DEPARTMENT OF CIVIL ENGINEERING
COURSE STRUCTURE
(Applicable for the batches admitted from the Academic Year 2022-23)

I Year I Semester   R22   I Semester

Sl.No	Course Code	Course Name	Periods / Week			Credits
			L	T	P	C
1	J2210001	Matrices & Calculus	3	1	0	4
2	J2210002	Applied Physics	3	1	0	4
3	J2210506	C Programming and Data Structures	3	0	0	3
4	J2210301	Engineering Workshop	0	1	3	2.5
5	J2210006	English for Skill Enhancement	2	0	0	2
6	J2210101	Elements of Civil Engineering	0	0	2	1
7	J2210003	Applied Physics Laboratory	0	0	3	1.5
8	J2210007	English Language and Communication Skills Lab	0	0	2	1
9	J2210507	C Programming and Data Structures Laboratory	0	0	2	1
10	J221MC01	Environmental Science	3	0	0	0
11	---	Induction Program	-	-	-	-
Total			**14**	**03**	**12**	**20**

I Year II Semester   R22   II Semester

Sl.No	Course Code	Course Name	Periods / Week			Credits
			L	T	P	C
1	J2220008	Ordinary Differential Equations and Vector Calculus	3	1	0	4
2	J2220004	Engineering Chemistry	3	1	0	4
3	J2220302	Computer Aided Engineering Graphics	1	0	4	3
4	J2220102	Applied Mechanics	3	0	0	3
5	J2220103	Surveying	2	0	0	2
6	J2220509	Python Programming Lab	0	1	2	2
7	J2220005	Engineering Chemistry Lab	0	0	2	1
8	J2220104	Surveying Laboratory - I	0	0	2	1
Total			**12**	**3**	**10**	**20**

DEPARTMENT OF CIVIL ENGINEERING

COURSE STRUCTURE

(Applicable for the batches admitted from the Academic Year 2022-23)

II Year I Semester   R22   III Semester

Sl.No	Course Code	Course Name	Periods / Week			Credits
			L	T	P	C
1	J2230011	Probability and Statistics	3	1	0	4
2	J2230105	Building Materials, Construction and Planning	3	0	0	3
3	J2230106	Engineering Geology	3	0	0	3
4	J2230107	Strength of Materials –I	3	0	0	3
5	J2230108	Fluid Mechanics	3	0	0	3
6	J2230109	Surveying Laboratory – II	0	1	2	2
7	J2230110	Strength of Materials Laboratory	0	0	2	1
8	J2230111	Computer Aided Drafting Laboratory	0	0	2	1
9	J223MC02	Constitution of India	3	0	0	0
		Total	**18**	**2**	**6**	**20**

II Year II Semester   R22   IV Semester

Sl.No	Course Code	Course Name	Periods / Week			Credits
			L	T	P	C
1	J2240207	Basic Electrical and Electronics Engineering	3	0	0	3
2	J2240112	Concrete Technology	3	0	0	3
3	J2240113	Strength of Materials – II	3	0	0	3
4	J2240114	Structural Analysis – I	3	0	0	3
5	J2240115	Hydraulics and Hydraulics Machinery	3	0	0	3
6	J2240116	Fluid Mechanics and Hydraulics Machinery Laboratory	0	0	2	1
7	J2240208	Basic Electrical and Electronics Engineering Laboratory	0	0	2	1
8	J2240117	Concrete Technology Laboratory	0	0	2	1
9	J2240118	Real Time Research Project / Field Based Project	0	0	4	2
10	J224MC03	Gender Sensitization Laboratory	0	0	2	0
		Total	**15**	**0**	**12**	**20**

DEPARTMENT OF CIVIL ENGINEERING
COURSE STRUCTURE
(Applicable for the batches admitted from the Academic Year 2022-23)

III Year I Semester   **R22**   **V Semester**

Sl.No	Course Code	Course Name	Periods / Week			Credits
			L	T	P	C
1	J2250119	Structural Analysis – II	3	0	0	3
2	J2250120	Geotechnical Engineering	3	0	0	3
3	J2250121	Structural Engineering – I (RCC)	3	0	0	3
4	J225E02	Business Economics and Financial Analysis	3	0	0	3
5	J2250122	Transportation Engineering	3	0	0	3
6	J2250123	Water Resource Engineering – I	3	0	0	3
7	J2250124	Transportation Engineering Laboratory	0	0	2	1
8	J2250125	Geotechnical Engineering Laboratory	0	0	2	1
9	J225MC05	Intellectual Property Rights	3	0	0	0
Total			**21**	**0**	**4**	**20**

III Year II Semester   **R22**   **VI Semester**

Sl.No	Course Code	Course Name	Periods / Week			Credits
			L	T	P	C
1	J2260126	Environmental Engineering	3	0	0	3
2	J2260127	Quantity Surveying and Valuation	3	0	0	3
3	J2260128	Structural Engineering – II (Steel Structures)	3	0	0	3
4	J2260138 J2260139 J2260140	**Professional Elective – I (PE-I)** i.. Prestressed Concrete ii. Rehabilitation and Retrofitting of Structures iii. Advanced Concrete Technology	3	0	0	3
5	J226_____	Open Elective – I **(OE-I)**	3	0	0	3
6	J2260129	Environmental Engineering Laboratory	0	0	2	1
7	J2260130	Structural Engineering Detailing Laboratory	0	0	2	1
8	J2260014	Advanced English Communication Skills Laboratory	0	0	2	1
9	J2260131	Industry Oriented Mini Project	0	0	4	2
10	J226MC01	Environmental Sciences(**For LE Students**)	3	0	0	0
Total			**18**	**0**	**10**	**20**

DEPARTMENT OF CIVIL ENGINEERING
COURSE STRUCTURE
(Applicable for the batches admitted from the Academic Year 2022-23)

IV Year I Semester **R22** **VII Semester**

Sl.No	Course Code	Course Name	Periods / Week			Credits
			L	T	P	C
1	J2270132	Foundation Engineering	2	0	0	2
2	J2270133	Construction Project Management	2	0	0	2
3	J2270141 J2270142 J2270143	**Professional Elective – II (PE-II)** i.. Green Building Technologies ii. Geomatic Applications in Civil Engineering iii. Smart Cities Planning and Management	3	0	0	3
4	J2270144 J2270145 J2270146	**Professional Elective – III (PE-III)** i.. Design of Hydraulic Structures ii. Advanced Water Resources Engineering iii. Engineering Hydrology	3	0	0	3
5	J2270147 J2270148 J2270149	**Professional Elective – IV (PE-IV)** i.. Earth Retaining Structures ii. Ground Improvement Techniques iii. Stability Analysis of Slopes	3	0	0	3
6	J227_____	Open Elective –II (**OE-II**)	3	0	0	3
7	J2270134	Computer Aided Design Laboratory	0	0	2	1
8	J2270135	Project Stage – I	0	0	6	3
		Total	**16**	**0**	**8**	**20**

IV Year II Semester **R22** **VIII Semester**

Sl.No	Course Code	Course Name	Periods / Week			Credits
			L	T	P	C
1	J2280150 J2280151 J2280152	**Professional Elective – V (PE-V)** i.. Environmental Impact Assessment for Civil Engg ii.. Solid Waste Management iii. Air & Noise Pollution and Control	3	0	0	3
2	J2280153 J2280154 J2280155	**Professional Elective – VI (PE-VI)** i.. Airports, Railways and Waterways ii. Pavement Asset Management iii. Pavement Analysis & Design	3	0	0	3
3	J228_____	Open Elective – III (**OE-III**)	3	0	0	3
4	J2280136	Technical Seminar	0	0	4	2
5	J2280137	Project Stage – II	0	0	18	9
		Total	**9**	**0**	**22**	**20**

