analysis of pin-jointed determinate plane frames

UNIT – IV

Matrix Methods - Stiffness Matrix Method:: Introduction to Stiffness matrix methods of analyses using 'system approach' up-to three degree of indeterminacy– Analysis of continuous beams including settlement of supports- Analysis of pin-jointed determinate plane frames ; Analysis of single bay single storey portal frames using stiffness method - Shear force and bending moment diagrams - Elastic curve.

UNIT- V

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

Course Outcomes: After the completion of the course the student will able to

- **CO1:** Solve indeterminate beams and frames using moment distribution and kani's method
- **CO2:** Analyze the two hinged arches and suspension bridges
- **CO3:** Analyze beams and frames by flexibility matrix method
- **CO4:** Analyze the beams and frames using stiffness matrix
- **CO5:** Draw the influence lines for statically indeterminate beams

TEXT BOOKS:

1. Bhavikatti, S.S, "Structural Analysis,Vol.1,& 2", Vikas Publishing House Pvt.Ltd., NewDelhi, 4th Edition, 2010.
2. Vazrani.V.N And Ratwani, M.M, "Analysis of Structures", Vol.II, Khanna Publishers, 16th Edition, 2015.
3. Hibbeler, R.C., Structural Analysis Prentice Hall, 7th Edition, 2012.

REFERENCES:

1. Punmia B.C., Ashok Kumar Jain and Arun Kumar Jain,"Theory of Structures (SMTS) – II" , Laxmi Publishing Pvt Ltd, New Delhi, 12th Edition, 2017.
2. William Weaver, Jrand James M.Gere, Matrix analysis of framed structures, CBS Publishers & Distributors, Delhi, 1995
3. Negi L.S.and Jangid R.S.,Structural Analysis, Tata McGraw Hill Publishing Co.Ltd.2004.

Online Resources:

1. https://nptel.ac.in/courses/105/105/105105166/
2. https://nptel.ac.in/courses/105/101/105101085/

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE21) GEOTECHNICAL ENGINEERING

B.Tech - III Year I – Semester

L	T	P	C
3	0	0	3

Pre-requisites: Nil

Course Objectives:

- Understand the formation of soil and classification of the soils
- Determine the Index & Engineering Properties of Soils
- Determine the flow characteristics & stresses due to externally applied loads
- Estimate the consolidation properties of soils
- Estimate the shear strength and seepage loss

UNIT – I

Introduction: Soil formation and structure – moisture content – Mass, volume relationships – Specific Gravity-Field density by core cutter and sand replacement methods-Relative density.

Index Properties of Soils: Grain size analysis – consistency limits and indices – I.S. Classification of soils.

UNIT –II

Permeability: Soil water – capillary rise – flow of water through soils – Darcy's law-permeability – Factors affecting permeability – laboratory determination of coefficient of permeability –Permeability of layered soils.

Effective Stress & Seepage Through Soils: Total, neutral and effective stress – principle of effective stress - quick sand condition – Seepage through soils – Flownets: Characteristics and Uses.

UNIT –III

Stress Distribution in Soils: Boussinesq's and Westergaard's theories for point load, uniformly loaded circular and rectangular areas, pressure bulb, variation of vertical stress under point load along the vertical and horizontal plane, and Newmark's influence chart for irregular areas.

Compaction: Mechanism of compaction – factors affecting compaction – effects of compaction on soil properties – Field compaction Equipment – compaction quality control.

UNIT – IV

Consolidation: Types of compressibility – Immediate Settlement, primary consolidation and secondary consolidation - stress history of clay; e-p and e-log(p) curves – normally consolidated soil, over consolidated soil and under consolidated soil - preconsolidation pressure and its determination - Terzaghi's 1-D consolidation theory – coefficient of consolidation: square root time and logarithm of time fitting methods - computation of total settlement and time rate of settlement.

UNIT - V

Shear Strength of Soils: Importance of shear strength **–** Mohr's– Coulomb Failure theories – Types of laboratory tests for strength parameters – strength tests based on drainage conditions – strength envelops – Shear strength of sands - dilatancy – critical void ratio, Introduction to stress path method.

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

CO1: Characterize and classify the soils.

CO2: Analyze permeability and seepage through soils.

CO3: Analyze the stress distribution and compressibility of the soils.

CO4: Analyze the consolidation settlement of soil.

CO5: Able to understand the strength of soils under various drainage conditions.

TEXT BOOKS:

1. Murthy, V.N.S., "Soil Mechanics and Foundation Engineering", CBS Publishers Distribution Ltd., First Edition, 2018
2. Gopal Ranjan and Rao, A.S.R., "Basic and Applied Soil Mechanics", New Age Ltd. International Publisher, 3rd Edition, 2019.
3. Braja M. Das and N. Sivakugan., "Introduction to Geotechnical Engineering", Cengage Learning, 2nd Edition,2015.

REFERENCE BOOKS:

1.Punmia, B.C., Ashok Kumar Jainand Arun Kumar Jain "Soil Mechanics and Foundations", Laxmi Publications Pvt. Ltd.,17th Edition 2019
2. Coduto, D.P., "Geotechnical Engineering – Principles and Practices", Prentice Hall of India Pvt.Ltd., 2nd Edition, 2010
3. Das, B.M., "Principles of Geotechnical Engineering", Brooks / Coles / Thompson Learning Singapore, 8th Edition, 2013

Online Resources:

1. https://nptel.ac.in/courses/105/101/105101201/
2. https://nptel.ac.in/courses/105/105/105105168/
3. https://nptel.ac.in/courses/105/101/105101160/

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE22) STRUCTURAL ENGINEERING - I (RCC)

B.Tech - III Year I – Semester

L	T	P	C
3	0	0	3

Pre-requisites: Strength of Materials - I

Course Objectives: The objectives of the course are to

- Identify the basic components of any structural system
- Identify the concept of shear, bond and torsion
- Describe the salient feature of limit state method in designing of slabs
- Evaluate the behaviour of short and long columns
- Identify the concept of design of foundation

UNIT - I

Introduction- Structure - Components of structure - Different types of structures - Equilibrium and compatibility– Safety and Stability - Loads – Different types of Loads – Dead Load, Live Load, Earthquake Load and Wind Load– Different types of materials – RCC, PSC and Steel – Planning of structural elements- Concepts of RCC Design – Different methods of Design- Working Stress Method and Limit State Method – Load combinations as per Limit state method - Materials - Characteristic Values – Partial safety factors – Behaviour and Properties of Concrete and Steel- Stress Block Parameters as per IS 456 -2000.

Limit state Analysis and design of sections in Flexure – Behaviour of RC section under flexure - Rectangular, T and L-sections, singly reinforced and doubly reinforced Beams – Detailing of reinforcement

UNIT – II

Design for Shear, Bond and Torsion - Mechanism of shear and bond failure - Design of shear using limit state concept – Design for Bond –Anchorage and Development length of bars - Design of sections for torsion - Detailing of reinforcement

UNIT - III

Design of Two-way slabs with different end conditions, one-way slab, and continuous slab Using I S Coefficients -Limit state design for serviceability for deflection, cracking and codal provisions.

UNIT – IV

Design of compression members - Short Column - Columns with axial loads, uni-axial and bi-axial bending – Use of design charts- Long column – Design of long columns - I S Code provisions.

UNIT – V

Design of foundation - Different types of footings – Design of wall footing – Design of flat isolated square, rectangular, circular footings and combined footings for two columns.

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

- **CO1:** Design the singly reinforced, doubly reinforced and flanged sections
- **CO2:** Design the RC Beams under shear and Torsion
- **CO3:** Design the one-way and two-way slabs.
- **CO4:** Design the axially loaded, uniaxial and biaxial bending columns.
- **CO5:** Design the isolated square, rectangular and circular footings

TEXT BOOKS:

1. B.C. Punmia. Ashok K. Jain and Arun K. Jain, "Limit State design of Reinforced Concrete", Laxmi Publications (P) Ltd., 2nd Edition, 2016
2. Unnikrishnan Pillai and Devdas Menon, "Reinforced Concrete Design",Tata McGraw Hill Publishing Company Ltd., 3rd Edition, 2017
3. N.Krishnaraju, "Design of Reinforced Concrete Structures, IS: 456-2000", CBS Publications, 4th Edition, 2019

REFERENCE BOOKS:

1. N. Subramanian, "Design of Reinforced Concrete Structures", Oxford University Press, First Edition, 2014
2. P.C. Varghese, "Limit State Design of Reinforced Concrete", Prentice Hall of India, Pvt. Ltd., 2nd Edition, 2008
3. S.N. Sinha, "Reinforced Concrete Design", Tata McGraw-Hill, Second Edition, 2002

CODE BOOKS:

1. IS 456:2000 Plain and Reinforced Concrete – Code of Practice.
2. IS 875(1-5):1987 Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures.
3. SP 16:1980 Design Aids for Reinforced Concrete.
4. SP 34:1987 Handbook of concrete reinforcement and detailing.

Online Resources:

1. https://nptel.ac.in/courses/105/105/105105105/
2. https://nptel.ac.in/courses/105/105/105105104/

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22MB01) BUSINESS ECONOMICS AND FINANCIAL ANALYSIS

B.Tech - III Year I – Semester

L	T	P	C
3	0	0	3

Pre-requisites: Surveying

Course Objective: To learn the basic business types, impact of the economy on Business and Firms specifically. To analyze the Business from the Financial Perspective.

UNIT – I: Introduction to Business and Economics

Business: Structure of Business Firm, Theory of Firm, Types of Business Entities, Limited Liability Companies,Sources of Capital for a Company, Non-Conventional Sources of Finance.

Economics: Significance of Economics, Micro and Macro Economic Concepts, Concepts and Importance of National Income, Inflation, Money Supply and Inflation, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinary nature of Business Economics.

UNIT - II: Demand and Supply Analysis

Elasticity of Demand: Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting.

Supply Analysis: Determinants of Supply, Supply Function and Law of Supply.

UNIT- III: Production, Cost, Market Structures & Pricing

Production Analysis: Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale, Different Types of Production Functions.

Cost analysis: Types of Costs, Short run and Long run Cost Functions.

Market Structures: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly, Monopolistic Competition.

Pricing: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, Cost Volume Profit Analysis.

UNIT - IV: Financial Accounting

Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, Preparation of Final Accounts.

UNIT - V: Financial Analysis through Ratios

Concept of Ratio Analysis, Importance, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios – Analysis and Interpretation (simple problems).

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

CO1: Acquire knowledge on Forms of Business and the impact of economic variables.

CO2: Understand the concept of demand and supply analysis.

CO3: Gain knowledge on prediction and cost analysis.

CO4: Apply the knowledge on financial accounting.

CO5: Understand the concept of ratio analysis .

TEXT BOOKS:

1. D. D. Chaturvedi, S. L. Gupta, Business Economics - Theory and Applications, International Book House Pvt. Ltd. 2013.
2. Dhanesh K Khatri, Financial Accounting, Tata Mc –Graw Hill, 2011.
3. Geethika Ghosh, Piyali Gosh, Purba Roy Choudhury, Managerial Economics, 2e, Tata Mc Graw Hill Education Pvt. Ltd. 2012.

REFERENCE BOOK:

1. Paresh Shah, Financial Accounting for Management 2e, Oxford Press, 2015.
2. S. N. Maheshwari, Sunil K Maheshwari, Sharad K Maheshwari, Financial Accounting, 5 Edition, Vikas Publications, 2013.

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE23) TRANSPORTATION ENGINEERING

B.Tech - III Year I – Semester

L	T	P	C
3	0	0	3

Pre-requisites: Surveying

Course Objectives:

- To impart knowledge on highway planning and development
- To attain knowledge on Design standards
- To learn basic traffic characteristics and design consideration
- To learn the desirable properties of highway materials
- To obtain the knowledge on pavement design

UNIT -I

Introduction: History and Importance of Highways, Characteristics of road transport, Current road development plans in India, Highway development in India, Highway planning, Highway alignment, Engineering surveys for Highway alignment, Highway projects, Highway drawings and reports, Detailed Project Report preparation, PPP schemes of Highway Development in India, Government of India initiatives in developing the highways and expressways in improving the mobility and village road development in improving the accessibility.

UNIT – II

Introduction to Highway Geometric Design: Width of Pavement, Formation and Land, Cross Slopes etc; Concept of Friction: Skid and Slip; Elements of geometric design of highways; Sight Distances: Stopping Sight Distance, Overtaking Sight Distance and Intermediate Sight Distance; Horizontal alignment: Design of horizontal curves, super elevation, extra widening of pavement at curves; Vertical Alignment: Gradients, Compensation in Gradient, Design of summit curves and valley curves using different criteria; Integration of Horizontal and Vertical Curves

UNIT - III

Basic traffic characteristics: Speed, volume and concentration, relationship between flow, speed and concentration; Highway capacity and Level of service (LOS) concepts: Factors affecting capacity and LOS, relationship between V/C ratio and LOS; Traffic volume and spot speed studies: Methods; Road Safety; Traffic Signals: Types, warrants for signalization, design of isolated traffic signal by IRC method; Parking and road accidents: Types of parking facilities – on-street and off street, introduction to parking studies; Accident studies, road safety auditing; Introduction to street lighting; Road Intersections: Design considerations of at-grade intersections, introduction to interchanges

UNIT - IV

Tests on soils: CBR, Field CBR, modulus of sub-grade reaction, Tests on Aggregates: specific gravity, shape (flakiness and elongation indices), angularity number, water absorption, impact, abrasion, attrition, crushing resistance, durability (weathering resistance), stone polishing value of aggregates; Tests on bitumen: spot, penetration, softening point, viscosity, ductility, elastic recovery, flash and fire points, Introduction to modified bituminous binders like crumb rubber modified, natural rubber modified and polymer modified bitumen binders; Bituminous Concrete: Critical parameters controlling bituminous concrete mixture design, aggregate blending concepts viz. Rothfuch's method, trial and error procedure.

UNIT -V

Introduction to Pavement Design: Types of pavements and their typical cross sections: flexible, rigid and composite; Flexible Pavement analysis and design: Introduction to multi layered analysis, IRC 37-2012 method of flexible pavement design; Rigid pavement analysis and design: Factors controlling rigid pavement design, types of stresses in rigid pavements, critical load positions, load stresses and temperature stresses in interior, corner and edge locations of jointed plain cement concrete pavement slabs, IRC 58-2015 method of rigid pavement design; Overlay Designs: Types of overlays on flexible and rigid pavements.

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

CO6: Acquire skills in selecting the highway alignment and planning.
CO7: Understand the elements of geometric design of highways.
CO8: Gain knowledge on traffic characteristics and signals.
CO9: Apply the knowledge on tests on soils and pavements.
CO10: Design flexible and rigid pavements as per codal provisions.