DEPARTMENT OF CIVIL ENGINEERING
(Applicable for the batches admitted from the Academic Year 2022-23)

Open Elective:

Sl.No	Course Code	Course Name	Periods / Week			Credits
			L	T	P	C
1	J22-01—56	Disaster Preparedness & Planning Management	3	0	0	3
2	J22-01—57	Building Management Systems	3	0	0	3
3	J22-01—58	Environmental Impact Assessment	3	0	0	3
4	J22-01--59	Remote Sensing & Geographical Information Systems	3	0	0	3
5	J22-01--60	Sustainable Infrastructure Development	3	0	0	3
6	J22-01—61	Solid Waste Management	3	0	0	3
7	J22-01—62	Energy Efficient Buildings	3	0	0	3
8	J22-01—63	Multi Criterion Decision Making	3	0	0	3
9	J22-01—64	Environmental Pollution	3	0	0	3

B.Tech
CIVIL ENGG.,

I -Year

I –Semester

MATRICES AND CALCULUS
(Common to all Branches)

B.Tech. I Year I SEM	**L**	**T**	**P**	**C**
Subject Code: J2210001	**3**	**1**	**0**	**4**

Pre-requisites: Mathematical Knowledge at pre-university level Course

Objectives:
To learn
- Concept to frank of matrix and apply to know the consistency of system of linear equations.
- To determine Eigen values, Eigen vectors of matrices.
- Geometrical approach to the mean value theorem sands their applications.
- To find extreme value of function of two and three variables.
- Evaluation of multiple integrations and their applications

COURSEOUTCOMES:
On successful completion of this course, students will be able to:
1. **Understand** the principles of matrix to calculate the characteristics of system of linear equations using multiple methods.
2. **Determine** Eigen values, Eigen vectors of matrices.
3. **Evaluate** limits of single-variable functions graphically and computationally. Analyse improper integrals using Beta and Gamma functions.
4. **Calculate** Partial derivatives, extreme of functions of multiple variables
5. **Evaluate** the multiple integrals in various coordinate systems.

UNIT-I
Matrices   **10L**
Types of Matrices: Symmetric, Skew-symmetric, Hermitian, Skew-Hermitian, orthogonal, Unitary matrices, Rank of a matrix by Echelon form and Normal form, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations.

UNIT-II
Eigen Values and Eigenvectors   **8L**
Linear Transformation and Orthogonal Transformation: Eigen values and Eigen vectors and their properties: Diagonalization of a matrix; Cayley-Hamilton Theorem (without proof); finding inverse and power of a matrix by Cayley-Hamilton Theorem.

UNIT-III
Calculus   **10L**
Mean value theorems (without proof): Rolle's Theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem. Taylor's Series. Definition of Improper Integral: Beta and Gamma functions and their applications.

UNIT-IV

Multivariable calculus (Partial Differentiation and applications)   **10L**

Definitions of Limit and continuity .Partial Differentiation; Total derivative; Jacobian; Functional dependence and independence, Maxima and Minima of functions of two and three variables using method of Lagrange's method of undetermined d multipliers.

UNIT-V

Multivariable Calculus   **10L**

Evaluation of Double Integrals (Cartesian and polar co ordinates), Change of order of integration (only Cartesian form); Evaluation of Triple Integrals: Change of variables (Cartesian and polar) for double. Applications: Area (by double) and volumes (by double and triple integrals).

Text Books:
1. B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers, 42nd Edition, 2012.
2. Erwinkreyszig, Advanced Engineering Mathematics, 9th Edition, John wiley &Sons, 2006.
3. T.K.V.Iyengar, Engineering Mathematics-I,S.Chand, 2018.

Reference Books:
1. G.B.Thomas and R.L.Finney, Calculus and Analytic geometry, 9^{th}Edition, Pearson, Reprint, 2002.
2. N.P.Baliand ManishGoyal,A text book of Engineering Mathematics, Laxmi Publications, Reprint,2008.
3. Ramana B.V.,Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11^{th}Reprint,2010.

*****

APPLIED PHYSICS

(Common to all Branches)

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

Subject code: J2210002   **3   1   0   4**

Pre-requisites: 10 + 2 Physics

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

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

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

1. 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.
2. Identify the role of semiconductor devices in science and engineering Applications.
3. Explore the fundamental properties of dielectric, magnetic materials and energy for their applications.
4. Appreciate the features and applications of Nano materials.
5. Understand various aspects of Lasers and Optical fiber and their applications in diverse fields.

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 - photoelectric effect - Davisson and Germer experiment –Heisenberg uncertainty principle – time independent Schrodinger wave equation - particle in one dimensional potential box.

Solids: Symmetry in solids, free electron theory (Drude& Lorentz, Sommerfeld) - Fermi-Dirac distribution , Bloch's theorem -Kronig-Penney model – 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 of 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.

<div align="center">

UNIT - III
</div>

DIELECTRIC AND MAGNETIC MATERIALS

Dielectric Materials: Basic definitions- types of polarizations (qualitative) - ferroelectric, piezoelectric, and pyroelectric materials – applications

Magnetic Materials: Classification of magnetic materials Hysteresis-soft and hard magnetic materials Magnetostriction, Magneto resistance - applications - bubble memory devices, magnetic field sensors and multiferroics.

<div align="center">

UNIT - IV
</div>

NANOTECHNOLOGY

Nano scale, 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.

<div align="center">

UNIT - V
</div>

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, CO_2 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.

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, 4th Edition, 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, Pragathi Prakashan, 2019.
5. A.K. Bhandhopadhya - Nano Materials, New Age International, 1st Edition, 2007.
6. Energy Materials a Short Introduction to Functional Materials for Energy Conversion and Storage Aliaksandr S. Bandarenka, CRC Press Taylor & Francis Group Energy Materials Taylor & Francis Group, 1st Edition, 2022.
7. Introduction to Nano science & Nano Technology, P.Venugopal Reddy, M.Laxmi, B.S.Publication, 2022.

C PROGRAMMING AND DATA STRUCTURES

(Common to CIVIL & MECH)

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

Subject Code: J2210506   **3 0 0 3**

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

Course Outcomes:
1. Understand the various steps in Program development.
2. Explore the basic concepts in C Programming Language.
3. Develop modular and readable C Programs
4. Understand the basic concepts such as Abstract Data Types, Linear and Non-Linear Datastructures.
5. Apply data structures such as stacks, queues in problem solving
6. To understand and analyze various searching and sorting algorithms.

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 manipulationfunctions, 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, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks-Operations, array and linked representations of stacks, stack applications, Queues-operations, array and linked representations.

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,Pearson Education.
3. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie,

   PHI/Pearso

   nEducation

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, PearsonEducation / 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.

ENGINEERING WORKSHOP
(Common to all Branches)

B.Tech. I Year I	L	T	P	C
Subject code: J2210301	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 engineeringproducts.
- To provide hands on experience about use of different engineering materials, tools, equipmentsand 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, equipmentand 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 prescribedtolerances.

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 includingdrilling, material removing, measuring, chiseling.
- CO 4: Apply basic electrical engineering knowledge for house wiring practice.

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 WoodWorking

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

ENGLISH FOR SKILL ENHANCEMENT
(Common to all Branches)

B.Tech. I Year I Sem	L T P C
Subject Code : J2210006	**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. Equip students to study engineering subjects more effectively and critically using the theoreticaland practical components of the syllabus.

Course Outcomes: Students will be able to:

1. Understand the importance of vocabulary and sentence structures.
2. Choose appropriate vocabulary and sentence structures for their oral and written communication.
3. Demonstrate their understanding of the rules of functional grammar.
4. Develop comprehension skills from the known and unknown passages.
5. Take an active part in drafting paragraphs, letters, essays, abstracts, précis and reports invarious contexts.
6. Acquire basic proficiency in reading and writing modules of English.

UNIT - I

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

Vocabulary: The Concept of Word Formation -The Use of Prefixes and Suffixes - Acquaintance withPrefixes and Suffixes from Foreign Languages to form Derivatives – framing sentences with 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 –Types and Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- techniques for writing precisely-paragraph writing – types, structures andFeatures 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 Black Swan, Hyderabad.

Vocabulary: Spelling- Rules of spelling-Words Often Mis-spelt - Homophones, Homonyms and Homographs- Words Often Confused - Words from Foreign Languages and their Use in English.

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

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. **Vocabulary**: Idioms, Proverbs, Phrasal verbs-Their Usage.

Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers, and Tenses- Usage in Written Communication- Question Tags

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-Blog Writing

UNIT - IV

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

Vocabulary: Standard Abbreviations and Acronyms in English

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 andCulture"* published by Orient Black Swan, Hyderabad.

Vocabulary: Technical Vocabulary and their Usage in sentences.

Grammar: Common Errors in English- Voice, Reported Speech, and (*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.

Note: Listening and Speaking Skills which are given under Unit-6 in AICTE Model Curriculum are coveredin 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 theneeds of the students in their respective colleges for effective teaching/learning in the class.

➢ **Note**: **2**. Based on the recommendations of NEP-2020, teachers are requested to be flexible toadopt Blended Learning in dealing with the course contents. They are advised to teach 40 percent of each topic from the syllabus in blended mode.

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

Reference Books:
1. Effective Academic Writing by Liss and Davis (OUP)
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. (2nd Ed.,). Sage Publications India Pvt. Ltd.
5. (2019). Technical Communication. Wiley India Pvt. Ltd.
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. Fourth Edition.

DEPARTMENT OF CIVIL ENGINEERING

(J2210101) ELEMENTS OF CIVIL ENGINEERING

B.Tech. I Year I Sem.

L	T	P	C
0	0	2	1

Course Objectives: The objectives of this course are to
1. Provide practical knowledge about physical properties of minerals and rocks.
2. Determine the characteristics of cement, Coarse & Fine aggregates.

List of Experiments:

1. **Identification of Minerals** – Silica Group, Feldspar Group, Crystalline Group, CarbonateGroup, Pyroxene Group, Mica Group, Amphibole Group.

2. **Identification of Rocks –** Igneous Petrology, Sedimentary Petrology, MetamorphicPetrology.
3. 1. Study of topographical features from Geological maps. Identification of symbols in maps.
3. 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.

Text Books:
1. IS 383 :1993 "Specification for Coarse and Fine Aggregates from Natural Sources for Concrete".

*Course Outcomes***:** At the end of the course, graduates will be able to
1. Understands the method and ways of investigations required for Civil Engineering projects
2. Identify the various rocks, minerals depending on geological classifications
3. Evaluate the properties of cement, fine and coarse aggregates and determine its suitability for construction.

APPLIED PHYSICS LABORATORY
(Common to All Branches)

		L	T	P	C
B.Tech. I Year I Sem.					
Subject code: J2210003		0	0	3	1.5

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

1. To gain practical knowledge by applying the experimental methods to correlate with the Physics theory
2. To learn the usage of electrical and optical systems for various measurements
3. Understand the characteristics of various devices such as PN junction diode, LED, lasers and optical fiber and measurement of energy gap of semiconductor materials.
4. Able to measure the characteristics of LED, analysis of CR circuit and it's applications
5. Apply the analytical techniques and graphical analysis to the experimental data

Course Outcomes: The students will be able to:

1. **Understand** the optical phenomenon of interference and diffraction   .
2. Know the **determination** of the energy gap of semiconductor materials.
3. **Gain** the knowledge of applications of fiber optics in communication.
4. **Appreciate** quantum physics in semiconductor devices and optoelectronics
5. **Apply** the various procedures, mathematical concepts and techniques for the experiments to obtain quantitative results

List Of Experiments:
1. Determination of Energy gap of semiconductor material of p-n junction diode.
2. Determination of frequency of electrical vibrator by using Melde's experiment.
3. Determination of wavelength of LASER by using diffraction grating.
4. Determination of rigidity modulus of a given wire by using Torsional pendulum.
5. R-C circuit analysis.
6. Determination of Numerical aperture of a given optical fiber.
7. Determination of the radius of curvature of plano-convex lens by forming Newton's rings
8. LED-characteristics
9. Study the V-I characteristics of a p-n junction diode and Zener diode
10. Study the V-I Characteristics of solar cell

Note: Any 8 experiments are to be performed.

Reference Book:
1. Laboratory Manual of Engineering Physics By Dr. Y.Aparna And Dr K. Venkateswara Rao (V.G.S Publishers).
2. Practical Engineering Chemistry by K. Mukkanti, etal' B'S' Publications, Hyderabad.

ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

B.Tech. I Year I/II Sem.	**L**	**T**	**P**	**C**
Subject Code : J2210007/J222007	**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 Englishby 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

Course Outcomes: Students will be able to:

- ✓ Understand the nuances of English language through audio- visual experience and group activities
- ✓ Understand and respond to their speakers.
- ✓ Neutralize their accent for intelligibility
- ✓ Speak with clarity and confidence which in turn enhances their employability skills
- ✓ Make presentations with proper communicative and body language.

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 LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening, so that they can comprehend the speechof people of different backgrounds and regions

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

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

Speaking Skills:

Objectives

1. To involve students in speaking activities in various contexts
2. To enable students express themselves fluently and appropriately in social and professional contexts
   - Oral practice
   - Describing objects/situations/people
   - Role play – Individual/Group activities
   - Just A Minute (JAM) Sessions

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: Syllabification-Structure of Syllables – Word Stress– Weak Forms and Strong Forms – Stress pattern insentences – 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- Verbal Non Verbal Communication Skills – Strategies for Effective Communication.

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

Exercise III :-

CALL Lab:

Understand: Errors in Pronunciation-Neutralizing 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.

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: Group Discussion-Introduction to Interview

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, a T. V. or LCD, a digital stereo –audio & video system and camcorder etc.

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, 10th Edition.
- English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
- English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge UniversityPress.
- 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)

Reference Books:

(2022). English Language Communication Skills – Lab Manual cum Workbook. Cengage Learning India Pvt. Ltd.

1. Shobha, KN&Rayen, J. Lourdes. (2019). *Communicative English – A workbook.* Cambridge University Press
2. Kumar, Sanjay & Lata, Pushp. (2019). *Communication Skills: A Workbook.* Oxford University Press
3. Board of Editors. (2016). *ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities.* Orient Black Swan Pvt. Ltd.
4. Mishra, Veerendra et al. (2020). *English Language Skills: A Practical Approach.* Cambridge University Press

C PROGRAMMING AND DATA STRUCTURES LABORATORY
(Common to CIVIL / MECH)

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

Subject code: J2210507   **0 0 2 1**

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

Course Outcomes:
1. Develop modular and readable C Programs
2. Solve problems using strings, functions
3. Handle data in files
4. Implement stacks, queues using arrays, linked lists.
5. To understand and analyze various searching and sorting algorithms

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 filefollowed by those of the second are put in the third file)

20. Write a C program that uses functions to perform the following operations on singly linkedlist.:
    i) Creation   ii) Insertion   iii) Deletion   iv) Traversal

21. Write C programs that implement stack (its operations) using
    i) Arrays   ii) Pointers

22. Write C programs that implement Queue (its operations) using
    i) Arrays   ii) Pointers

23. Write a C program that implements the following sorting methods to sort a given list ofintegers in ascending order i) Bubble sort ii) Selection sortiii)Insertion sort

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

Text Books:
1. C Programming & Data Structures, B.A. Forouzan and R. F. Gilberg, Third Edition, CengageLearning.
2. Let us C, Yeswanth Kanitkar C Programming, Balaguruswamy.