TEXT BOOKS:

1. Khanna, S.K, Justo, A and Veeraragavan, A, 'Highway Engineering', Nem Chand & Bros. Revised Tenth Edition, 2014
2. Kadiyali L.R. and Lal N B, Principles and Practices of Highway Engineering; Seventh Edition, First Reprint; Khanna Publishers, New Delhi, 2018
3. Subhash C Saxena, Text Book of Highway and Traffic Engineering;; CBS Publishers and Distributors. New Delhi, First Edition ,2014

REFERENCE BOOKS:

1. Papacoastas, C. S. and Prevedouros, Transportation Engineering and Planning, Third Impression; Pearson Education, Third Edition, 2018.
2. Khisty C J and Lall B Kent; Transportation Engineering: An Introduction, Third Edition, 1st Indian Adaptation; Pearson India Education Service Pvt. Ltd, New Delhi 2017.
3. C Venkatramaih, Transportation Engineering Volume 1 – Highway Engineering, Universities Press, 1st Edition, 2016

Online Resources:

1. https://nptel.ac.in/courses/105/105/105105106/
2. https://nptel.ac.in/courses/105/104/105104191/

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE24) HYDROLOGY AND WATER RESOURCES ENGINEERING

B.Tech - III Year I – Semester

L	T	P	C
3	0	0	3

Pre-requisites: Nil

Course Objectives:

- To introduce the student with concept of hydrological aspects of water.
- To gain knowledge of Runoff and Evapotranspiration process.
- To understand concept of Hydrographs
- To gain knowledge on ground water hydrology and hydraulics.
- Able to know canal system and canal linings.

UNIT - I

Introduction: Concepts of Hydrologic cycle, **Precipitation :** Forms of precipitation, characteristics of precipitation in India, measurement of precipitation: Recording and non-recording types, rain gauge network: mean precipitation over an area: Missing Rainfall Data – Estimation, Consistency of Rainfall records, depth area-duration relationships, maximum intensity/depth-duration-frequency relationship, Probable Maximum Precipitation (PMP), rainfall data in India.

UNIT - II

Abstractions from precipitation:

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

Run off: Components of Runoff, Factors affecting runoff, Basin yield, SCS-CN method of estimating runoff, Flow duration curves, Mass curve of runoff – Analysis, concepts of watershed management.

UNIT - III

Hydrographs: Hydrograph –Distribution of Runoff – Hydrograph Analysis Flood Hydrograph – Effective Rainfall – Base Flow- Base Flow Separation - Unit Hydrograph, definition, limitations and applications and Unit hydrograph, S-hydrograph, Synthetic Unit Hydrograph.

UNIT - IV

Groundwater Hydrology: Occurrence, movement and application of groundwater, aquifers – types, Specific Yield, Permeability, Storage coefficient, Transmissibility, Darcy's Law. **Well Hydraulics -** Steady radial flow into well for confined and unconfined aquifers, Recuperation tests. Well constants.

Crop water requirements – Water requirements of crops – crops and crop seasons in India , cropping pattern , duty and delta; Quality of irrigation water; Soil-water relationships , root zones oil water ,infiltration, consumptive use, irrigation requirement, frequency of irrigation; Methods of applying water to the fields: surface, sub-surface, Micro irrigation.

UNIT - V

Canal systems : Alignment of canals, canal losses , estimation of design discharge. Design of channels- rigid boundary channels, alluvial channels. canal outlets: Non-modular , semi modular and modular outlets **.** Canal outlets non-modular, semi-modular and modular outlets. Water logging: causes, effects and remedial measures. Lining of canals-Types of lining-Advantages and disadvantages. Drainage of irrigated lands- necessity, methods.

Course Outcomes: On completion of this course, students will able to:

CO1 : Define the key drivers on water resources and hydrological processes.
CO2 : Apply the knowledge of Abstractions from precipitation and Runoff
CO3 : Apply the knowledge of analysis and applications of hydrograph
CO4 : Describe the importance of ground water hydrology and well hydraulics.
CO5 : Apply the concepts of groundwater for water resources management.

TEXTBOOKS:

1. Subramanya.K. "Engineering Hydrology"- Tata McGraw Hill,4th Edition 2017
2. Vedula S. and. Mujumdar P.P. 'Water resources Systems', McGraw-Hill Publishing Company, New Delhi. 2005
3. Chahar BR, "Groundwater Hydrology", Mc Graw Hill Education, First Edition,2017

REFERENCE BOOKS:

1. David Keith Todd &Larry W. Mays "Groundwater Hydrology", John Wiley & Sons, 3rd Edition,2005
2. Ven Te Chow, David.R.Maidment and Mays, Larry W. Mays "Applied Hydrology", McGraw Hill Education, Indian Edition 2017
3. Raghunath .H.M., "Hydrology", New Age International publishers, 3rd Edition, 2015

Online Resources:

1. https://nptel.ac.in/courses/105/104/105104103/
2. https://nptel.ac.in/courses/105/107/105107129/

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE25) TRANSPORTATION ENGINEERING LABORATORY

B.Tech - III Year I – Semester

L	T	P	C
0	0	2	1

Course Objectives:

- To provide knowledge on test of aggregates
- Impart properties of bitumen by various tests
- To understand Mix Design of sub base and bituminous layer
- To gain knowledge on different Traffic Surveys

LIST OF EXPERIMENTS

Tests on aggregate

1. Shape Test - Flakiness and Elongation Index
2. Los Angeles Abrasion Test
3. Los Angeles Attrition Test

Tests on bitumen

4. Penetration and Softening Point
5. Ductility Value
6. Flash and Fire Point

Mix design

7. Marshall's Stability sample preparation and Testing

Traffic Surveys

8. Volume studies at Mid blocks and Intersection
9. Speed Studies using Spot speeds
10. Parking studies

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

CO1: Acquire skills in testing the aggregates
CO2: Know the procedure to design bituminous roads.
CO3: Measure the physical properties of bitumen for their suitability as road material.
CO4: Analyze the traffic based on traffic surveys.

REFERENCE BOOKS:

1. Khanna, S.K., Justo, C.E.G and Veeraragavan, A, 'Highway Engineering', Nem Chand & Bros, 10th Edition, 2017
2. Srinivasa Kumar, R, Textbook of Highway Engineering, Universities Press, First Edition 2011.
3. Kadiyalai, L.R., 'Traffic Engineering and Transport Planning', Khanna Publishers, First Edition, 1999

IS CODES:

- IS 1201 -1220 (1978) "Methods for testing tars and bituminous materials"
- IRC SP 53 -2010 "Guidelines on use of modified bitumen"
- MS-2 Manual for Marshalls Mix design 2002

Online Resources:

1. https://ts-nitk.vlabs.ac.in/transportation-engineering/

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE26) GEOTECHNICAL ENGINEERING LABORATORY

B.Tech - III Year I – Semester

L	T	P	C
0	0	2	1

Course Objectives:

- To find out the method and practices of testing properties of the soil
- To learn the principles of permeability of soil
- To study the procedures of testing shear strength parameters of soil
- To obtain compression test on soil.

LIST OF EXPERIMENTS

1. Atterberg Limits (Liquid Limit, Plastic Limit, and shrinkage limit)
2. a) Field density by core cutter method and
   b) Field density by sand replacement method
3. Determination of Specific gravity of soil Grain size distribution by sieve analysis
4. Permeability of soil by constant and variable head test methods
5. Standard Proctor's Compaction Test
6. Determination of Coefficient of consolidation (square root time fitting method)
7. Unconfined compression test
8. Direct shear test
9. Vane shear test
10. Differential free swell index (DFSI) test

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

CO1: Identify and classify soils with reference to their characteristics
CO2: Learn about grain size distribution using sieve analysis
CO3: Calculate the permeability value of the soil
CO4: Determine the shear strength properties of the soil

REFERENCE BOOKS:

1. Murthy, V.N.S., "Soil Mechanics and Foundation Engineering", CBS Publishers Distribution Ltd., First Edition, 2018
2. Gopal Ranjan and Rao, A.S.R., "Basic and Applied Soil Mechanics", New Age Ltd. International Publisher, 3rd Edition, 2019.
3. Punmia, B.C., Ashok Kumar Jainand Arun Kumar Jain "Soil Mechanics and Foundations", Laxmi Publications Pvt. Ltd. New Delhi, 17th Edition 2019.

Online Resources:

1. https://smfe-iiith.vlabs.ac.in/
2. https://nptel.ac.in/courses/105/101/105101160/

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22MB06) INTELLECTUAL PROPERTY RIGHTS

B.Tech - III Year I – Semester

L	T	P	C
3	0	0	3

Pre-requisites: Nil

Course Objectives:

In the interest of the national economic growth the innovations and improvements are to be owned and used for the production and distribution process. The students of technology will be benefited by knowing the process of obtaining recognition of their innovations. This course will enable them to know the legal process of registering the innovations.

UNIT-I

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT-II

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting, and evaluating trade mark, trade mark registration processes.

UNIT-III

Law of copy rights : Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law. Law of patents: Foundation of patent law, patent searching process, ownership rights, and transfer.

UNIT-IV

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation. Unfair competition: Misappropriation right of publicity, false advertising.

UNIT-V

New development of intellectual property: new developments in trade mark law; copyright law, patent law, intellectual property audits. International overview on intellectual property, international – trade mark law, copy right law, international patent law, and international development in trade secrets law.

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

CO1: Acquire the knowledge of the intellectual property rights.

CO2: Understand the purposes and functions of trade marks.

CO3: Understand the laws of copy rights and Patents.

CO4: Acquire knowledge on trade secrets.

CO5: Gain knowledge on development of intellectual property.

TEXT BOOKS & REFERENCES:

1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning.
2. Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, Tata Mc Graw Hill Publishing company ltd.,

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE27) ENVIRONMENTAL ENGINEERING

B.Tech - III Year II – Semester

L	T	P	C
3	0	0	3

Pre-requisites: -

Course Objectives:

- To impart knowledge about Water quality Standards
- To acquaint the students with the basic concepts of Water Distribution systems
- To learn the methods of collection of waste water and plumbing requirements
- To understand the process of water treatment.
- To gain knowledge about air pollution.

UNIT – I

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

UNIT – II

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

UNIT - III

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

UNIT – IV

Waste water treatment plant : Flow diagram **-** primary treatment Design of screens – grit chambers – skimming tanks – sedimentation tanks – principles of design – Biological treatment – trickling filters – ASP– Construction and design of oxidation ponds. Sludge digestion – factors effecting – design of Digestion tank – Sludge disposal by drying – septic tanks working principles and design – soak pits.

UNIT – V

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

Course Outcomes: At the end of this course, the students will able to:
CO1: Acquire the knowledge of the water quality standards and requirement.
CO2: Understand the methods of water distribution system.
CO3: Demonstrate the steps involved in drinking and waste water treatment.
CO4: Explain the impacts of Air Pollution.
CO5: Gain knowledge on management of Municipal Solid Waste.

TEXT BOOKS:

1. Howard S. Peavy, Donald R. Roweand George Tchobanoglous, "Environmental Engineering", McGraw Hill, First Edition 2017
2. Duggal, K. N., Elements of Environmental Engineering, S. Chand & Co., 3rd Edition, 2008.
3. Birdie, G. S. and Birdie, Water Supply and Sanitary Engineering, Dhanpat Rai & Sons, Revised Edition, 2014

REFERENCE BOOKS:

1. Manual on Water supply and Treatment – CPHEEO, 1999
2. Davis M. L. and Cornwell D. A., Introduction to Environmental Engineering, Tata McGraw Hill Education Pvt. Ltd., 5th Edition, 2017
3. Punmia B. C., Ashok Jain & Arun Jain, Water Supply Engineering, Laxmi Publication Pvt., Ltd., 2nd Edition, 2016

ONLINE RESOURCES:

1. https://nptel.ac.in/courses/103/107/103107084/
2. https://nptel.ac.in/courses/105/106/105106119/

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE28) FOUNDATION ENGINEERING

B.Tech - III Year II – Semester

L	T	P	C
3	0	0	3

Pre-requisites: Geotechnical Engineering

Course Objectives:

- To attain adequate knowledge in soil exploration methods and testing.
- To attain knowledge on the earth pressure in soils
- To attain knowledge on types and failures of Foundation
- To impart knowledge on shallow foundations and settlement of structures.
- To learn the concepts of Pile Foundation.

UNIT – I

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

UNIT – II

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

UNIT – III

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

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

UNIT – IV

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

UNIT - V

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

Course Outcomes: On completion of the course, the students will able to:

CO1: Understand the methods of soil investigation for any civil engineering construction

CO2: Analyze the stability of slopes for dams under different conditions

CO3: Analyze the earth retaining structures in various types of soil medium

CO4: Do proper foundation proportioning for any kind of shallow foundation system.

CO5: To estimate pile and pile group capacity for any kind of soils.

TEXT BOOKS:

1. Murthy, V.N.S, "A text book of Soil Mechanics and Foundation Engineering", CBS Publishers & Distributors Pvt. Ltd., Revised Edition, 2018
2. Gopal Ranjan and Rao, "Basic and Applied Soil Mechanics", New Age International (P) Ltd., 3rd Edition, 2016
3. Donald P. Coduto, Man-Chu Ronald Yeung and William A. Kitch, "Geotechnical Engineering, Principles and Practices", PHI Learning Private limited, 2nd Edition, 2010

REFERENCE BOOKS:

1. Nainan P Kurian, "Design of foundation Systems Principles and Practices", Narosa Book Distributor, 3rd Edition, 2011
2. Punmia, B.C., "Soil Mechanics and Foundation Engineering", Laxmi Publications Pvt. Ltd., 16th Edtion, 2017
3. Shenbaga R Kaniraj, "Design Aids in Soil Mechanics and Foundation Engineering", Tata McGraw Hill, Revised Edition, 2011

Online Resources:

1. https://nptel.ac.in/courses/105/105/105105176/
2. https://nptel.ac.in/courses/105/101/105101083/

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE29) STRUCTURAL ENGINEERING – II (STEEL STRUCTURES)

B.Tech - III Year II – Semester

L	T	P	C
3	0	0	3

Pre-requisites: Strength of Materials

Course Objectives:

- To introduce the students to mechanical properties of steel and design of connection
- To design Tension and Compression Members
- To impart knowledge on Plastic Analysis and design of Continuous beams
- To learn the design of plate girders and stiffeners
- To learn design of roof trusses and welded Gantry girder

UNIT – I

Materials – Types of structural steel – Mechanical properties of steel – Concepts of plasticity – yield strength - Loads and Stresses – Local buckling behavior of steel. Concepts of limit State Design – Different Limit States – Load combinations for different Limit states - Design Strengths - deflection limits – serviceability – stability check.

Design of Connections– Different types of connections – Bolted connections – Design strength – efficiency of joint– prying action - Welded connections – Types of welded joints – Design requirements Design of Beam-column connections - Eccentric connections - Type I and Type II connection – Framed connection– stiffened / seated connection.