(J221MC01)   ENVIRONMENTAL SCIENCE
(Common to all Branches)

L	T	P	C
2	0	0	0

Course Objectives: The objectives of this course are to
1. Understanding the importance of ecological balance for sustainable development.
2. Understanding the impacts of developmental activities and mitigation measures.
3. 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.

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 PHI Learning 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.

Course Outcomes: On completion of this course, students will be able to
1. Understanding of Ecosystem
2. Natural resources, Depletion of natural resources and prevention methods
3. Biodiversity, Protection, sharing of the biodiversity.
4. Environmental pollution- Understanding of water, soil, noise and air pollution and their control measures.
5. Students can understand about global environmental problems and they are aware of global efforts.

B.Tech
CIVIL ENGG.,

I -Year

II –Semester

ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS
(Common to all branches)

B.Tech. I Year II SEM	**L T P C**
Subject Code: J2210008	**3 1 0 4**

Pre-requisites: Mathematical Knowledge at pre-university level

Course Objectives:
To learn
- Methods of solving the applications of differential equations.
- To solve initial value problems using differential equations.
- Solving ordinary differential equations using Laplace transforms techniques
- The physical quantity involved in Engineering field related to vector field.
- To apply fundamental theorems of vectors integrations in their applications.

COURSE OUTCOMES:
On successful completion of this course, students will be able to:
1. **Identify** whether the given differential equation of first order is exact or not
2. **Find** the complete solution of a non homogeneous differential equations and applying its concepts in Engineering problems.
3. **Solving** ODE's by using Laplace transforms techniques.
4. **Apply** the concepts of gradient, divergence and curl to formulate Engineering problems.
5. **Analyse** line, surface and volume integrals using fundamental theorems.

UNIT-I
Ordinary Differential Equations of First Order: **10L**
Exact, Non-Exact differential equations, linear and Bernoulli's differential equations, Applications: Newton's law of cooling, Law of Natural growth and decay.

UNIT-II
Ordinary Differential Equations of Higher Order: **8L**
Second order linear differential equations with constant coefficients, Non-Homogeneous terms of the type e^{ax}, sin ax, cos ax, polynomials in x, $e^{ax} V(x)$, Method of variation of parameters.

UNIT-III
Laplace transforms   **12 L**
Laplace Transforms: Laplace Transform of standard functions, First shifting theorem, Second shifting theorem, Laplace transforms of functions when they are multiplied and divided by 't', Laplace transforms of derivatives and integrals of function, Evaluation of integrals by Laplace transforms, Laplace transform of periodic functions, Inverse Laplace transform by different methods, convolution theorem (without proof). Applications: solving Initial value problems by Laplace Transform method.

UNIT-IV
Vector Differentiation: **10L**

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

UNIT-V
Vector Integration: **8L**

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

Text Books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 42nd Editions, 2012.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. T.K.V. Iyengar, Engineering Mathematics-II, S. Chand, 2018.

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

ENGINEERING CHEMISTRY

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

Subject code: J2220004   **3   1   0   4**

Course Objectives:

1. To achieve the knowledge about various kinds of orbital's and splitting patterns.
2. To know about water quality and its parameters, learning the knowledge inthe assessment of water quality and purifications.
3. To achieve the knowledge about various kinds of Electro chemical cells, batteriesand corrosion phenomenon.
4. To acquire required knowledge about engineering materials like cement, smartmaterials and lubricants.

Course Outcomes:

1. Students will acquire the basic knowledge of MOT and CFT.
2. The students are able to understand the basic properties of water and its usage in domestic and industrial purposes.
3. The students are able to again knowledge electrochemical procedures related tocorrosion and it's control.
4. They can predict potential applications of chemistry and practical utility in order to became goodengineers and entrepreneurs

UNIT-I

Molecular structure and theories of Bonding: **8L**

Atomic and Molecular orbital's. Linear combination of Atomic Orbital's (LCAO), molecular orbital's of diatomic molecules, molecular orbital energy level diagrams of N2, O2 and F2 molecules.

Crystal Field Theory (CFT): Salient Features of CFT – Crystal Field Splitting of transition metal ion d-orbital's in Tetrahedral, Octahedral and square planar geometries.

CFSCE, spectral and magnetic properties. factors affecting the magnitude of splitting
   a) Magnetic properties   b) Spectral properties

Bond structure of solids and effect of doping on conduction n –doping and p-doping in semiconductors.

UNIT - II

Water and its treatment: **8L**

Introduction to hardness of water – Estimation of hardness of water by complexometric method and related numerical problems. Potable water and its specifications - Steps involvedin the treatment of potable water - Disinfection of potable water by chlorination and break - pointchlorination.

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

UNIT – III

Electrochemistry and Batteries   8L

Introduction – Electro chemical cells electrode potential, standard electrode potential types of electrodes- calomel, quinhydrone and glass electrode.Nernest equation determination of PH of asolution by using quinhydrone and glass electrode. Electrochemical series and it's applications. Numerical problems potentiometric titrations .Batteries-primary battery(Dry cell) and secondary battery (lead acid storage battery) Fuel Cell- Construction and applications ofHydrogen-Oxygen fuel. Comparisons of primary secondary and fuel cells.

UNIT- IV

Corrosion and It's control   8L

Introduction, Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-lineand pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodicprotection – Sacrificial anode and impressed current methods. Surface coatings(anodic and cathodic),methods of applications of metal coatings-Hot dipping and Electroplating.

UNIT- V

Engineering Materials   8L

Cement: Portland cement, its composition, setting and hardening

Smart materials and their engineering applications

Shape memory materials- poly-lactic acid. Thermoresponse materials- polyacryl amides, polyvinyl amides.

Lubricants: Classifications of lubricants with examples -characteristics of good lubricants-mechanism of lubrication (thin film and extreme pressure) – properties of lubricants: Viscosity, cloud point , pour point, flash point and fire point.

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, Cengagelearning,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(2011)

*****

COMPUTER AIDED ENGINEERING GRAPHICS

(Common to ECE , MECH, CE, AI&ML)

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

Subject code: **J2220302**   **1   0   4   3**

Course Objectives:

- 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 ofengineering products

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

- Apply computer aided drafting tools to create 2D and 3D objects
- sketch conics and different types of solids
- Appreciate the need of Sectional views of solids and Development of surfaces of solids
- Read and interpret engineering drawings
- Conversion of orthographic projection into isometric view and vice versa manually and by usingcomputer aided drafting

UNIT – I

Introduction to Engineering Graphics: Principles of Engineering Graphics and their Significance, Scales – Plain & Diagonal, Conic Sections including the Rectangular Hyperbola – 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. Auxiliary Planes. Computer aided orthographic projections – points, lines and planes

UNIT – III

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

UNIT – IV

Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Developmentof 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. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa –Conventions. Conversion of orthographic projection into isometric view 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

Note: - External examination is conducted in conventional mode and internal evaluation to be done byboth conventional as well as using computer aided drafting.

DEPARTMENT OF CIVIL ENGINEERING
(J2220102   ) APPLIED MECHANICS

B.Tech. I Year II Sem.

L	T	P	C
3	1	0	4

Course Objectives: The objectives of this course are to
1. Explain the resolution of a system of forces, compute their resultant and solve problems using equations of equilibrium
2. Perform analysis of bodies lying on rough surfaces.
3. Locate the Centroid of a body and compute the area moment of inertia and mass moment of inertia of standard and composite sections
4. Explain kinetics and kinematics of particles, projectiles, curvilinear motion, centroidal motion and plane motion of rigid bodies.
5. 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

Text Books:
1. Engg. Mechanics / S.S. Bhavikatti & K.G. Rajasekharappa / Third edition /New age International Publishers
2. Reddy Vijay Kumar K. and J. Suresh Kumar (2010), Singer's Engineering Mechanics – Statics & Dynamics

Reference:
1. Timoshenko S.P and Young D.H., "Engineering Mechanics", McGraw Hill International Edition, 1983.
2. Andrew Pytel, Jaan Kiusalaas, "Engineering Mechanics", Cengage Learning, 2014.
3. Beer F.P & Johnston E.R Jr. Vector, "Mechanics for Engineers", TMH, 2004.
4. Hibbeler R.C & Ashok Gupta, "Engineering Mechanics", Pearson Education, 2010.
5. Tayal A.K., "Engineering Mechanics – Statics & Dynamics", Umesh Publications, 2011.
6. Basudeb Bhattacharyya, "Engineering Mechanics", Oxford University Press, 2008.
7. Meriam. J. L., "Engineering Mechanics", Volume-II Dynamics, John Wiley & Sons, 2008.

Course Outcomes: At the end of the course, graduates will be able to
1. Determine resultant of forces acting on a body and analyze equilibrium of a body subjected to a system of forces.
2. Solve problem of bodies subjected to friction.
3. Find the location of Centroid and calculate moment of inertia of a given section.
4. Evaluate the kinetics and kinematics of a body undergoing rectilinear, curvilinear, rotatory motion and rigid body motion.
5. Solve problems using work energy equations for translation, fixed axis rotation and plane motion and solve problems of vibration.

DEPARTMENT OF CIVIL ENGINEERING

(J2220103)   SURVEYING

B.Tech. I Year II Sem.

L	T	P	C
2	0	0	0

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.

Text Books:
1. Surveying and levelling by R. Subramanian, Oxford university press, New Delhi.
2. Chandra A M, "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. Surveying (Vol – 1, 2 & 3), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi.
4. Chandra A M, "Plane Surveying", New Age International Pvt. Ltd., New Delhi, 2002.
5. Surveying by Bhavikatti; Vikas publishing house ltd.
6. Duggal S K, "Surveying (Vol – 1 & 2), Tata McGraw Hill Publishing Co. Ltd. New Delhi, 2004.
7. Surveying and leveling by R. Agor Khanna Publishers 2015.

*Course Outcomes***:** At the end of the course, graduates will be able to
1. Calculate angles, distances and levels
2. Identify data collection methods and prepare field notes
3. Understand the working principles of survey instruments
4. Estimate measurement errors and apply corrections
5. Interpret survey data and compute areas and volume.

PYTHON PROGRAMMING LABORATORY
Common to Civil, Mech and EEE

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

Subject code: J2220509   **0   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

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

- Develop the application specific codes using python.
- Understand Strings, Lists, Tuples and Dictionaries in Python
- Verify programs using modular approach, file I/O, Python standard library
- Implement Digital Systems using Python

 Note: The lab experiments will be like the following experiment examples

 Week -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 help utility.
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 are 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:

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:

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 returnsTrue 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:

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 theunique 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 itscontent. 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 letter of every word with the corresponding upper case letter and the rest of the letters 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:

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.

3. Use the structure of exception handling all general purpose exceptions.

Week-6:

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_rectangle so 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 and draws 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 multiplelevels 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

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 presentin 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 of vowels, blankspaces, lower case letters and uppercase letters.

Week - 8:

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 Parallel Adder
5. Write a GUI program to create a window wizard having two text labels, two text fields and twobuttons as Submit and Reset.

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

Reference Books:
1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
2. Python Programming A Modular Approach with Graphics, Database, Mobile, and Web Applications, Sheetal Taneja, Naveen Kumar, Pearson
3. Programming with Python, A User's Book, Michael Dawson, Cengage Learning, India Edition
4. Think Python, Allen Downey, Green Tea Press
5. Core Python Programming, W. Chun, Pearson
6. Introduction to Python, Kenneth A. Lambert, Cengage

ENGINEERING CHEMISTRY LABORATORY

B.Tech. I Year II Sem.	**L T P C**
Subject Code: J2220005	**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:

1. Estimation of hardness of water to check its suitability for drinking purpose.
2. Students are able to perform estimations of acids and bases using conductometry, potentiometry methods.
3. Students will learn to prepare in the laboratory.
4. Students will learn skills related to the lubricant properties such as saponification value, surfacetension and viscosity of oils.

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

1. Determination of parameters like hardness of water and rate of corrosion of mild steel in various conditions.
2. Able to perform methods such as conductometry, potentiometry in order to findout the concentrations or equivalence points of acids and bases.
3. Students are able to prepare Drugs like aspirin and paracetamol.
4. Estimations saponification value, surface tension and viscosity of lubricant oils.

List of Experiments:

1. Estimation of Hardness of water by EDTA Complexometry method
2. Estimation of the concentration of strong acid by Conductometric titrations.
3. Estimation of the concentration of weak acid by Conductometric titrations.
4. Estimation of the concentration of strong acid by Potentiometric titrations.
5. Determination of rate constant of acid catalysed hydrolysis of methyl acetate
6. Synthesis of Aspirin and Paracetamol.
7. Thin layer chromatography calculation of Rf values.eg: ortho and para nitro phenols.
8. Verification of freundlich adsorption isotherm-adsorption of acetic acid on charcoal.
9. Determination of Viscosity of castor oil and ground nut oil by using Ostwald's Viscometer.
10. Determination of surface tension of a give liquid using stalagmometer.
    Note: Any 8 experiments are to be performed.

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).

*****

DEPARTMENT OF CIVIL ENGINEERING
(J2220104   ) SURVEYING LABORATORY - I

L	T	P	C
0	0	2	1

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.

CYCLE - I

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.

CYCLE – II

      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, graduates will be able to

1. Student will be able to prepare Map and Plan for required site with suitable scale.
2. Student will be able to prepare contour Map and Estimate the Quantity of earthwork required for formation level for Road and Railway Alignment.
3. 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.
4. Student will be able to judge the profile of ground by observing the available existing contour map.

B.Tech
CIVIL ENGG.,

II -Year

I –Semester

DEPARTMENT OF CIVIL ENGINEERING

(J2230011) PROBABILITY AND STATISTICS

L	T	P	C
3	1	0	4

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

Course Objective: To Learn

1. The theory of Probability, and probability distributions of single and multiple random variables
2. 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 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.

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.

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.

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

Reference Books:
1. T. T. Soong, Fundamentals of Probability and Statistics for Engineers, John Wiley & Sons, Ltd, 2004.
2. Sheldon M Ross, Probability and statistics for Engineers and scientists, academic press

Course outcomes: After learning the contents of this paper the student must be able to
1. Apply the concepts of probability and distributions to some case studies.
2. Correlate the concepts of one unit to the concepts in other units

DEPARTMENT OF CIVIL ENGINEERING
(J2230105) BUILDING MATERIALS, CONSTRUCTION AND PLANNING

B.Tech. II Year I Sem.

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are to
1. List the construction material.
2. Explain different construction techniques
3. Understand the building bye-laws
4. 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 – manufacture – Chemical composition – Hydration -field & lab tests.
Admixtures – mineral & chemical admixtures – uses.

UNIT - III

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

Building Services: Plumbing Services: Water Distribution, Sanitary – Lines & Fittings; Ventilations: Functional requirements systems of ventilations. Air-conditioning - Essentials and Types; Acoustics – characteristic – absorption – Acoustic design; Fire protection – Fire Hazards – Classification of fire- resistant materials and constructions

UNIT - IV

Mortars, Masonry and Finishing's Mortars: Cement Mortar, Brick masonry – types – bonds; Stonemasonry – 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 relationto outside environment

Text Books:
1. Building Materials and Construction – Arora & Bindra, Dhanpat Roy Publications.
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 - LaxmiPublications (P) ltd., New Delhi.