UNIT – II

Design of tension members –Simple and built up members - Design strength – Design procedure for splicing - lug angle.

Design of compression members – Buckling class – slenderness ratio – Design of simple compression members - laced – battened columns – splice – column base – slab base.

UNIT – III

Plastic Analysis; Plastic moment – Plastic section modulus - Plastic analysis of continuous beams Design of Flexural Members – Laterally supported and unsupported Beams – Design of laterally supported beams - Bending and shear strength/buckling – Built-up sections - Beam splice

UNIT – IV

Design of welded plate girders – elements – economical depth – design of main section – connections between web and flange – design of stiffeners - bearing stiffener– intermediate stiffeners – Design of web splice and flange splice

UNIT – V

Design of Industrial Structures; Types of roof trusses - loads on trusses – wind loads - Purlin design – truss design – Design of welded Gantry girder

Course Outcomes: On completion of this course, students will able to:

CO1 : Recognize the design philosophy of steel structures and connections.

CO2 : Select the suitable section shape and size for tension and compression members.

CO3 : Able to calculate ultimate load of steel beams and portal frames using plastic analysis.

CO4 : Able to design plate girders and stiffeners.

CO5 : Identify and compute the design trusses on Industrial structures.

TEXT BOOKS:

1. Duggal S.K., "Design of Steel Structures", Tata McGraw Hill, Publishing Co. Ltd., 3rd Edition, 2019
2. Bhavikatti S.S, "Design of Steel Structures", Dreamtech Press, 3rd Edition, 2019
3. Subramanian N, "Steel Structures: Design and Practice", Oxford Publishers, Revised Edition, 2018

REFERENCE BOOKS:

1. Gambhir M L, "Fundamentals of Structural Steel Design", McGraw Hill Education India Pvt Limited, First Edition, 2017
2. Jack C. McCormac and Stephen F Csernak, "Structural Steel Design", Pearson Education Limited, 6th Edition, 2018
3. Sarwar Alam Raz, "Structural Design in Steel", New Age International Publishers, 3rd Edition, 2020

CODE BOOKS:

1. IS 800-2007, General Construction in Steel — Code of Practice, BIS Publication
2. IS 875(1-5):1987 Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures, BIS Publication
3. SP6(1) - 1964,Handbook for Structural Engineers, BIS Publication

Online Resources:

1. https://nptel.ac.in/courses/105/105/105105162/
2. https://nptel.ac.in/courses/105/106/105106112/

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE30) DESIGN OF HYDRAULIC STRUCTURES

(Professional Elective – I)

B.Tech - III Year II – Semester

L	T	P	C
3	0	0	3

Pre-requisites: Hydrology and Water Resources Engineering

Course Objectives:

- To attain adequate knowledge on Reservoirs.
- To understand the forces acting and causes of Gravity Dam
- To determine the design principles of spillways
- To impart knowledge on weirs and barrages.
- To learn the mechanism of canal regulation works.

UNIT - I

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

UNIT - II

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

UNIT- III

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

UNIT- IV

Diversion Head works: Types of Diversion head works- weirs and barrages, layout of diversion head work - components. Causes and failure of Weirs and Barrages on permeable foundations,-Silt Ejectors and Silt Excluders

Weirs on Permeable Foundations – Creep Theories - Bligh's, Lane's and Khosla's theories, Determination of uplift pressure– Design principles of weirs on permeable foundations using Creep theories - exit gradient, U/s and D/s Sheet Piles - Launching Apron.

UNIT- V

Canal Falls - Types of falls and their location, Design principles of Notch Fall.

Canal regulation works: principles of design of cross and distributary head regulators, types of Canal escapes - types of canal modules, proportionality, sensitivity, setting and flexibility. **Cross Drainage works**: types, selection of suitable type, various types, design considerations for cross drainage works

Course Outcomes: On completion of the course, the students will be able to:
CO1: Identify the importance and functions of Dams and Reservoirs.
CO2: Understand the concepts of Gravity dam.
CO3: Ability to know types and design principles of Earth dam and spillway.
CO4: Understand the principles of diversion head works.
CO5: Able to know design considerations of canal regulation works.

TEXT BOOKS:

1. Santhosh kumar Garg, "Irrigation Engineering and Hydraulic structures", Khanna Publishers, 36th Edition, 2006
2. K. R. Arora , "Irrigation Engineering", Standard Publishers, 2nd Edition,2010
3. Dr. B. C. Punmia, Dr. Pande Brij Basi Lal, Ashok Kumar Jain, Arun Kumar Jain, "Irrigation and Water Power Engineering", Laxmi Publications,17th Edition, 2021

REFERENCE BOOKS:

1. R.S. Varshney, S.C. Gupta and R.L. Gupta, "Theory and Design of Irrigation Structures", Nem Chand & Bros, Revised Edition, 2009
2. A. M. Micheal, "Irrigation Theory and Practice", Vikas Publishing House, 2nd Edition, 2015
3. G.L. Asawa, "Irrigation and Water Resources Engineering", New Age International Publishers, First Edtion, 2005

Online Resources:

1. https://nptel.ac.in/courses/105/105/105105110/

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE31) ADVANCED WATER RESOURCES ENGINEERING

(Professional Elective – I)

B.Tech - III Year II – Semester

L	T	P	C
3	0	0	3

Pre-requisites: Hydrology and Water Resources Engineering

Course Objectives:

- To know about the statistics and Analysis in Hydrology
- To study about the flood routing and forecasting
- To learn about the flood mitigation and regulations.
- To study about the climate system and causes of climate change
- To know about optimization techniques for the modelling.

UNIT I:

Statistics in Hydrology: Random variables, probability of hydrologic events, probability (Gumbel, Log-Pearson type-III distribution) and statistical methods for flood frequency, trend analysis for hydrologic events.

Regression Analysis: Identification of appropriate models, parameters estimation by the least square method, measures of goodness fit, uncertainty features of LS based model parameters, statistical Inferences of Regression Coefficients, confidence Interval. Multivariate linear regression and correlation.

UNIT II:

Flood Routing: Mathematics of flood routing, various methods of flood routing, Hydrologic and Hydraulic routing. -Modified Puls Method- Muskhinghum Method-flood forecasting (unit hydrograph method)

UNIT III

Flood mitigation: flood ways, channel improvement, evacuation and flood proofing, land management, flood plain management, estimating benefits of flood mitigation.

Flood plain adjustments and regulations: Results of controlling floods, alternatives to controlling floods, range of possible adjustments, practical range of choice, critical characteristics of flood hazards.

UNIT IV

Climate System- Weather and Climate- Overview of earth-atmosphere- vertical structure of atmosphere-Radiation and Temperature- Temperature variation- vertical variation in Air temperature-temperature extremes.

Causes of climate change - Modeling of climate change-General circulation models (GCMs) –IPCC scenarios - IPCC Assessment Report (AR5) - Physical Science basis.

UNIT V

Optimization Techniques, Model Formulation, models, General L.P Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Model. Formulation of a LPP - revised simplex method - duality theory - dual simplex method - sensitivity analysis. Introduction and Applications of ANN, Machine and Deep Learning in water resources Engineering.

Course Outcomes: On completion of the course, the students will be able to:

CO1: Ability to apply statistical techniques for flood frequency studies and hydrological events
CO2: Applications of flood routing, flood forecasting techniques for real time flood studies.
CO3: Understanding of various mitigation measures for control of floods.
CO4: Understanding of climate change using GCM models.
CO5: Ability to formulate optimization models and soft computing applications

TEXT BOOKS:

1. Vedula S. and. Mujumdar P.P. 'Water resources Systems', McGraw-Hill Publishing Company, New Delhi. 2005
2. Subramanya, K. 'Hydrology for Engineers', Tata McGraw-Hill Publishing Company, New Delhi.(1984.
3. Raja Sekharan S. and Vijaya Laxmi Pai G. A. , 'Neural Networks, Fuzzy Logic, and Genetic Algorithm', Prentice-Hall of India, New Delhi. 2003

REFERENCE BOOK:

1. Snedecor, G.W., and W.G. Cochran , 'Statistical Methods', East West Press, NewDelhi. 1994
2. Alfredo, H.S. and Tang Wah , 'Probability Concepts in Engineering Planning and Design: Vol-I (Basic Principles), John Wiley & Sons, New York. 1975
3. RL Wilby, SP charles, E Zoritaa, B Timbal, P WHetton, LO Mearns - Guide lines for use of climate science from Statistical Modeling models. 2004

Online Resources:

1. https://archive.nptel.ac.in/courses/105/105/105105110/
2. https://nptel.ac.in/courses/105104103

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE32) GROUND WATER HYDROLOGY

(Professional Elective – I)

B.Tech - III Year II – Semester

L	T	P	C
3	0	0	3

Pre-requisites: Hydrology and Water Resources Engineering

Course Objectives:

- To introduce the student with concept of ground water occurrence.
- To gain knowledge on analysis of steady flow ground water.
- To understand the concept of unsteady flow ground water.
- To attain knowledge on Surface and sub-surface Investigation.
- Able to know about Saline water intrusion in aquifer.

UNIT- I

Ground Water Occurrence: Ground water hydrologic cycle, origin of ground water, rock properties effecting ground water, Vertical distribution of ground water, zone of aeration and zone of saturation, geologic formation as aquifers, types of aquifers, porosity, specific yield and specific retention. Ground Water Movement-Permeability, Darcy's law, storage coefficient, Transmissivity, Differential equation governing ground water flow in three dimensions derivation, ground water flow equation in polar coordinate system, ground water flow contours and their applications.

UNIT- II

Analysis of Pumping Test Data-I: Steady flow ground water flow towards a well in confined and unconfined aquifers-Dupit's and Theism's equations, assumptions, formation constants, yield of an open well interface and well tests.

UNIT- III

Analysis of Pumping Test Data-II: Unsteady flow towards well-Non-Equilibrium equations, Thesis solution, Jocob and Chow's simplifications, Leak aquifers.

UNIT- IV

Surface and sub-surface Investigation: Surface methods of exploration-Electrical resistivity method and Seismic refraction methods. Subsurface methods geophysical logging and resistivity logging. Concept of artificial recharge of ground water, recharge methods, Applications of GIS and RS in artificial recharge of ground water along with case studies.

UNIT- V

Saline water intrusion in aquifer: Occurrence of saline water intrusion, Ghyben-Herzberg relation, Shape of interface, control of water intrusion. Ground water basin management-case studies.

Course Outcomes: On completion of this course, students will able to:
CO1 : Define the key drivers on water occurrence and ground water flow.
CO2 : Apply the knowledge on analysis on pumping test data for steady flow ground water
CO3 : Analyze the pumping data for Unsteady flow ground water .
CO4 : Describe the investigation on surface and sub-surface exploration
CO5 : Apply the concepts of occurrence of ground water basin management

TEXTBOOKS:

1. Subramanya.K. "Engineering Hydrology"- Tata McGraw Hill,4th Edition 2017
2. JayaRamiReddy .P. "Hydrology", Laxmi Publication, 3rd Edition, 2016
3. Chahar BR, “Groundwater Hydrology”, Mc Graw Hill Education, First Edition,2017

REFERENCE BOOKS:

1. David Keith Todd &Larry W. Mays "Groundwater Hydrology", John Wiley & Sons, 3rd Edition,2005
2. Ven Te Chow, David.R.Maidment and Mays, Larry W. Mays "Applied Hydrology", McGraw Hill Education, Indian Edition 2017
3. Raghunath .H.M., "Hydrology", New Age International publishers, 3rd Edition, 2015

Online Resources:

1. https://nptel.ac.in/courses/105/104/105104103/
2. https://nptel.ac.in/courses/105/107/105107129/

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE33) ENVIRONMENTAL ENGINEERING LABORATORY

B. Tech - III Year II – Semester

L	T	P	C
0	0	2	1

Course Objectives:

- To conduct test on determination of water standards
- To understand the procedure of determining various parameters of water
- To impart knowledge on evaluating chloride content
- To attain knowledge of B.O.D and C.O.D determination

LIST OF EXPERIMENTS

1. Determination of pH
2. Determination of Electrical Conductivity
3. Determination of Acidity
4. Determination of Alkalinity
5. Determination of Total Hardness
6. Determination of Chlorides
7. Determination of optimum coagulant Dosage
8. Determination of Dissolved Oxygen
9. Determination of COD
10. Determination of BOD

Course Outcomes: On completion of the course, the students will be able to:

CO1: Test water to determine pH and conductivity
CO2: Estimate quality of water
CO3: Determine chloride content in water
CO4: Determine BOD and COD of water

REFERENCE BOOKS:

1. Howard S. Peavy, Donald R. Roweand George Tchobanoglous, “Environmental Engineering”, McGraw Hill, First Edition 2017
2. Duggal, K. N., Elements of Environmental Engineering, S. Chand & Co., 3rd Edition, 2008.

Online Resources:

1. https://ee1-nitk.vlabs.ac.in/List%20of%20experiments.html

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE34) COMPUTER AIDED DESIGN LABORATORY

B. Tech - III Year II – Semester

L	T	P	C
0	0	2	1

Course Objectives:

- Learn the usage of any fundamental software for design
- Create geometries using pre-processor
- Analyze and Interpret the results using post processor
- Design the structural elements

LIST OF EXPERIMENTS

1. Analysis & Design determinate beams using a software
2. Analysis & Design of fixed beam using a software
3. Analysis & Design of Plane Frames
4. Analysis & Design of space frames
5. Analysis & Design of residential building
6. Analysis & Design of Roof Trusses
7. Design and detailing of built up steel beam
8. Developing an excel template for foundation design
9. Detailing of RCC beam and RCC slab
10. Detailing of RCC column and RCC footing

Course Outcomes: On completion of the course, the students will be able to:

CO1: Analyse and design the beams and frames
CO2: Design the building under all loading conditions
CO3: Analyse the roof truss and built up steel beams
CO4: Draw the detailing of beam, slab, Column and Footing.

REFERENCE BOOKS

1. B.C. Punmia. Ashok K. Jain and Arun K. Jain, "Limit State design of Reinforced Concrete", Laxmi Publications (P) Ltd., 2nd Edition, 2016
2. Unnikrishnan Pillai and Devdas Menon, "Reinforced Concrete Design", Tata McGraw Hill Publishing Company Ltd., 3rd Edition, 2017
3. N. Krishnaraju, "Design of Reinforced Concrete Structures, IS: 456-2000", CBS Publications, 4th Edition, 2019

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22EN03) ADVANCED ENGLISH COMMUNICATION SKILLS LABORATORY

B. Tech - III Year II – Semester

L	T	P	C
0	0	2	1

Introduction

The introduction of the Advanced English Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen, speak, read, and write in English both for their professional and interpersonal communication in the globalised context.

The proposed lab should be a laboratory course to enable students to use 'good' English and perform the following:

- Gather ideas and information to organize ideas relevantly and coherently.
- Engage in debates.
- Participate in group discussions.
- Face interviews.
- Write project/research reports/technical reports.
- Make oral presentations.
- Write formal letters.
- Transfer information from non-verbal to verbal texts and vice-versa.
- Take part in social and professional communication.

Course Objectives

This Lab focuses on using multi-media instruction for language development to meet the following targets. By the end of the course the students will be able

- To prepare the students for their placements by improving communication skills.
- To familiarize and train students with the types and elements of Résumé/ Curriculum Vitae.
- To expose students to the concepts of report writing familiarize and train students to write technical reports.
- To practice interview skills as an observer, an interviewer and/or an interviewee.

Module 1: Fundamentals of Interpersonal Communication

- Listen to process information- give information, as part of a simple explanation – conversation starters: small talk-exposure to functional aspects of intonation- accent- tone- pauses for practice – compare information and ideas from multiple sources- converse with reasonable accuracy over a wide range of everyday topics.
- Lexical chunks for accuracy and fluency- factors influencing the fluency, Role play-deliver a five-minute formal / informal talk – greetings – respond to greetings – invite and offer – accept – decline – take leave- making a request-apology etc.
- Listening for gist- listening for details-Being an active listener: giving verbal and non-verbal feedback – Summarizing academic readings and lectures - conversational speech listening to and participating in conversation – persuasion.

Module 2: Effective Writing Skills

- Resume Writing-Concept of Résumé Writing-Professional career objective-Resume-Curriculum vitae, Biodata: Difference-Format of Résumé and Types of Résumés -Tips to build a winning Resume-Tips to write effective cover letter-Statement of Purpose-Letters of Recommendation.
- Report Writing-Elements of Report Writing- Significance, format, layout, and mechanism- types of Reports-Newspaper Reports-Technical reports -Special Reports-Report in manuscript format.

Module 3: Presentation Skills

Oral presentations - individual and group through JAMsessions/seminars/PPTs and Written presentations through posters/projects/reports.

Module 4: Group Discussion

Concept and process of Group Discussion-Importance of Group Discussion-Do's and Don'ts of Group Discussion-Group Discussion for placements-Practice on topics–Current affairs, Abstract topics, General awareness, Business and economy, Education and Social issues.

Module 5: Interview Skills

Interview Skills: Meaning and Purpose of an Interview-Types of interviews-telephonic interview, video conference-(n)etiquette; Interview preparation techniques-Dress code at an interview-Types of interview questions-FAQs in HR Interview.

Course Outcomes: After completing this course, students will be able to:

CO1: Participate in group discussion to present their viewpoints briefly and effectively.

CO2: Inculcate flair for writing and felicity in written expression in Resume / Curriculum Vitae / Reports.

CO3: Participate confidently with appropriate body language in interviews.

CO4: Enhance their team building skills and capabilities for effective decision making.

Books Prescribed:

1. **Technical Communication** by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
2. **English Language Communication : A Reader cum Lab Manual** Dr A Ramakrishna Rao, Dr G Natanam& Prof SA Sankaranarayanan, Anuradha Publications, Chennai 2008.
3. **Advanced Communication Skills Laboratory Manual** by Sudha Rani, D, Pearson Education 2011.
4. **Technical Communication** by Paul V. Anderson. 2007. Cengage Learning pvt. Ltd. New Delhi.
5. **Business and Professional Communication:** Keys for Workplace Excellence. Kelly M. Quintanilla & Shawn T. Wahl. Sage South Asia Edition. Sage Publications. 2011.

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE35) INDUSTRY ORIENTED MINI PROJECT/INTERNSHIP

B.Tech – III Year II – Semester

L	T	P	C
0	0	4	2

Course Outcomes: On the completion of the course, the students will be able to,

CO 1 - Enhance students knowledge in current technology

CO 2 - Develop leadership ability and responsibility to execute the given task

CO 3 - Enhance their employability skills along with real corporate exposure

CO 4 - Elaborate the completed task and compile the report

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CH03) ENVIRONMENTAL SCIENCE

B.Tech - III Year II – Semester (Only for Lateral entry Students)

L	T	P	C
3	0	0	0

Course Objectives:

- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures.
- Understanding the environmental policies and regulations

UNIT - I

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

UNIT - II

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

UNIT - III

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

UNIT - IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation.

Global Environmental Issues and Global Efforts: Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

UNIT - V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act-1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

Course Outcomes:

- Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

TEXT BOOKS:

3. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
4. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

7. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
8. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHILearning Pvt. Ltd.
9. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
10. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
11. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
12. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications.

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE36) QUANTITY SURVEY & VALUATION

L	T	P	C
2	0	0	2

B.Tech – IV Year I – Semester

Pre-requisites: Nil

Course Objectives:

- To understand the types of various works in construction.
- To identify the methods used for multilevel structural estimation.
- To understand the estimation of bar bending, Roads and canals.
- To understand rate analysis of rates on various works.
- To make the students to learn Contracts, valuation of buildings& Standards.

UNIT – I

General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates – Approximate method of Estimating.

UNIT – II

Detailed estimation of single and multi storied building.

UNIT – III

Reinforcement bar bending and bar requirement schedules Earthwork for roads and canals.

UNIT – IV

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

UNIT-V

Contracts – Types of contracts – Contract Documents – Conditions of contract, Valuation -Standard specifications for different items of building construction.

Course Outcomes: On completion of the course, the students will be able to:

CO1: Understand the technical specifications for various works to be performed for a project.

CO2: Understand the concepts of estimate for different types of structures

CO3: Prepare detailed estimate for roads, canals.

CO4: Evaluate rate for works and learn about overall cost of the structure

CO5: Prepare contracts estimations as per standard specification.

TEXT BOOKS:

1. Datta B.N. Estimating and Costing, Charator Publishing House, 28th Revised Edition,2016
2. Kohli D. D and Kohli R.C, "Estimating and Costing", S. Chand Publishers,13th Edition, 2013
3. Duncan Cartlidge, "Quantity Surveyor's Pocket Book", Routledge Publishers, 2012

REFERENCE BOOKS:

1. Vazirani V. N and Chandola S. P, "Estimating and costing", Khanna Publishers, 6th Edition, 2015
2. Rangwala, C. "Estimating, Costing and Valuation", Charotar Publishing House Pvt. Ltd., 17th Edition, 2017
5. PWD Data Book and CPWD Schedule of Rates (DSR)

Online Resources:

1. https://nptel.ac.in/courses/105/103/105103093/
2. https://nptel.ac.in/courses/105/106/105106149/

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE37) PROJECT MANAGEMENT

B.Tech – IV Year I – Semester

Pre-requisites: Nil

L	T	P	C
2	0	0	2

Course Objectives:

- To learn the concept of project management along with functions
- To gain knowledge of the various techniques used for project planning
- To learn the estimation and financing of projects
- Acquire knowledge on various steps of planning scheduling and control
- Able to learn organizational behavior of project management

UNIT-I

Introduction: Introduction to Project management – Project Characteristics-Project Life cycle-Project Identification. Formulation and implementation. Project management in different sectors: Construction, Services Sector , Public sector and Government Projects. Systems approach to project management.

UNIT-II

Project Planning and Appraisal: Project Planning – Project Appraisal-Feasibility study-Technical, Commercial, Economic, Financial, Management, Social Cost Benefit Analysis-Project Risk Analysis.

UNIT-III

Project Finance: Project Cost Estimation, Project Financing-Investment Criteria. Project Evaluation Techniques - Pay Back Period , Accounting rate of return. Net present value, Internal Rate of return, Profitability Index, Cash Flows Estimation for new and replacement projects-Cost of Capital, Risk Analysis.

UNIT-IV

Project Planning and Control: Planning Steps-Scheduling- Network Diagrams. Network Analysis, Critical Path, Quality Management, Project Execution, Monitoring and control, Agile project Management, Scrum, Lean Production and project management.

UNIT-V

Organizational Behavior and Project Management: Organizational Structure and Integration, Role of Project manager, Roles in the project team, Project stakeholder engagement. Leadership in Construction project management, Participative management, Team building approach. Conflict Management in Projects, Stress Management.

Course Outcome: Students will be able to understand

CO1: Understand about importance of Project Management.

CO2: Able to gain the knowledge of Project Planning, Execution and implementation.

CO3: Able to understand project financial techniques and maintenance.

CO4: Apply concepts of project planning and management.

CO5: Analyze the organizational behavior and project team.

TEXT BOOK:

1. Join M.Nicholas and Herman Steyn, Project Management for Engineering. Business and Technology, Routledge, 5th Ediiton, 2017
2. Prasanna Chandra, Projects. Planning, Analysis. Selection. Financing Implementation and review, Tata McGaw Hill, 6h Ediiton,2008.
3. K.Nagrajan, Project Management, New Age International publishers, 7th Edition, 2015.

REFERENCE BOOKS:

1. Punmia B.C. and Khandelwal, Project Planning and Control with PERT and CPM, Laxmi Publications, 4th Edition, 2016
2. Gahloj. P.S. and Dhiv. B.M., Construction Planning and Management, WileyEastern Ltd., 2nd Edition, 2018
3. Kumar NeerajJha., Construction Project Management: Theory and Practice, Pearson Education, 2nd Edition, 2015

Online Resources:

1. https://nptel.ac.in/courses/105/103/105103093/
2. https://nptel.ac.in/courses/105/104/105104161/

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE38) PRESTRESSED CONCRETE

(Professional Elective-II)

B.Tech – IV Year I – Semester

L	T	P	C
3	0	0	3

Pre-requisites: No prerequisites are needed for enrolling into the course

Course Objectives:

- To impart knowledge on fundamentals& Principles of prestressing
- To attain understanding on different techniques and losses of prestressing systems
- To learn and understanding flexure and shearof prestressing and codes.
- To impart concepts on design of prestressing and pretensioning.
- To obtain knowledge on composite beams and deflections.

UNIT - I

Introduction: Historic development- General principles of prestressing pre-tensioning and post tensioning-Advantages and limitations of Prestressed concrete- General principles of PSC-Classification and types of prestressing- Materials- high strength concrete and high tensile steel their characteristics.

UNIT - II

Methods and Systems of prestressing: Pre-tensioning and Posttensioning methods and systems of prestressing like Hoyer system, Magnel Blaton system, Freyssinet system and Gifford- Udall System-Lee McCall system.

Losses of Prestress: Loss of prestress in pretensioned and posttensioned members due to various causes like elastic shortage of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, slip in anchorage, frictional losses.

UNIT - III

Flexure: Analysis of sections for flexure- beams prestressed with straight, concentric, eccentric, bent and parabolic tendons- stress diagrams- Elastic design of PSC slabs and beams of rectangular and I sections- Kern line – Cable profile and cable layout.

Shear: General Considerations- Principal tension and compression- Improving shear resistance of concrete by horizontal and vertical prestressing and by using inclined or parabolic cables- Analysis of rectangular and I beams for shear – Design of shear reinforcements- IS Code provisions**.**

UNIT - IV

Transfer of Prestress in Pretensioned Members: Transmission of prestressing force by bond – Transmission length – Flexural bond stresses – IS code provisions – Anchorage zone stresses in post tensioned members –stress distribution in End block – Analysis by Guyon, Magnel, Zienlinski and Rowe's methods – Anchorage zone reinforcement- IS Provisions

UNIT - V

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

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

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

CO1: Acquire the knowledge of basic fundamentals, classifications of prestressing.

CO2: Acquire the knowledge of various methods and losses of prestressing techniques.

CO3: Develop skills in analysis design of prestressed structural elements

CO4: Able to understand bond stresses of prestressing and posttensioning.

CO5: Able to analyze the concepts of composite beams and deflection.

TEXT BOOKS:

1. Krishna Raju. N, "Prestressed Concrete", Tata McGraw Hill, 6th Edition, 2018
2. Lin.T.Y and Ned H. Burns, "Design of Prestressed concrete structures", Wiley, 3rd Edition,2010
3. Rajagopalan, N, "Prestressed concrete", Narosa Publishing House,2nd Edition, 2010

REFERENCE BOOKS:

1. Edward G. Nawy P.E., "Prestressed Concrete: A Fundamental Approach", Pearson, 3rd Edition,1999
2. P. Dayaratnam, P Sarah, "Prestressed Concrete Structures", Medtech, 7th Edition,2017
3. F. K. Kong, R. H. Evans, "Reinforced and Prestressed Concrete", CRC Press, 3rd Edition, 1990

Code Books:

1. IS 1343:2016, "Prestressed Concrete- Code of practice", BIS Publications

Online Resources:

1. https://nptel.ac.in/courses/105/106/105106117/
2. https://nptel.ac.in/courses/105/106/105106118/

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE39) EARTH RETAINING STRUCTURES

(Professional Elective – II)

B.Tech – IV Year I – Semester

L	T	P	C
3	0	0	3

Pre-requisites: Geotechnical Engineering, Foundation Engineering

Course Objectives:

- To attain adequate knowledge in earth pressure theories.
- To attain knowledge on the retaining walls, backfill material.
- To attain knowledge on sheet piles and flexible walls.
- To impart knowledge on braced cuts, settlement in ground.
- To learn the concepts reinforced geosynthetics soil and applications.

UNIT-I

Earth Pressure Theories: Rankine's and Coulomb's Earth pressure theories for cohesive and cohesionless soils, stresses due to compaction and surcharge loads.

UNIT-II

Conventional Retaining Wall: Types of retaining walls, Stability (sliding, overturning, bearing capacity & overall) of gravity and cantilever walls, Proportioning of retaining walls, Backfill material and drainage.

UNIT-III

Flexible Walls: Sheet pile walls, Construction methods- Cantilever and Anchored (Free and Fixed support methods) sheet pile walls in coarse and fine grained soils, Rowe's moment reduction method.

UNIT-IV

Braced Cuts: Lateral earth pressure in braced cuts, Design of various components, Stability of braced cuts, base heave and stability, yielding and settlement of ground surrounding excavation, Diaphragm walls – slurry support.

UNIT-V

Reinforced Soil Walls/Mechanically Stabilised Earth: - Introduction to geosynthetics – Functions and applications - Failure mechanisms of Reinforced soil walls -bond and rupture failures- Internal and external stability by Static analyses -Soil Nailing.

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

CO1: Understand the methods of calculation of the earth pressures

CO2: Analyze the stability of conventional retaining walls.

CO3: Design flexible retaining walls under different soil and fixity conditions.

CO4: Design the lateral earth pressure in braced cuts.

CO5: Understand the design of geosynthetic reinforced earth walls.