Reference:
1. 1. Building Materials by Duggal, New Age International.
2. Building Materials by P. C. Varghese, PHI.
3. Building Construction by PC Varghese PHI.
4. Construction Technology – Vol – I & II by R. Chubby, Longman UK.
5. Alternate Building Materials and Technology, Jagadish, Venkatarama Reddy and others; New Age Publications.
.

*Course Outcomes***:** At the end of the course, graduates will be able to
1. Understand the different construction material.
2. Understand the different component parts of building and their construction practices and techniques
3. Understand the functional requirements to be considered for design and construction of building
4. Identify the factors to be considered in planning and construction of buildings
5. Plan a building based on the factors and principles of planning

DEPARTMENT OF CIVIL ENGINEERING
(J2230106)   ENGINEERING GEOLOGY

B.Tech. II Year I Sem.

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are to
1. To give the basics knowledge of Geology that is required for constructing various Civil Engineering Structures, basic Geology, Geological Hazardous and Environmental Geology.
2. 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 Physicalgeology, 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.

*Text Books***:**
1. Engineering Geology by N. Chennakesavulu, McMillan, India Ltd. 2005
2. Engineering Methods by D. Venkat Reddy; Vikas Publishers 2015.
3. Engineering Geology by S K Duggal, H K Pandey Mc Graw Hill Education Pvt Ltd 2014
4. Principles of Engineering Geology by K.V.G.K. Gokhale – B.S publications

*Reference Books***:**
1. F.G. Bell, Fundamental of Engineering B.S. Publications, 2005.
2. Krynine & Judd, Principles of Engineering Geology & Geotechnics, CBS Publishers & Distribution
3. Engineering Geology by Subinoy Gangopadhyay, Oxford university press.
4. Engineering Geology for Civil Engineers – P.C. Varghese PHI

*Course Outcomes***:** At the end of the course, graduates will be able to
1. Site characterization and how to collect, analyze, and report geologic data using standards in engineering practice.
2. The fundamentals of the engineering properties of Earth materials and fluids.
3. Rock mass characterization and the mechanics of planar rock slides and topples.

DEPARTMENT OF CIVIL ENGINEERING
(J2230107)   STRENGTH OF MATERIALS –I

B.Tech. II Year I Sem.

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are to
1. To understand the nature of stresses developed in simple geometries such as bars, cantilevers and beams for various types of simple loads.
2. To calculate the elastic deformation occurring in simple members for different types of loading.
3. To show the plane stress transformation with a particular coordinate system for different orientation of the plane.
4. 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 andcouple -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).

*Text Books***:**
1. Strength of Materials by R. K Rajput, S. Chand & Company Ltd.
2. Mechanics of Materials by Dr. B.C Punmia, Dr. Ashok Kumar Jain and Dr. Arun Kumar Jain
3. Strength of Materials by R. Subramanian, Oxford University Press

*Reference Books***:**
1. Mechanics of material by R.C. Hibbeler, Prentice Hall publications
2. Engineering Mechanics of Solids by Egor P. Popov, Prentice Hall publications
3. Strength of Materials by T.D.Gunneswara Rao and M.Andal, Cambridge Publishers
4. Strength of Materials by R.K. Bansal, Lakshmi Publications House Pvt. Ltd.
5. Strength of Materials by B.S.Basavarajaiah and P. Mahadevappa, 3rd Edition, Universities Presss

*Course Outcomes***:** At the end of the course, graduates will be able to
1. Describe the concepts and principles, understand the theory of elasticity including strain/displacement and Hooke's law relationships; and perform calculations, related to the strength of structured and mechanical components.
2. Recognize various types loads applied on structural components of simple framing geometries and understand the nature of internal stresses that will develop within the components.
3. To evaluate the strains and deformation that will result due to the elastic stresses developed within the materials for simple types of loading.
4. Analyze various situations involving structural members subjected to plane stresses by application of Mohr's circle of stress.

DEPARTMENT OF CIVIL ENGINEERING
(J2230108)   FLUID MECHANICS

B.Tech. II Year I Sem.

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are to
1. Introduce the concepts of fluid mechanics useful in Civil Engineering applications.
2. Provide a first level exposure to the students to fluid statics, kinematics and dynamics.
3. Learn about the application of mass, energy and momentum conservation laws for fluid flows.
4. Train and analyses engineering problems involving fluids with a mechanistic perspective is essential for the civil engineering students
5. To obtain the velocity and pressure variations in various types of simple flows.
6. To prepare a student to build a good fundamental background useful in the application-intensive courses covering hydraulics, hydraulic machinery and hydrology.

UNIT – I

Properties of Fluid   Distinction between a fluid and a solid; Properties of fluids – Viscosity, Newton law of viscosity; vapourpressure, 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 realfluid 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, applicationsof 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.
.

*Text Books***:**
1. Fluid Mechanics by Modi and Seth, Standard Book House.
2. Fluid Mechanics and Hydraulic machines by Manish Kumar Goyal, PHI learning Private Limited,2015.
3. Fluid Mechanics by R.C. Hibbeler, Pearson India Education Services Pvt. Ltd.

*Reference Books***:**
1. Fluid Mechanics – Frank M. White – 8th Edition – Mc Graw Hill Education.
2. Theory and Applications of Fluid Mechanics, K.Subramanya, Tata McGraw Hill
3. Introduction to Fluid Mechanics and Fluid Machines by SK Som, Gautam Biswas, SumanChakraborthy, Mc Graw Hill Education (India) Private Limited
4. Fluid Mechanics and Machinery,C.S.P. Ojha, R. Berndtsson and P. N. Chadramouli, Oxford University Press, 2010
5. Fluid mechanics & Hydraulic Machines, Domkundwar & Domkundwar Dhanpat Rai &Co
6. Fluid Mechanics and Hydraulic Machines, R. K. Bansal, Laxmi Publication Pvt Ltd.

*Course Outcomes***:** At the end of the course, graduates will be able to
1. Understand the broad principles of fluid statics, kinematics and dynamics.
2. Understand definitions of the basic terms used in fluid mechanics and characteristics of fluids and its flow.
3. Understand classifications of fluid flow.
4. Be able to apply the continuity, momentum and energy principles.

DEPARTMENT OF CIVIL ENGINEERING
(J2230109)   SURVEYING LABORATORY – II

B.Tech. II Year I Sem.

L	T	P	C
0	1	2	2

Course Objectives: The objectives of this course are to

1. learn and understand the various basic concept and principles used insurveying like Chain Surveying, Compass Surveying, Plane Table Surveying, and Levelling Surveying.
2. learn and understand about theodolite and total station in surveying.
3. learn and understand how to calculate Area of plot and Ground.
4. learn and understand about Horizontal Angle, Vertical Angle, Horizontal distanceand Vertical distance to study the ground profile using total station.

CYCLE - I

Theodolite surveying:
1. Measurement of horizontal angles and vertical angles.
2. Distance between two inaccessible points.
3. Measurement of area by theodolite traversing (Gales traverse table).
4. Determination of tachometer constants.
5. Distance between two inaccessible points using the principles of tachometer surveying.
6. Distance between two inaccessible points using the principles of trigonometric surveying

CYCLE - II

Total Station:
7. Area Measurement
8. Stake Out
9. Remote Elevation Measurement
10. Missing Line Measurement
11. Longitudinal & Cross Section Profile
12. Contouring
13. Providing a Simple Circular Curve

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

1. Prepare Map and Plan for required site with suitable scale.
2. Prepare contour Map and Estimate the Quantity of earthwork required for formation level forRoad and Railway Alignment.
3. Judge which type of instrument to be used for carrying out survey for a Particular Area andestimate the area.
4. Judge the profile of ground by observing the available existing contour map.