TEXT BOOKS:

1. Das, B. M. - Principles of Foundation Engineering Nelson Engineering, 5th Edition, 2004
2. Koerner, R. M – Designing with Geosynthetics – Prentice Hall, New Jersey,1994
3. Donald P Coduto – Foundation Design Principles and Practices, 2nd edition, Pearson, Indian edition, 2012.

REFERENCE BOOKS

1. Bowles, J. E. - Foundation Analysis & Design, McGraw-Hill Companies, Inc., 5th Edition, 1996
2. Rowe, R. K. - Geotechnical & Geoenvironmental Engineering Hand Book – Springer, 2001
3. Geotechnical Engineering by ManojDutta & Gulati S.K – Tata McGraw- Hill Publishers New Delhi, First Edition,2017

Online resources:

1. https://nptel.ac.in/courses/105/105/105105176/
2. https://nptel.ac.in/courses/105/101/105101083/

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE40) REPAIR AND REHABILITATION OF STRUCTURES

(Professional Elective – II)

B.Tech – IV Year I – Semester

Pre-requisites: -

L	T	P	C
3	0	0	3

Course Objectives:

- To attain adequate knowledge on distress of structures.
- To understand inspection and testing methods to evaluate concrete structures
- To attain knowledge on corrosion of steel reinforcement
- To impart knowledge on selection of Repair Material
- To learn the different repair and rehabilitation methods of structures

UNIT – I : Introduction

Introduction - Deterioration of Structures - Distress in the Structures - Causes and Prevention - Types of Damage.

UNIT – II : Inspection and Testing

Inspection - Damage Assessment - Estimation of Strength, Chemical and other durability tests – Non – Destructive Testing

UNIT – III : Corrosion and Fire Rating

Corrosion of Steel Reinforcement: Causes, Mechanism and Prevention – Damage of structure due to Fire – Fire Rating of Structures

UNIT – IV : Repair Materials

Ideal characteristics for selection of repair materials, premixed cement concrete and mortars, polymer modified mortars and concrete, epoxy and epoxy systems

UNIT – V : Repair / Rehabilitation methods

Shortcreting and Guniting, Repair and strengthening of columns and beams using ferrocement jacketing, fiber wrap technique, Foundation Rehabilitation methods.

Course Outcomes: On completion of the course, the students will be able to:

CO1 : Identify the reasons for distress and deterioration of structures.

CO2 : Apply condition assessment of structures by various tests

CO3 : Understand corrosion Mechanism and damage of structure due to fire

CO4 : Select a suitable repair material for various field applications

CO5 : Select suitable repair and rehabilitation methods for Civil Infrastructure

TEXT BOOKS:

1. J. Bhattacharjee, "Concrete Structures-Repair, Rehabilitation and Retrofitting", CRS Publishers and Distributors, First Edition, 2019
2. R. Dodge Woodson, "Concrete Structures-Protection, Repair and Rehabilitation", Elsevier, First Edition, 2019
3. Santhakumar A.R, "Concrete Technology", Oxford University Press, 2nd Edition, 2018

REFERENCE BOOKS:

1. CPWD Handbook on Repair and Rehabilitation of RCC buildings, Govt. of India Press, NewDelhi, 2014
2. ACI 546R-14, Guide to Concrete Repair, American Concrete Institute, 2014
3. Gupta B L and Amit Gupta., Maintenance Repair of Civil structures,Standard Publication, First Edition, 2009

Online Resources:

1. https://nptel.ac.in/courses/105/106/105106202/
2. https://nptel.ac.in/courses/105/105/105105213/

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE41) DESIGN OF BRIDGES

(Professional Elective – III)

B.Tech – IV Year I – Semester

L	T	P	C
3	0	0	3

Pre-requisites: Structural Engineering – I&II, Foundation Engineering

Course Objectives:

- To learn basic components of bridge
- To impart knowledge on design of RCC Bridge
- To gain knowledge on design of steel bridge
- To learn design of various components in bridge
- To learn the different types of foundation

UNIT- I

Introduction: Definition, components of bridge, classification of bridges, selection of site, economical span, aesthetics consideration, necessary investigations and essential design data.

Standard Specifications for Roads and Railways Bridges: General, Indian Road Congress Bridge Code, width of carriage way, clearance, various loads to be considered for the design of roads and railway bridges, detailed explanation of IRC standard live loads.

UNIT- II

Design Consideration for R. C. C. Bridges: Various types of R.C.C. bridges (brief description of each type), Design of R.C.C. culvert and T-beam bridges.

UNIT- III

Design Consideration for Steel Bridges: Various types of steel bridges (brief description of each), Design of truss and plate girder bridges.

UNIT- IV

Hydraulic & Structural Design: Piers, abutments, wing-wall, Bearings and expansion joints - Functions, types and selection of bearings - Bearing materials - Design of elastomeric bearings for different conditions - Expansion joints – types of expansion joints

UNIT - V

Bridge Foundation: Various types, necessary investigations and design criteria of well foundation.

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

CO1: Know the specification for Roads and Railway Bridges
CO2: Design the Culvert and T-Beam bridges
CO3: Design Truss and plate girder bridges
CO4: Design bearings and types of joints
CO5: Know various types of bridge foundation and its investigation

TEXT BOOKS:

1. Essentials of Bridge Engineering, D.J.Victor, Oxford & IBH Pub, N. Delhi.
2. Design of Bridges, N. Krishna Raju, Oxford & IBH, N. Delhi.
3. Bridge Deck Analysis, R. P. Pama & A. R. Cusens, John Wiley & Sons.

REFERENCE BOOKS:

1. Design of Bridge Structures, T. R. Jagadish & M.A.Jairam, Prentice Hall of India, N. Delhi.
2. J.E. Long, "Bearings in Structural Engineering", Newnes Butterworth & Co., 1974.
3. 3. R.E. Rowe, "Concrete Bridge Design", 1st Edition, Elsevier Science and Technology,1962.

Online Resources:

1. https://archive.nptel.ac.in/courses/105/105/105105216/
2. https://archive.nptel.ac.in/courses/105/105/105105165/

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE42) ELEMENTS OF EARTHQUAKE ENGINEERING

(Professional Elective-III)

B.Tech – IV Year I – Semester

L	T	P	C
3	0	0	3

Pre-requisites: Structural Engineering - I

Course Objectives:

- To impart knowledge on theory of vibrations.
- To learn basic elements in the seismology
- Acquire knowledge on principles of earthquake resistant RC design.
- Acquire knowledge on behavior of masonry buildings
- To impart knowledge on ductile detailing of structural members as per codes

UNIT - I

Theory of Vibrations: Elements of a vibratory system- Degrees of Freedom-Continuous system-Lumped mass idealization-Oscillatory motion-Simple Harmonic Motion-Free vibration of single degree of freedom (SDOF) system- undamped and damped-critical damping-Logarithmic decrement-Forced vibrations- Harmonic excitation-Dynamic magnification factor-Excitation by rigid based translation for SDOF system-Earthquake ground motion.

UNIT - II

Engineering Seismology: Earthquake phenomenon - cause of earthquakes-Faults- Plate tectonics-Seismic waves- Terms associated with earthquakes-Magnitude/Intensity of an earthquake-scales-Energy Released-Earthquake measuring instruments seismogram - Seismograph -strong ground motions- Seismic zones of India.

UNIT - III

Reinforced Concrete Buildings: Principles of earthquake resistant design of RC members-Structural models for frame buildings- Seismic methods of analysis- IS code based methods for seismic design - Determination of design lateral forces as per IS 1893 (Part-1):2016

UNIT - IV

Masonry Buildings: Introduction- Elastic properties of masonry assemblage- Categories of masonry buildings-Behaviour of unreinforced and reinforced masonry walls- Behaviour of infill walls-Improving seismic behaviour of masonry buildings- Load combinations and permissible stresses-Seismic design requirements- Lateral load analysis of masonry buildings.

UNIT - V

Ductility : Considerations in Earthquake Resistant Design of RC Buildings: Introduction- Impact of Ductility-Requirements for Ductility- Assessment of Ductility- Factors affecting Ductility- Ductile detailing considerations as per IS 13920-2016 -Behaviour of beams, columns and joints in RC buildings during earthquakes.

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

CO1: Gain knowledge on the Vibrations and Degrees of Freedom

CO2 : Understand concepts of seismic waves and measurement of earthquakes.

CO3 : Understand the methods to evaluate lateral forces.

CO4: Able to know the response of behavior of walls in masonry structure

CO5 : Able to design ductile detailing for structural elements

TEXT BOOKS:

1. A.K. Chopra, "Dynamics of structures", Pearson Education India, 3rd Edition, 2020
2. Clough R.W, "Dynamics Of Structures", CBS Publishers, 2nd Edition, 2015
3. Pankaj Agarwal and Manish Shrikhande, "Earthquake resistant design of structures", PHI Learning, Revised Edition, 2017

REFERENCE BOOKS:

1. Mario Paz and Young Hoon Kim, "Structural Dynamics: Theory and Computation", Springer Publisher, 6th Edition. 2018,
2. Shashikant K. Duggal, "Earthquake Resistant Design of Structures", Oxford Higher Education, 2nd Edition, 2013
3. Dr. Vinod Hosur, "Earthquake-Resistant Design of Building Structures", Wiley, 2012

CODE BOOKS:

1. IS 13920 – 2016, Ductile Detailing of Reinforced Concrete Structures Subjected To Seismic Forces - Code Of Practice, BIS Publication
2. IS 1893 (Part 1)-2016 - Criteria for Earthquake Resistant Design of Structures (Part 1 General Provisions and Buildings), BIS Publication
3. IS 4326 (Part 1)-2013 - Earthquake Resistant Design and Construction of Buildings — Code of Practice, BIS Publication

Online Resources:

1. https://nptel.ac.in/courses/105/101/105101004/
2. https://nptel.ac.in/courses/105/106/105106151/

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE43) GROUND IMPROVEMENT TECHNIQUES

(Professional Elective – III)

B.Tech – IV Year I – Semester

L	T	P	C
3	0	0	3

Pre-requisites: Geotechnical Engineering

Course Objectives:

- To identify difficult ground conditions in engineering practice.
- To select suitable ground improvement techniques for problematic soils.
- To assess suitable physical, chemical, mechanical and hydraulic modifications.
- To attain knowledge about stabilization of soil and grouting.
- Able to analyze soil reinforcement and bolting and nailing.

UNIT- I

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

UNIT- II

Mechanical Modification – Deep Compaction Techniques- Blasting Vibrocompaction, Dynamic Tamping and Compaction piles.

UNIT- III

Hydraulic Modification – Objectives and techniques, traditional dewatering methods and their choice, Design of dewatering system, Electro-osmosis, Electro-kinetic dewatering.Filtration, Drainage and Seepage control with Geosynthetics, Preloading and vertical drains.

UNIT- IV

Physical and chemical modification: Stabilisation with admixtures like cement, lime, calcium chloride, fly ash and bitumen; Grouting: Categories of grouting, Art of grouting, Grout materials, Grouting techniques and control.

UNIT- V

Modification by Inclusions and Confinement - Soil reinforcement, reinforcement with strip, and grid reinforced soil. In-situ ground reinforcement, ground anchors, rock bolting and soil nailing.

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

CO1: Understand the various ground improvement methods.

CO2: Assess different compaction methods for ground modification.

CO3: Design dewatering systems to reduce the settlements.

CO4: Comprehend stabilizations with chemical and grouting techniques.

CO5: Understand the principles of soil reinforcement and confinement

TEXT BOOKS:

1. Hausmann, M. R. – Engineering Principles of Ground Modifications, McGraw Hill publications, First Edition,1990
2. M. P. Moseley and K. Krisch – Ground Improvement, Taylor and Francis, 2nd edition 2006
3. Donald P Coduto – Foundation Design Principles and Practices, 2nd edition, Pearson, Indian edition, 2012.

REFERENCE BOOKS:

1. Jones C. J. F. P. – Earth Reinforcement and soil structures – Butterworths, London, First Edition, 1985
2. Xianthakos, Abreimson and Bruce - Ground Control and Improvement, John Wiley & Sons, First Edition, 1994.
3. K. Krisch& F. Krisch - Ground Improvement by Deep Vibratory Methods, Spon Press, Taylor and Francis, 2010

Online Resources:

1. https://nptel.ac.in/courses/105/107/105107129/
2. https://nptel.ac.in/courses/105/104/105104103/

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE44) BUILDING INFORMATION MODELLING

(Professional Elective – IV)

B.Tech – IV Year I – Semester

L	T	P	C
3	0	0	3

Pre Requisites – No prerequisites are needed for enrolling into the course

Course Objectives:

- To learn the fundamentals and components of BIM
- To understand the BIM Architectural Drafting and Rendering
- To impart the knowledge on BIM analysis and Design
- To learn the role of BIM in scheduling and estimation
- To learn BIM modelling for residential and Multi storey buildings

UNIT – I : Introduction

Introduction to Building Information Modelling (BIM): Background of Building Information Modelling (BIM); Components of BIM, BIM Focus, Users of BIM information and Project Delivery Methods using BIM

UNIT – II : Drafting and Rendering

BIM in Pre-Construction Phase: Conceptual Design in Terms Shape, Orientation, Site in terms of Green Strategy, Architectural BIM, Architectural Drafting, Architecture 3D Rendering.

UNIT – III : Structural BIM Design

Systems and Materials, Structural Rebar Detailing, Green DesignDecisions. BIM Analysis: Day lighting, Energy Analysis and Energy Cost; Documentation.

UNIT – IV : BIM in Planning and Construction Phase

BIM In Fabrication, BIM In Construction, Gate keeping, 4D BIM – Construction Scheduling, 5D – Construction Cost Estimation, Quantity Take off, Clash Detection and Construction Logistics.

UNIT – V : Case studies on BIM

Architectural BIM in Residential Buildings and 3D Rendering Services; Structural BIM Modelling for Multi Storey– Residential Building and BIM Implementation during New Construction

Course Outcomes: On completion of the course, the students will be able to:

CO1 : Study the background of BIM and its role in construction management

CO2 : Make architectural drafting and 3D Rendering

CO3 : Extend knowledge on structural BIM Analysis and Design

CO4 : Apply BIM in construction design, planning and construction phases.

CO5 : Apply BIM for case studies

TEXT BOOKS:

1. De Wilde, P., Mahdjoubi, L., & Garrigós, A. G., "Building Information Modelling (BIM) in Design, Construction and Operations", WIT Press, Volume 192, 2019
2. Kymmell, W., "Building Information Modeling: Planning and Managing Construction Projects with 4D CAD and Simulations", McGraw-Hill Education, First Edition, 2008
3. Karen M. Kensek, "Building Information Modeling", Routledge, 2014

REFERENCE BOOKS:

1. Elvin, G., "Integrated Practice in Architecture: Mastering Design-Build, Fast-Track, And Building Information Modelling", John Wiley & Sons, First Edition, 2007
2. Ingibjorg Birna Kjartansdóttir, Stefan Mordue, Paweł Nowak, David Philp, Jónas Thór Snæbjörnsson, "Building Information Modelling BIM", Warsaw University of Technology, Warsaw, 2017

Online Resources:

1. https://www.classcentral.com/course/building-information-modelling-10604

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE45) GREEN BUILDING TECHNOLOGIES

(Professional Elective – IV)

B.Tech – IV Year I – Semester

L	T	P	C
3	0	0	3

Pre-requisites: No prerequisites are needed for enrolling into the course

Course Objectives:

- To learn about the environmental Implications of building construction materials.
- To learn about suitable Industrial waste materials including Biomass materials
- To understand Thermal characteristics and heat flow characteristics of building materials.
- To study about the non-conventional energy resources like solar energy
- To learn about management of water, solid and sewage.

UNIT-I

Introduction

Environmental implications of buildings energy, carbon emissions, water use, waste Disposal. Building materials:sources, methods of production and environmental Implications. Green cover and built environment.

UNIT-II

Implications of Resources

Implication of resources for Building Materials and alternative concepts, Recycling of Industrial and Building Wastes, Biomass Resources for buildings.

UNIT-III

Comforts in Building

Comforts in Building: Thermal Comfort in Buildings-Issues; Heat Transfer Characteristics of Building Materials and Building Techniques. Incidence of Solar Heat on Buildings.

UNIT-IV:

Energy Conservation

Utility of Solar energy is buildings concepts of Solar Passive Cooling and Heating of Buildings. Low Energy Cooling.Case studies of Solar Passive Cooled and Heated Buildings.

UNIT-V:

Green Composites for Buildings & Waste Management

Green Composites for buildings .Concepts of Green Composites. Water Utilization in Buildings. Waste Management: Low Energy Approaches to Water Management, Management of Solid Wastes, Management of Sullage water and Sewage.

Courses Outcomes; On completion of the course, the students will be able to:

CO1: Identify alternative materials for civil engineering construction.

CO2: Know the background reasons for energy efficient materials to build environment.

CO3: Relate comfort in Green Technology.

CO4: Apply concepts of energy coservation in optimizing the building performance

CO5: Understand a importance of green performance in buildings and its rating

TEXT BOOKS:

1. K.S.Jagadish, B.U.Venkataramareddy and K.S.Nanjundarao. Alterative Building Materials and Technologies. New Age International, Revised Edition 2007.
2. Michael Bauer, Peter Mosle and Michael Schwarz " Green Building-Guide book for Sustainable Architecture " Springer, 2010.
3. Jerry Yudelson Green building Through Integrated Design McGraw Hill, Revised Edition 2009.

REFERENCE BOOKS :

1. Osman Attmann Green Architecture Advanced Technologies and Materials. McGraw Hill, 2nd Edition2010.
2. Michael F. Ashby Materials and the Environment, Elsevier, 2009.
3. Low Energy Cooling For Sustainable Buildings John Wiley and Sons Ltd. 2009.

Online Resources:

1.https://nptel.ac.in/courses/105/102/105102195/

2.http://www.nitttrc.edu.in/nptel/courses/video/105102195/L02.html

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE46) REMOTE SENSING & GEOGRAPHICAL INFORMATION SYSTEMS

(Professional Elective – IV)

B.Tech – IV Year I – Semester

L	T	P	C
3	0	0	3

Pre-requisites: No prerequisites are needed for enrolling into the course

Course Objectives:

- Know the concepts of Remote Sensing, its interpreting Techniques
- Know the concept of fundamentals of Geographical Information System
- Understand the concept for data input methods, sources in errors.
- Understand the students managing the digitization of GIS.
- Able to analyze applications of GIS.

UNIT – I

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

Remote Sensing Data Interpretation Visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of soil, water and vegetation. Concepts of Digital image processing, image enhancements, qualitative & quantitative analysis and pattern recognition, classification techniques and accuracy estimation.

UNIT- II

Introduction to GIS: Introduction, History of GIS, GIS Components, GIS Applications in Real life, The Nature of geographic data, Maps, Types of maps, Map scale, Types of scale, Map and Globe, Co-ordinate systems, Map projections, Map transformation, Geo-referencing.

Spatial Database Management System: Introduction: Spatial DBMS, Data storage, Database structure models, database management system , entity-relationship model, normalization.

Data models and data structures: Introduction, GIS Data model, vector data structure, raster data structure, attribute data, geo-database and metadata.

UNIT- III

Spatial Data input and Editing: Data input methods – keyboard entry, digitization, scanning, conversion of existing data, remotely sensed data, errors in data input, Data accuracy, Micro and Macro components of accuracy, sources of error in GIS.

Spatial Analysis: Introduction, topology, spatial analysis, vector data analysis, Network analysis, raster data analysis, Spatial data interpolation techniques.

UNIT- IV

Awareness and digitization of GIS: Awareness, developing system requirements, evaluation of alternative systems, decision making using GIS.

UNIT- V

Applications of GIS: GIS based road network planning, Mineral mapping using GIS, Shortest path detection using GIS, Hazard Zonation using remote sensing and GIS, GIS for solving multi criteria problems, GIS for business applications.

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

CO1: Describe different concepts and terms used in Remote Sensing and its data.
CO2: Understand the Data conversion and Process in different coordinate systems
CO3: Evaluate the accuracy of Data and implementing a GIS.
CO4: able to understand digitization of GIS and evaluation.
CO5: Understand the applicability of RS and GIS for various applications.

TEXT BOOKS

1. Remote Sensing and GIS by BasudebBhatta , Oxford University Press, 2nd Edition, 2011.
2. Introduction to Geographic Information systems by Kang-tsung Chang, McGrawHill Education (Indian Edition), 7th Edition, 2015.
3. Fundamentals of Geographic Information systems by Michael N. Demers, 4th Edition, Wiley Publishers, 2012.

REFERENCE BOOKS

1. Remote Sensing and Image Interpretation by Thomas M. Lillesand and Ralph W.Kiefer, Wiley Publishers, 7th Edition, 2015.\
2. Geographic Information systems – An Introduction by Tor Bernhardsen, Wiley India Publication, 3rd Edition,
3. Advanced Surveying: Total Station, GIS and Remote Sensing by SatheeshGopi, R.SathiKumar, N.Madhu, Pearson Education, 1st Edition, 2007.

Online Resources:

1.https://nptel.ac.in/courses/105/107/105107155/
2.https://nptel.ac.in/courses/107/105/107105088/

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE47) CIVIL ENGINEERING SOFTWARE LABORATORY

B.Tech - IV Year I – Semester

L	T	P	C
0	0	2	1

Pre-Requisites: Structural Engineering - I & II

Course Objectives:

- Learn the usage of software for analysis and design
- Estimate the Multi storey buildings using excel template
- Analyze and Interpret the results using post processor
- Design the structural el0ements

LIST OF EXPERIMENTS

1. Three dimensional modelling of a building using software.
2. Rendering of buildings using software.
3. Planning and Estimation of Multi-storey buildings and development of Excel Template.
4. Digitization of Maps using software.
5. Creation of Thematic Maps using software.
6. Analysis of continuous Beams
7. Analysis and Design of Multi storey Buildings
8. Analysis of steel framed structure.
9. Demonstration to Analysis of different types of Bridge structures.
10. Demonstration to Finite Element Analysis software.

Note : Open/education/academic version of software can be used.

Course Outcomes: On completion of the course, the students will be able to:

CO1: Analyse the beams and framed structure

CO2: Analyse the building under all loading conditions

CO3: Analyse the steel frame structures

CO4: Acquire knowledge on finite element analysis software

REFERENCE BOOKS

1. B.C. Punmia. Ashok K. Jain and Arun K. Jain, “Limit State design of Reinforced Concrete”, Laxmi Publications (P) Ltd., 2nd Edition, 2016
2. Unnikrishnan Pillai and Devdas Menon, “Reinforced Concrete Design”, Tata McGraw Hill Publishing Company Ltd., 3rd Edition, 2017
3. Datta B.N. Estimating and Costing, Charator Publishing House, 28th Revised Edition,2016

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE48) PROJECT STAGE - I

B.Tech - IV Year I – Semester

L	T	P	C
0	0	6	3

Course Outcomes: On completion of the course, the students will be able to:

CO1 - Identify the problem by applying acquired knowledge.

CO2 - Analyze and categorize executable project modules.

CO3 - Choose efficient tools for designing project modules.

CO4 - Combine all the modules through effective team work after efficient testing.

CO5 - Elaborate the completed task and compile the project report.

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE49) SOLID WASTE MANAGEMENT

(Professional Elective-V)

B.Tech – IV Year II – Semester

L	T	P	C
3	0	0	3

Pre-requisites: Nil

Course Objectives:

- Understand the necessity of solid waste management.
- Able to gain the knowledge on strategies for the collection of solid waste.
- Understand the concepts of engineering systems and energy recovery.
- Know the importance of Landfills and pollution control
- Understand the concept of Hazardous waste

UNIT – I

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

UNIT – II

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

UNIT - III

Engineering Systems for Resource and Energy Recovery: Processing techniques; materials recovery systems; recovery of biological conversion products – Composting, pre and post processing, types of composting, Critical parameters, Problems with composing - recovery of thermal conversion products; Pyrolisis, Gasification, RDF - recovery of energy from conversion products; materials and energy recovery systems.

UNIT – IV

Landfills: Evolution of landfills – Types and Construction of landfills – Design considerations – Life of landfills- Landfill Problems – Lining of landfills – Types of liners – Leachate pollution and control – Monitoring landfills – Landfills reclamation.

UNIT – V

Hazardous waste Management: Sources and characteristics, Effects on environment, Risk assessment – Disposal of hazardous wastes – Secured landfills, incineration - Monitoring – Biomedical waste disposal, E-waste management, Nuclear Wastes, Industrial waste Management

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

CO1: Identify the physical and chemical composition of solid wastes.

CO2: Analyze the functional elements for solid waste management.

CO3: Able to analyze engineering systems and energy recovery

CO4: Understand the types and construction of land fills

CO5: Identify the methods of waste management and waste disposal systems.

TEXT BOOKS:

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

REFERENCE BOOKS:

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

ONLINE RESOURCES:

1. https://nptel.ac.in/courses/124/107/124107158/

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE50) SMART CITIES PLANNING AND MANAGEMENT

(Professional Elective – V)

B.Tech – IV Year II – Semester

L	T	P	C
3	0	0	3

Pre-requisites: Nil

Course Objectives:

- To introduce students on smart city basic concepts and Indian context of smart cities.
- To understand smart community, smart transportation and smart buildings
- Understand smart city components, green impact and solar representatives
- To understand Energy demand and Green approach to meet Energy demand
- To identify Smart Transportation Technologies in cities

UNIT – I: **Introduction to Smart Urban Infrastructures and Smart Cities**: Introduction to City Planning - Understanding Smart Cities - Dimensions of Smart Cities - Global Experience of Smart Cities Smart Cities – Global Standards and Performance Benchmarks, Practice Codes -Indian scenario - India "100 Smart Cities" Policy and Mission.

UNIT – II: **Smart Cities Planning and Development**: Introduction to Smart Community - Smart community concepts: Concept of Smart Community - Smart Transportation - Smart Building and Home Device - Smart Health - Smart Government - Smart Energy and Water – Cyber Security, Safety, and Privacy - Internet of Things, Block chain, Artificial Intelligence, Alternate Reality, Virtual Reality.

UNIT – III: **Smart Urban Energy Systems** – I: Conventional vs. Smart, City components, Energy demand, Green approach to meet Energy demand, Index of Indian cities towards smartness – a statistical analysis -Meeting energy demand through direct and indirect solar resources - Efficiency of indirect solar resources and its utility, Capacity limit for the indirect solar resources - Effectiveness in responsive environment in smart city; Smart communication using green resources.

UNIT – IV: **Smart Urban Energy Systems** – II: Introduction to PV technology - PV of various scale for smart city applications - Energy efficiency - Policies of Solar PV in smart domains (RPO, REC, Carbon credit, etc.) Definition - Structure of Smart Grid - Indian Perspective - Advantage & limitation - Definition, Structure of Smart Grid- Indian Perspective Advantage & limitation.

UNIT – V: **Smart Urban Transportation Systems**: Smart Transportation Technologies - Driverless and connected vehicles - ride sharing solutions - The "improve" pathway - The "shift" pathway – Smart Roads and Pavement systems.

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

CO1: Recognize smart city concepts and their international and national standards.

CO2: Recognize smart community, transportation and building concepts.

CO3: Understand the concept of smart urban system, components of solar system

CO4: Develop and calibrate energy demand and their capacity limits.

CO5: Predict the various smart urban transportation systems

TEXT BOOKS:

1. G. R.Kanagachidambaresan, R. Maheswar, V. Manikandan, K. Ramakrishnan, "Internet of Things in Smart Technologies for Sustainable Urban Development", Springer, 2020
2. "Society 5.0: A People-centric Super-smart Society", Hitachi-UTokyo Laboratory, Springer, 2020
3. Katharine S. Willis, Alessandro Aurigi, "The Routledge Companion to Smart Cities", Routledge International Handbooks, 2020

REFERENCE BOOKS:

1. YuminJoo, Yu-Min Joo, Teck-Boon Tan, "Smart Cities in Asia: Governing Development in the Era of Hyper-Connectivity",Edward Elgar Publishing, 2020
2. Yoshiki Yamagata, Perry P. J. Yang, "Urban Systems Design: Creating Sustainable Smart Cities in the Internet of Things Era", Elsevier, 2020
3. Christopher Grant Kirwan, Zhiyong Fu, "Smart Cities and Artificial Intelligence: Convergent Systems for Planning, Design and Operations", Elsevier, 2020

Online Resources:

1. https://nptel.ac.in/courses/124/107/124107158/
2. https://nptel.ac.in/courses/105/105/105105160/

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE51) AIR POLLUTION

(Professional Elective-V)

B.Tech – IV Year II – Semester

L	T	P	C
3	0	0	3

Pre-requisites: Nil

Course Objectives:

- To attain adequate knowledge on sources of air pollutants
- To find out the strategies for Control of Gaseous Pollutants
- To understand the system to Control Particulate Pollutants
- To impart knowledge on Automobile Pollution And its Control techniques
- To learn the steps involved in Air Quality Modelling

UNIT-I

Air Pollution: Definition of Air Pollution - Sources & Classification of Air Pollutants - Effects of air pollution-Global effects– Ambient Air Quality and standards– Monitoring air pollution, Sampling and analysis of Pollutants in ambient air – Stack sampling.

UNIT-II

Meteorology and Air Pollution: Factors influencing air pollution , Windrose , Mixing Depths , Lapse rates and dispersion - Atmospheric stability, Plume behavior, Plume rise and dispersion, Prediction of air quality, Box model - Gaussian model - Dispersion coefficient - Application of tall chimney for Pollutant dispersion.