DEPARTMENT OF CIVIL ENGINEERING
(J2230110)   STRENGTH OF MATERIALS LABORATORY

B.Tech. II Year I Sem.

L	T	P	C
0	0	2	1

Course Objectives:

1. To conduct the Tension test, Compression test on various materials
2. To conduct the Shear test, Bending test on determinate beams
3. To conduct the Compression test on spring and Hardness test using various machines
4. To conduct the Torsion test, Impact test on various materials

List of Experiments:

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

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

1. Determine the yield stress, ultimate tensile stress, percentage elongation of steel, compressive strength of brick and concrete
2. Determine the ultimate shear stress, modulus of elasticity of steel
3. Determine the stiffness of the close coiled helical spring and hardness number of mild steel, brass, copper and aluminium.
4. Determine the modulus of rigidity and impact strength of steel**.**

DEPARTMENT OF CIVIL ENGINEERING
(J2230111)   COMPUTER AIDED DRAFTING LABORATORY

B.Tech. II Year I Sem.

L	T	P	C
0	0	2	1

Course Objectives:
1. To be able to plan buildings as per NBC.
2. To understand various types of conventional signs and brick bonds.
3. To draw the plan section and elevation for doors, trusses and staircases.
4. To use AutoCAD tools to draw building plans, sections and elevations from a given line diagramand specifications.
5. To develop working drawings of residential buildings.

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.

Text Books:
1. Computer Aided Design Laboratory by M. N. Sesha Praksh & Dr. G. S. Servesh –Laxmi Publications.
2. Engineering Graphics by P. J. Sha – S. Chand & Co.
3. Civil Engineering Drawing-I by N. Sreenivasulu, S. Rama Rao – Radiant Publishing House.
4. Civil Engineering Drawing-II by N. Sreenivasulu – Radiant Publishing House.

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

***Course Outcomes*:** At the end of the course, graduates will be able to
1. Plan buildings as per NBC.
2. Use different Commands of selected drafting software to draw Conventional signs and brick bonds, Plan, Section and Elevation of buildings.
3. Draw section and elevation of panelled doors and trusses.
4. Draw and detail the different components of Stair cases.
5. Develop and draw single /two storey residential building and public building as per the building by-laws.
6. Draw Electrical layout, Plumbing layout for residential buildings.

DEPARTMENT OF CIVIL ENGINEERING
(J223MC02)   CONSTITUTION OF INDIA

B.Tech. II Year I Sem.

L	T	P	C
3	0	0	0

Course Objectives: Students will be able to:

1. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
2. To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
3. To address the role of socialism in India after the commencement of the Bolshevik Revolutionin1917 and its impact on the initial drafting of the Indian Constitution.

UNIT – I

History of Making of the Indian Constitution – History of Drafting Committee.

UNIT – II

Philosophy of the Indian Constitution – Preamble Salient Features

UNIT – III

Contours of Constitutional Rights & Duties – Fundamental Rights

i. Right to Equality
ii. Right to Freedom
iii. Right against Exploitation
iv. Right to Freedom of Religion
v. Cultural and Educational Rights
vi. Right to Constitutional Remedies
vii. Directive Principles of State Policy
viii. Fundamental Duties.

UNIT – IV

Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions

UNIT – V

Local Administration: District's Administration head: Role and Importance
Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation.

Panchayat Raj: Introduction, PRI: Zila Panchayat. Elected officials and their roles, CEO
ZilaPanchayat: Position and role. Block level: Organizational Hierarchy (Different departments),
Village level: Role of Elected and Appointed officials, Importance of grass root democracy

Election Commission: Role and Functioning. Chief Election Commissioner and Election
Commissioners.
State Election Commission: Role and Functioning. Institute and Bodies for the welfare of
SC/ST/OBCand women.

Suggested Reading:
1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N.Busi, Dr.B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P.Jain, Indian Constitution Law, 7thEdn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

Course Outcomes: Students will be able to:

1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the frame work of argument that informed the conceptualization of social reforms leading to revolution in India.
3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP]under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution
4. Discuss the passage of the Hindu Code Bill of 1956.

B.Tech
CIVIL ENGG.,

II -Year

II –Semester

DEPARTMENT OF CIVIL ENGINEERING

(J2240207)   BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

B.Tech. II Year II Sem.

L	T	P	C
3	0	0	3

Prerequisites: Mathematics

Course Objectives:

1. To introduce the concepts of electrical circuits and its components
2. To understand magnetic circuits, DC circuits and AC single phase & three phase circuits
3. To study and understand the different types of DC/AC machines and Transformers.
4. To import the knowledge of various electrical installations.
5. To introduce the concept of power, power factor and its improvement.
6. To introduce the concepts of diodes & transistors, and
7. 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 dcexcitation.

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 intransformers, efficiency, Three-phase transformer connections. Construction and working principle ofDCgenerators, EMF equation, working principle of DC motors, Torque equations and Speed control of DC motors, Construction and working principle of Three-phase Induction motor, Torque sequations 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, Capacit or Filters, L-section Filters, π-section Filters.

<div align="center">

UNIT-V

</div>

Bipolar Junction Transistor (BJT): Construction, Principle of Operation, Amplifying Action, Common Emitter, Common Baseand 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.

Text Books:

1. Basic Electrical and electronics Engineering–MS Sukija TK Nagasarkar Oxford University
2. Basic Electrical and electronics Engineering -DP Kothari. IJNagarath, McGraw Hill Education

Reference Books:

1. Electronic Devices and Circuits–R.L.BoylestadandLouisNashelsky, PEI/PHI,9th Ed,2006.
2. Millman's Electronic Devices and Circuits – J. Millman andC.C. Halkias,Satyabrata Jit, TMH,2/e,1998.
3. Engineering circuit analysis-byWilliamHaytandJackE.Kemmerly,McGrawHillCompany,6[th]edition.
4. Linear circuit analysis (timedomainphasorandLaplacetransformapproaches)-2[nd]editionbyRaymondA.De Carloand Pen-Min-Lin,Oxford UniversityPress-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,"FundamentalsofElectricalEngineering",OxfordUniversityPress,2011.
8. E.Hughes,"ElectricalandElectronicsTechnology",Pearson,2010.
9. V. D.Toro,"ElectricalEngineeringFundamentals",PrenticeHallIndia,1989.

Course Outcomes:

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

DEPARTMENT OF CIVIL ENGINEERING
(J2240112)   CONCRETE TECHNOLOGY

B.Tech. II Year II Sem.

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are to

1. **Know** different types of cement as per their properties for different field applications.
2. **Understand Design** economic concrete mix proportion for different exposure conditions and intended purposes.
3. **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.

Text Books:
1. Concrete Technology by M.S. Shetty. – S. Chand & Co.; 2004
2. Concrete Technology by A.R. Santhakumar, 2nd Edition, Oxford university Press, New Delhi
3. Concrete Technology by M. L. Gambhir. – Tata Mc. Graw Hill Publishers, 5THEdition,New Delhi

Reference Books:
1. Properties of Concrete by A. M. Neville – Low priced Edition – 4th edition
2. Concrete: Micro structure, Properties and Materials – P.K. Mehta and J.M. Monteiro, Mc-Graw Hill Publishers

*Course Outcomes***:** At the end of the course, graduates will be able to
1. **Determine** the properties of concrete ingredients i.e., cement, sand, coarse aggregate by conducting different tests. Recognize the effects of the rheology and early age properties of concrete on its long-term behavior.
2. **Apply** the use of various chemical admixtures and mineral additives to design cement-based materials with tailor-made properties
3. **Use** advanced laboratory techniques to characterize cement-based materials.
4. **Perform** mix design and engineering properties of special concretes such as high-performance concrete, self-compacting concrete, and fiber reinforced concrete.