UNIT-III

Control of Particulate Pollutants: Properties of particulate pollution - Particle size distribution - Control mechanism,Dust removal equipment – Working principles and operation of settling chambers, cyclones, wet dust scrubbers, fabric filters & ESP.

UNIT-IV

Control of Gaseous Pollutants: Process and equipment for the removal by chemical methods - Working principles and operation of absorption and adsorption equipment - Combustion and condensation equipment.

UNIT-V

Automobile and Indoor Pollution: Vehicular pollution – Sources and types of emission – Effect of operating conditions-Alternate fuels and emissions-Emission controls and standards, Strategies to control automobile pollution– Causes of indoor air pollution-changes in indoor air quality-control and air cleaning systems-indoor air quality.

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

CO1 : Recognize the effects of Air pollution and learnt standards of Air quality
CO2 : Know the factors influencing air pollutin
CO2 : Able to know the techniques to control particulate Pollutants
CO3 : Analyze the systems to control the gaseous pollutants
CO5 : Identify the causes of automobile pollution and its control technique

TEXT BOOKS:

1. M.N.Rao and HVN Rao, Air Pollution, Tata McGraw Hill Publishers, 26th Reprint,2007
2. Noel, D. N., Air Pollution Control Engineering, Tata McGraw Hill Publishers,First Edition,1999.

REFERENCE BOOKS:

1. Air Pollution Control Engineering by Nevers, McGraw-Hill, Inc., Revised Edition, 2000.
2. Fundamentals of Air Pollution by Dr. B.S.N. Raju, Oxford &I.B.H. 2nd Edition,2005
3. Air Pollution and Health by T. Holgate, Hillel S. Koren, Jonathan M. Samet, Robert L. Maynard publisher Academic Press, First Edition,1995

Online Resources:

1. https://nptel.ac.in/courses/105/107/105107213/
2. https://nptel.ac.in/courses/105/104/105104099/

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE52) AIRPORT, RAILWAYS AND WATERWAYS

(Professional Elective-VI)

B.Tech – IV Year II – Semester

L	T	P	C
3	0	0	3

Pre-requisites: Nil

Course Objectives:

- Deal with the characteristics of aircrafts related to airport design
- To know about the importance of railway for urban transportation.
- Introduce geometric design of railway track.
- To study about the track maintenance and operation.
- Explain the classes of harbours and design of port facilities.

UNIT – I

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

UNIT - II

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

UNIT – III

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

UNIT – IV

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

UNIT – V

Dock & Harbour Engineering: Water Transportation: Ports and Harbours - Types of water transportation, water transportation in India, Ports and harbours: requirements, classification. Harbour works: break waters, jetties, fenders, piers, wharves, dolphins, etc., Navigational aids: types, requirements, light house, beacon lights, buoys, Port facilities: general layout, development, planning, facilities, terminals. Docks and repair facilities: design, dry docks, wet docks, slipways, Locks and lock gates: materials, size, Dredging: classification, dredgers, uses of dredged materials.

Course Outcomes: On completion of the course, the students will be able to:

CO1: Understand the basics and components of Airport Engineering

CO2: Able to know Railways for Urban Transportation and its functions

CO3: Understand the concepts of Geometric Design of Railway Track

CO4: Acquire knowledge on Track maintenance and operation

CO5: Know the fundamentals and planning principles of docks and harbours

TEXT BOOKS:

1. K.P. Subramaniam, "Highway Railway Airport and Harbour Engineering",Scitech Publications (India) Pvt Ltd, Revised Edition, 2018
2. Saxena Subhash, C. and Satyapal Arora, "A textbook of Railway Engineering", Dhanapat Rai and Sons, Delhi, Revised Edition 2010
3. Khanna. S.K. Arora. M. G and Jain. S. S, "Airport Planning and Design", Nemchand and Bros, Roorkee, First Edition, 1994

REFERENCE BOOKS:

1. Venkatramaiah. C., "Transportation Engineering-Vol.2 Railways, Airports, Docks and Harbours, Bridges and Tunnels", Universities Press (India) Private Limited, Hyderabad, 2015.
2. Rangwala, "Railway Engineering", Charotar Publishing House, 27th Edition, 2017
3. Rangwala, "Airport Engineering", Charotar Publishing House, 17th Edition, 2018

Online Resources:

1. https://nptel.ac.in/courses/105/107/105107123/
2. https://nptel.ac.in/courses/114/106/114106025/

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE53) PAVEMENT ANALYSIS & DESIGN

(Professional Elective-VI)

B.Tech – IV Year II – Semester

Pre-requisites:

L	T	P	C
3	0	0	3

Course Objectives:

- Engineering analysis of stresses and strains in typical highway pavement structures due to loading from traffic and climate.
- Characterization of paving materials; structural pavement design by IRC, and AASHTO for flexible and rigid pavement are discussed.
- Overlay design for Flexible and Rigid pavement is discussed.

UNIT – I

Factors Affecting Pavement Design: Variables Considered in Pavement Design, Types of Pavements, Functions of Individual Layers, Classification of Axle Types of Rigid Chassis and Articulated Commercial Vehicles, Legal Axle and Gross Weights on Single and Multiple Units, Tire Pressure, Contact Pressure, EAL and ESWL Concepts, Traffic Analysis: ADT, AADT, Truck Factor, Growth Factor, Lane, Directional Distributions & Vehicle Damage Factors, Effect of Transient & Moving Loads.

UNIT – II

Stresses In Pavements: Vehicle-Pavement Interaction: Transient, Random & Damping Vibrations, Steady State of Vibration, Experiments on Vibration, Stress Inducing Factors in Flexible and Rigid pavements. **Stresses in Flexible Pavements**: Visco-Elastic Theory and Assumptions, Layered Systems Concepts, Stress Solutions for One, Two and Three Layered Systems, Fundamental Design Concepts. **Stresses in Rigid Pavements**: Westergaard's Theory and Assumptions, Stresses due to Curling, Stresses and Deflections due to Loading, Frictional Stresses, Stresses in Dowel Bars & Tie Bars.

UNIT – III

Material Characteristics: CBR and Modulus of Subgrade Reaction of Soil, Mineral aggregates – Blending of aggregates, binders, polymer and rubber modified bitumen, Resilient, Diametral Resilient and Complex (Dynamic) Moduli of Bituminous Mixes, Permanent Deformation Parameters and other Properties, Effects and Methods of Stabilisation and Use of Geo Synthetics.

UNIT - IV

Design Of Flexible Pavements: Flexible Pavement Design Concepts, Asphalt Institute's Methods with HMA and other Base Combinations, AASHTO, IRC Methods.

Design Of Rigid Pavements: Calibrated Mechanistic Design Process, PCA, AASHTO & IRC Specifications, Introduction to Prestressed and Continuously Reinforced Cement Concrete Pavement Design.

UNIT – V

Design of Pavement for Low Volume Roads: Pavement design for low volume roads, Rural road designs –code of practice. **Design of Overlays**: Types of Overlays, Suitability, Design of overlays.

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

CO1: Understand Factors Affecting Pavement Design.
CO2: Understand Stresses in flexible and rigid Pavements
CO3: Acquire knowledge on Material Characteristics for pavement
CO4: Design Flexible and Rigid Pavements.
CO5: Design of Pavement for Low Volume Roads

TEXT BOOKS:

1. Concrete Pavements, AF Stock, Elsevier, Applied Science Publishers.,1988
2. Pavement Analysis & Design, Yang H. Huang, Prentice Hall Inc.,First Edition 1993

REFERENCE BOOKS:

1. Design of Functional Pavements, Nai C. Yang, McGraw Hill Publications, First Edition.1973
2. Principles of Pavement Design, Yoder.J. &Witzorac Mathew, W. John Wiley & Sons Inc., 2nd Edition, 1991
3. Pavement and Surfacings for Highway & Airports, MichealSargious, Applied Science Publishers Limited, First Edition,1995

Code Book:

1. IRC Codes 37,58,62,81 for Flexible and Rigid Pavements design, low volume roads and over lays.

Online Resources:

1. https://nptel.ac.in/courses/105104098

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE54) PAVEMENT ASSET MANAGEMENT

(Professional Elective-VI)

B.Tech – IV Year II – Semester
Pre-requisites: Nil

L	T	P	C
3	0	0	3

Course Objectives:

- Understand the role of Pavement Asset Management.
- Understand the Flexible pavement failures and importance of maintenance.
- Understand the Rigid pavement failures and importance of maintenance.
- Understand pavement evaluation.
- Understand pavement performance and deterioration modeling.

UNIT 1: Introduction to Pavement Asset Management:
Introduction to road assets: Pavement structure, shoulders, road side tree plantations, street lighting, traffic signs, traffic signals, intersection elements, interchange elements; Pavement Management as a part of Road Asset Management: Evolution and Development of Pavement Management Systems (PMS), Components of PMS and their inter linkages, Project and Network level PMS.

UNIT 2: Flexible Pavement Failures and Maintenance
Flexible Pavement Failures: Identification, measurement, causative factors and remedies for all the varieties of failure under the headings of surface defects, deformation and disintegration of flexible pavements.
Maintenance of Flexible Pavements: Periodic maintenance: periodic renewals, need and importance of periodic renewals, planning and programming of renewals, identification of stretches to be renewed, types of renewal treatments, periodicity of renewal, rectification of profile at the time of renewal; pothole filling / patching, tools and equipment for pothole / patch repairs, modern mobile mechanized pothole filling/road patching technologies, arrangements for traffic and safety measures during road maintenance, preventive maintenance: introduction, selection of preventive maintenance treatment, warrants for preventive maintenance, flexible pavement preservation tools.

UNIT 3: Rigid Pavement Failures and Maintenance:
Rigid Pavement Failures: Rigid Pavement Failures: Identification, measurement, causative factors and remedies for all the varieties of failure under the headings of joint spalling, faulting, polished aggregate, shrinkage cracking, pumping, linear cracking, durability cracking;

Maintenance of Rigid Pavements: Assessing maintenance needs, methods for repairing concrete pavements, crack sealing and joint resealing, crack stitching (cross stitching), partial-depth repair, full depth repair, slab stabilization, special techniques for rehabilitation of rigid pavements, repair materials, tools and plant, planning the maintenance operations, arrangement for traffic and safety, rigid pavement preservation tools.

UNIT 4: Pavement Evaluation

Pavement Structural Condition Evaluation: Importance of structural condition evaluation of pavements, benkelman beam technique for flexible pavement evaluation, falling weight deflectometer technique for both flexible and rigid pavements

Pavement Functional Condition Evaluation: Importance of functional condition evaluation of pavements, pavement roughness concepts; instrumentation used to assess pavement roughness, international roughness index and its importance, measurement of surface defects in both flexible and rigid pavements

Pavement Safety Condition Evaluation: Pavement texture, importance of surface friction characteristics on pavement safety, discussion on the methods of evaluation of pavement safety

UNIT 5: Pavement Performance and Deterioration Modelling:

Structural condition (Distress) models, functional condition models, initiation models and progression models; Combined measures of pavement quality, discussions on condition indices and serviceability indices, pavement condition rating, introduction to pavement rating manuals by different agencies.

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

CO1: Understand the role of Pavement Asset Management.
CO2: Understand the Flexible failures and importance of maintenance.
CO3: Understand the Rigid pavement failures and importance of maintenance.
CO4: Understand importance of pavement evaluation.
CO5: Understand pavement performance and deterioration modeling.

TEXT BOOKS:

1. Ralph Haas, Ronald Hudson, Zanieswki with Lynne Cowe Falls, "Pavement Asset Management', Wiley, 2015.
2. Shahin, M.Y., "Pavement Management for Airports, Roads and Parking Lots", Springer, 2nd Edition, 2005
3. ACRP Synthesis 22, Common Airport Maintenance Practices, Transportation Research Board, Washington DC, 2011

REFERENCE BOOKS:

1. Feng Li, JinyanFeng, Youxin Li, Siqi Zhou, Preventive Maintenance Technology for Asphalt Pavement, Springer, 2021
2. R. Keith Moble, An Introduction to Predictive Maintenance, Second Edition, Butterworth Heinemann Publications, 2002
3. RajibBasuMallick and Tahar El-Kochi, Pavement Engineering: Principles and Practice, CRC Press 2013

Code Books:

1. IRC 82: 2015, First Revision, Code of Practice for maintenance of Bituminous Road Surfaces
2. IRC SP 83: 2018, First Revision, Guidelines for maintenance, repair and rehabilitation of cement concrete pavements

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE55) PROJECT STAGE – II INCLUDING SEMINAR

B.Tech – IV Year II – Semester
Pre-requisites: -

L	T	P	C
0	0	22	11

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

CO1 - Identify the problem by applying acquired knowledge.

CO2 - Analyze and categorize executable and efficient project tools for designing project modules. CO3 - Combine all the modules through effective team work after efficient testing.

CO4 - Elaborate the completed task and compile the project report.

CO5 - Develop Presentation and Communication skills.

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE56) DISASTER PREPAREDNESS & PLANNING MANAGEMENT

(Open Elective)

L	T	P	C
3	0	0	3

Pre-Requisites–No prerequisites are needed for enrolling into the course

Course Objectives:

- To Know about the state of art of disaster management in world
- To Study the various natural disasters and its mitigation measures
- To understand human induced Hazards and its case studies
- To impart knowledge on remote sensing and GIS
- To expose students to various technologies used for disaster mitigation and management.

UNIT – I : Introduction

Hazard, vulnerability and risk, Types of disasters, Disaster management cycle, role of civil engineers in disaster management, Progress of disaster management in world, vulnerability profile of India, Disaster management act, Disaster management in India

UNIT – II : Natural Disasters

Hydro - meteorological based disasters –Tropical cyclones, floods, drought and desertification zones, Geographical based disasters – Earthquake, Tsunamis, Landslides and avalanches – Causes, Types, effects and Mitigation measures, coastal zone management

UNIT – III : Human induced hazards

Human induced hazards: chemical industrial hazards, major power breakdowns, traffic accidents, etc. Case studies

UNIT - IV: Remote sensing and GIS for Disaster Management

Introduction to remote sensing and GIS, its applications in disaster mitigation and management, case studies

UNIT - V: Disaster Management

Risk assessment and hazard mapping –mitigation and management options – warning and forecasting

Course Outcomes: On completion of the course, the students will able to,
CO 1: Attain knowledge on various types, stages, phases in disaster management
CO 2: Recognize various types of natural disaster, Mitigation and Management Systems
CO 3: Know the different types of manmade disasters and its effects
CO 4: Explain Remote sensing technology and GIS in disaster mitigation and management.
CO 5: Know the concepts of risk, warning and forecasting methods in disaster management

TEXT BOOKS:

1. Pradeep Sahni, "Disaster Risk Reduction in South Asia", Prentice Hall, First Edition, 2003
2. Singh B.K., "Handbook of Disaster Management: Techniques & Guidelines", Rajat Publication, 2008
3. Ghosh G.K., "Disaster Management", APH Publishing Corporation, First Edition, 2011

REFERENCE BOOKS:

1. Rajib, S and Krishna Murthy, R.R. "Disaster Management Global Challenges andLocal Solutions", Universities Press, First Edition, 2012
2. Navele, P & Raja, C.K., "Earth and Atmospheric Disasters Management, Natural and Manmade", B.S. Publications, First Edition, 2019
3. Tushar Battacharya., "Disaster Science and Management", Tata McGraw Hill Company, 2012

Online Resources:

1. https://nptel.ac.in/courses/105/104/105104183/
2. https://nptel.ac.in/courses/124/107/124107010/

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE57) BUILDING TECHNOLOGY

(Open Elective)

Pre Requisites – No prerequisites are needed for enrolling into the course

L	T	P	C
3	0	0	3

Course Objectives:

- To impart different types of buildings, principles and planning of the buildings
- To learn the importance of grouping circulation
- To know the different modes of vertical transportation in buildings.
- To know the utilization of prefabricated structural elements in buildings.
- To know the importance of air conditioning and acoustics in buildings.

UNIT - I

Buildings, Types, Components, economy and design principles of planning of buildings and their importance, Definitions and importance of grouping and circulation, lighting and ventilation-consideration of the above aspects during planning of building.

UNIT - II

Termite proofing: Inspection-control measures and precautions, lighting protection of buildings, general principles of design of opening, various types of fire protection measures to be considered while panning a building.

UNIT - III

Vertical transportation in a building: Types of vertical transportation-stairs-different forms of stairs-planning of stairs-other modes of vertical transportation –lifts-ramps-escalators.

UNIT - IV

Prefabrication systems in residential buildings-walls,openings,cupboards,shelves etc., planning and modules and sizes of components in prefabrication.

Planning and designing of residential buildings against the earthquake forces, principles, seismic forces and their effect on buildings.

UNIT - V

Air conditioning – process and classification of air conditioning, Dehumidification. Systems of air-conditioning, ventilation, functional requirements of ventilation.

Acoustics, effect of noise, properties of noise and its measurements, Principles of acoustics of building. Sound insulation – importance and measures.

Course Outcomes: On completion of the course, the students will be able to:

CO1: Understand the principles in planning and design the buildings.

CO2: Know the different methods of termite proofing in buildings.

CO3: Know the different methods of vertical transportation in buildings.

CO4: Know the implementation of prefabricated units and effects of earthquake in buildings

CO5: Know the importance of air conditioning and acoustics in planning of buildings.

TEXT BOOKS:

1.“Building construction-Technical teachers training institute”, Madras, Tata McGraw Hill.

2. S.P.Arora and S.P.Brndra “Building construction”, Dhanpat Rai and Sons Publications, New Delhi

REFERENCE BOOKS:

1.Varghese, “Building construction”, PHI Learning Private Limited.

2. Punmia.B.C, “Building construction”, Jain.A.K and Jain.A.K Laxmi Publications.

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE58) ENVIRONMENTAL IMPACT ASSESSMENT
(Open Elective)

L	T	P	C
3	0	0	3

Pre Requisites – No prerequisites are needed for enrolling into the course

Course Objectives:

- To learn basic concepts of Environmental Impact Assessment
- To impart knowledge on Environmental Assessment
- To gain knowledge on Environmental management plan and report preparation.
- To evaluate Socio economic environment and cost benefit analysis.
- To learn the different case studies on infrastructure projects

UNIT - I : Introduction

Impacts of Development on Environment –Sustainable Development and Environmental Impact Assessment (EIA) – Objectives – Historical development – EIA Types EIA in project cycle –EIA Notification and Legal Framework in India– Selection & Registration Criteria for EIA Consultants, Stakeholders and their Role in EIA

UNIT - II : Environmental Assessment

Screening and Scoping in EIA – Drafting of Terms of Reference -Baseline monitoring, Prediction and Assessment of Impact on land, water, air, noise and energy, flora and fauna - Matrices –Networks – Checklist Methods - Mathematical models for Impact prediction – Analysis of alternatives.

UNIT – III : Environmental Management Plan

Plan for mitigation of adverse impact on water, air and land, water, energy, flora and fauna – Environmental Monitoring Plan – EIA Report Preparation – Review of EIA Reports – Environmental Clearance – Post Project Audit

UNIT – IV : Socio Economic Assessment

Baseline monitoring of Socio-economic environment – Identification of Project Affected Personal – Rehabilitation and Resettlement Plan- Economic valuation of Environmental impacts – Cost benefit Analysis- Public Consultation

UNIT – V : Case Studies

EIA case studies pertaining to Infrastructure Projects – Real Estate Development - Roads and Bridges – Mass Rapid Transport Systems - Ports and Harbour – Airports - Dams and Irrigation projects - Waste Processing and Disposal facilities Mining Projects.

Course Outcomes: On completion of this course, students will be able to:

CO1: Carry out developmental projects for environmental and social assessments

CO2: Explain different methodologies for environmental impact prediction and assessment

CO3: Plan environmental impact assessments and environmental management plans

CO4: Assess socioeconomic investigation of the environment in a project

CO5: Knowledge to prepare environmental impact assessment reports

TEXTBOOKS:

1. Canter, R.L., Environmental impact Assessment, McGraw Hill Inc., 2nd Edition,1995
2. Lohani, B., J.W. Evans, H. Ludwig, R.R. Everitt, Richard A. Carpenter, and S.L. Tu. Environmental Impact Assessment for Developing Countries in Asia, Volume 1 – Overview, Asian Development Bank, 1997
3. Peter Morris, RikiTherivel," Methods of Environmental Impact Assessment", Routledge Publisher, 2nd Edition, 2009

REFERENCE BOOKS:

1. Barry Sadler and Mary McCabe, "Environmental Impact Assessment Training Resource Manual", United Nations Environment Programme, 2002
2. Judith Petts, Handbook of Environmental Impact Assessment Vol. I and II, Blackwell Science, New York, 1999.
3. Ministry of Environment and Forests, EIA Notification and Sectoral Guides, Government of India, New Delhi, 2010

Online Resources:

1. https://nptel.ac.in/courses/124/107/124107160/
2. https://nptel.ac.in/courses/122/102/122102006/

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE59) SUSTAINABLE INFRASTRUCTURE DEVELOPMENT

(Open Elective)

L	T	P	C
3	0	0	3

Pre Requisites – No prerequisites are needed for enrolling into the course

Course Objectives:

- Presenting elements of sustainable infrastructure system
- Know the components of sustainable infrastructure Framework.
- Introducing practices of water resources and water treatment
- Able to design the sustainable power supplies and standards

UNIT 1

Process of Sustainable Engineering Design: Key principle of sustainability; Integration of architecture and engineering; Design drivers for sustainable infrastructure system; implementation.

UNIT 2

Sustainable infrastructure framework: Green building rating system; Sustainable Infrastructure frameworks: Pillars of sustainability, scale-density framework, transect, built form-ecology framework.

UNIT 3

Water conservation and supply: water management plans; achieving water balance; analyzing water resources; water supply strategies

Integrated water management: Integrated storm water management; urban storm water treatment strategies; constraints and barriers to implementation; gray water treatment and reuse; integrating gray water into a water resources master plan; Black water management approaches.

UNIT 4

Energy and greenhouse gases: reducing demand by design; Designing Sustainable power supplies; Addressing climate change and reducing carbon footprint; Policy measures for increasing energy security and efficiency; Design guidelines and Performance standards.

UNIT 5

Sustainable site planning: Built systems, and Material flows: Sustainable site planning; Green streets and transportation network; working with the land, material and waste flows.

Course Outcomes: On completion of this course, students will be able to:

CO1: The students will acquire fundamentals and principles of sustainable engineering design.
CO2: Knowledge of existing frameworks to achieve long-term sustainability.
CO3: Understand the methods and techniques for waste water management
CO4: Able to understand the concept of greenhouse gas emission reduction.
CO5: Knowledge on the civil engineering aspects overall green city planning.

TEXT BOOKS:

1. Sustainable Infrastructure - S. BrySarté- John Wiles & Sons, Inc. ISBN 978-0-470-912,2010
2. Sustainable Infrastructure: Sustainable Buildings – Elisabeth Green , Tristram Hope & Alan Yates, ICE Publishing, First Edition, 2015
3. Sustainable Development spiritual dimension – Krishnan Saigal, Kalpaz Publications, First Edition, 2008

REFERENCES :

1. Dredging for sustainable infrastructure – Stefan Aarninkhof , Laboyrie Polite, Koningsveld Mark Van – CEDA IADC publishing, 2018
2. Sustainable infrastructure: Breakthrough in Research & Practice, IGI Global Publishing, 2019

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE60) ENVIRONMENTAL POLLUTION AND CONTROL

(Open Elective)

L	T	P	C
3	0	0	3

Pre Requisites – No prerequisites are needed for enrolling into the course

Course Objectives:

- Impart knowledge on aspects of air pollution & control and noise pollution.
- Impart concepts of treatment of waste water from industrial source.
- Differentiate the solid and hazardous waste based on characterization.
- Introduce sanitation methods essential for protection of community health.
- Provide basic knowledge on sustainable development.

UNIT – I:

Air pollution Control Methods: Particulate control devices – Methods of Controlling Gaseous Emissions – Air quality standards. Noise Pollution: Noise standards, Measurement and control methods – Reducing residential and industrial noise – ISO:14000.

UNIT –II:

Industrial waste water Management: Strategies for pollution control – Volume and Strength reduction – Neutralization – Equalization – Proportioning – Common Effluent Treatment Plants – Recirculation of industrial wastes – Effluent standards.

UNIT – III:

Solid Waste Management: Solid waste characteristics – basics of on-site handling and collection – separation and processing – Incineration- Composting-Solid waste disposal methods – fundamentals of Land filling. Hazardous Waste: Characterization – Nuclear waste– Biomedical wastes – Electronic wastes – Chemical wastes – Treatment and management of hazardous waste-Disposal and Control methods.

UNIT – IV:

Environmental Sanitation: Environmental Sanitation Methods for Hostels and Hotels, Hospitals, Swimming pools and public bathing places, social gatherings (melas and fares), Schools and Institutions, Rural Sanitation-low cost waste disposal methods.

UNIT – V:

Sustainable Development: Definition- elements of sustainable developments-Indicators of sustainable development- Sustainability Strategies- Barriers to Sustainability–Industrialization and sustainable development – Cleaner production in achieving sustainability- sustainable development.

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

CO1: Identify the air pollutant control devices and d air emission standards.

CO2: Identify the treatment techniques used for industrial wastewater treatment.

CO3: Understand the fundamentals of solid waste management and its importance

CO4: Understand the methods of environmental sanitation and its disposal methods

CO5: Know the importance of sustainable development while planning a project

TEXT BOOKS

1. Peavy, H. S., Rowe, D.R, Tchobanoglous, "Environmental Engineering", G.Mc-Graw Hill International Editions, New York, Fist Edition 1985.
2. J. G. Henry and G.W. Heinke, "Environmental Science and Engineering", Pearson Education, Fist Edition 1998
3. K. V. S. G. Murali Krishna, "Air Pollution and Control" by University Science Press,2012

REFRENCES:

1. G. L. Karia and R.A. Christian, "Waste water treatment- concepts and design approach", Prentice Hall of India, Revised Edition 2008.
2. M. N. Rao and H. V. N. Rao, "Air pollution", Tata Mc.Graw Hill Company,26th Reprint, 2007
3. Ruth F. "Weiner and Robin Matthews Environmental Engineering", 4th Edition Elesevier, 2003.

Online Resources:

1. https://archive.nptel.ac.in/courses/123/105/123105001/

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)

(B22CE61) ENERGY EFFICIENT BUILDINGS

(Open Elective)

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Pre Requisites – No prerequisites are needed for enrolling into the course

Course Objectives: To introduce the different concepts of sustainable design and green building techniques to achieve energy efficient buildings concepts and how they may be synthesized to best fit a specific construction project.

UNIT I:

Introduction : Life Cycle impacts of materials and products – sustainable design concepts – strategies of Design for the Environment -The sun-earth relationship and the energy balance on the earth's surface, climate, wind – Solar radiation and solar temperature – Sun shading and solar radiation on surfaces – Energy impact on the shape and orientation of buildings – Thermal properties of building materials.

UNIT II :

Energy Efficient Buildings : Passive cooling and day lighting – Active solar and photovoltaic- Building energy analysis methods- Building energy simulation- Building energy efficiency standards- Lighting system design-Lighting economics and aesthetics- Impacts of lighting efficiency – Energy audit and energy targeting-Technological options for energy management.

UNIT III:

Indoor Environmental Quality Management : Psychometric- Comfort conditions- Thermal comfort-Ventilation and air quality-Air conditioning requirement- Visual perception- Illumination requirement- Auditory requirement- Energy management options- -Air conditioning systems- Energy conservation in pumps- Fans and blowers- Refrigerating machines- Heat rejection equipment- Energy efficient motors- Insulation.

UNIT IV:

Energy Conservation Building Codes: Energy Efficiency, Energy Efficient Design (Achieving Efficiency through design) Energy Conservation Building Codes (ECBC) Codes 2007 Learning Different Energy Simulation Techniques (Energy / Lighting) Advanced Energy Efficient Standards and Systems HVAC Lighting Appliances and Equipments Building Envelope Understanding and calculation of energy consumption of a House, office building.

UNIT V:

Concepts of Sustainable Building - Social, Economic and Environmental aspects - Different types of Indian and International Rating Systems (GRIHA, LEED, IGBC, Eco Housing, BREEAM, CASBEE, etc)

Course Outcomes:

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

CO1: Identify Life Cycle impacts of materials and products.
CO2: Apply concepts of energy efficiency in optimizing the building performance
CO3: Understand the concepts of environmental quality management
CO4: Understand a importance of energy conservation and consumption
CO5: Extend their concept of rating systems.

TEXTBOOKS:

1. Kibert, C. "Sustainable Construction: Green Building Design and Delivery", John Wiley & Sons, 2005
2. Edward G Pita, "An Energy Approach- Air-conditioning Principles and Systems", Pearson Education, 2003.
3. John Littler and Randall Thomas, "Design with Energy: The Conservation and Use of Energy in Buildings", Cambridge University Press, 1984.

REFERENCES:

1. Colin Porteous, "The New Eco-Architecture", Spon Press, 2002.
2. Energy Conservation Building Codes: www.bee-india.nic.in
3. Lever More G J, "Building Energy Management Systems", E and FN Spon, London, 2000.