IS Codes:
IS 383 : 2016
IS 516 : 2018 (Part -1 - 4)
IS 10262 – 2019

DEPARTMENT OF CIVIL ENGINEERING
(J2240113)   STRENGTH OF MATERIALS – II

B.Tech. II Year II Sem.

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are to

1. To understand the nature of stresses developed in simple geometries shafts, springs, columns &cylindrical and spherical shells for various types of simple loads.
2. To calculate the stability and elastic deformation occurring in various simple geometries fordifferent types of loading.
3. 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 – Combinedbending and torsion – Design of shafts according to theories of failure.

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

UNIT – II

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

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

UNIT - III

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

UNIT – IV

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

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

UNIT – V

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.

Text Books:
1. Strength of Materials by R.K Rajput, S. Chand & Company Ltd.
2. Mechanics of Materials by Dr. B. C Punmia, Dr. Ashok Kumar Jain and Dr. Arun Kumar Jain
3. Strength of Materials by R. Subramanian, Oxford University Press.

Reference Books:
1. Mechanics of Materials by R.C. Hibbeler, Pearson Education
2. Engineering Mechanics of Solids by Popov E.P. Prentice-Hall Ltd
3. Strength of Materials by T.D.Gunneswara Rao and M.Andal, Cambridge Publishers
4. Strength of Materials by R. K. Bansal, Lakshmi Publications House Pvt. Ltd.
5. Fundamentals of Solid Mechanics by M. L. Gambhir, PHI Learning Pvt. Ltd

Course Outcomes: At the end of the course, graduates will be able to
1. Describe the concepts and principles, understand the theory of elasticity, and perform calculations, relative to the strength of structures and mechanical components in particular to torsion and direct compression.
2. To evaluate the strains and deformation that will result due to the elastic stresses developed within the materials for simple types of loading.
3. Analyze strength and stability of structural members subjected to Direct, and Direct and Bending stresses.
4. Understand and evaluate the shear center and unsymmetrical bending.

DEPARTMENT OF CIVIL ENGINEERING
(J2240114)   STRUCTURAL ANALYSIS – I

B.Tech. II Year II Sem.

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are to
1. Differentiate the statically determinate and indeterminate structures.
2. To understand the nature of stresses developed in perfect frames and three hinged arches for various types of simple loads
3. Analyse the statically indeterminate members such as fixed bars, continuous beams and for various types of loading.
4. Understand the energy methods used to derive the equations to solve engineering problems
5. 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, effectof 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.

Text Books:
1. Structural Analysis Vol –I & II by V.N. Vazirani and M.M. Ratwani, Khanna Publishers.
2. Structural Analysis Vol I & II by G. S. Pandit and S.P. Gupta, Tata McGraw Hill Education Pvt.Ltd.
3. Structural analysis T. S Thandavamoorthy, Oxford university Press

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

Course Outcomes: At the end of the course, graduates will be able to
1. An ability to apply knowledge of mathematics, science, and engineering
2. Analyse the statically indeterminate bars and continuous beams
3. Draw strength behaviour of members for static and dynamic loading.
4. Calculate the stiffness parameters in beams and pin jointed trusses.
5. Understand the indeterminacy aspects to consider for a total structural system.
6. Identify, formulate, and solve engineering problems with real time loading

DEPARTMENT OF CIVIL ENGINEERING
(J2240115)   HYDRAULICS AND HYDRAULICS MACHINERY

B.Tech. II Year II Sem.

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are to
1. To Define the fundamental principles of water conveyance in open channels.
2. To Discuss and analyze the open channels in uniform and Non-uniform flow conditions.
3. To Study the characteristics of hydroelectric power plant and its components.
4. 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 workdone 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.

Text Books:
1. Fluid Mechanics by Modi and Seth, Standard Book House.
2. Fluid Mechanics and Hydraulic machines by Manish Kumar Goyal, PHI learning Private Limited,2015
3. Open channel flow by V.T. Chow (McGraw Hill Book Company).

Reference Books:
1. Fluid Mechanics by R. C. Hibbeler, Pearson India Education Services Pvt. Ltd
2. Fluid Mechanic & Fluid Power Engineering by D. S. Kumar (Kataria & Sons Publications Pvt.Ltd.).
3. Introduction to Fluid Mechanics and Fluid Machines by SK Som, Gautam Biswas, SumanChakraborthy, Mc Graw Hill Education (India) Private Limited
4. Hydraulic Machines by Banga& Sharma (Khanna Publishers).

Course Outcomes: At the end of the course, graduates will be able to
1. Apply their knowledge of fluid mechanics in addressing problems in open channels and hydraulic machinery.
2. Understand and solve problems in uniform, gradually and rapidly varied flows in open channelin steady state conditions.
3. Apply dimensional analysis and to differentiate the model, prototype and similitude conditionsfor practical problems.
4. Get the knowledge on different hydraulic machinery devices and its principles that will beutilized in hydropower development and for other practical usages.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
Autonomous & Accredited Institution
Narsampet, Warangal 506 332

DEPARTMENT OF CIVIL ENGINEERING

(J2240116)   FLUID MECHANICS AND HYDRAULICS MACHINERY LABORATORY

B.Tech. II Year II Sem.

L	T	P	C
0	0	2	1

Course Objectives: The objectives of this course are to

1. **Identify** the behavior of analytical models introduced in lecture to the actual behavior of real fluid flows.
2. **Explain** the standard measurement techniques of fluid mechanics and their applications.
3. **Illustrate** the students with the components and working principles of the Hydraulic machines- different types of Turbines, Pumps, and other miscellaneous hydraulics machines.
4. **Analyze** the laboratory measurements and to document the results in an appropriate format.

List of Experiments

1. Verification of Bernoulli's equation
2. Determination of Coefficient of discharge for a small orifice by a constant head method
3. Calibration of Venturimeter / Orifice Meter
4. Calibration of Triangular / Rectangular/Trapezoidal Notch
5. Determination of Minor losses in pipe flow
6. Determination of Friction factor of a pipe line
7. Determination of Energy loss in 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***:** At the end of the course, graduates will be able to

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

DEPARTMENT OF CIVIL ENGINEERING

(**J2240208**)   **BASICELECTRICAL ANDELECTRONICSENGINEERING** LABORATORY

B.Tech. II Year II Sem.

L	T	P	C
0	0	2	1

Pre-requisites: Basic Electrical and Electronics Engineering

Course Objectives:

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

List of Experiments/Demonstrations:

PARTA: ELECTRICAL

1. Verification of KVL and KCL
2. (i) Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
   (ii)Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star)in aThree Phase Transformer
3. Measurement of Active and Reactive Power in a balanced Three- phase circuit
4. Performance Characteristics of a Separately Excited DCS hunt Motor
5. Performance Characteristics of aThree-phase Induction Motor
6. No-Load Characteristics of aThree-phaseAlternator

PARTB: ELECTRONICS
1. Study and operation of
   (i) Multi-meters (ii) Function Generator (iii) Regulated Power Supplies (iv) CRO.
2. PN Junction diode characteristics
3. Zener diode characteristics and Zener as voltage Regulator
4. Input & Output characteristics of Transistor in CB/CE configuration
5. Full Wave Rectifier with & without filters
6. Input and Output characteristics of FET in CS configuration

Text Books:
1. Basic Electrical and electronics Engineering–MSSukija TKNagasarkar Oxford University
2. Basic Electrical and electronics Engineering-DP Kothari. IJ Nagarath, McGraw Hill Education

Reference Books:

1. ElectronicDevicesandCircuits–R.L.BoylesteadandLouisNashelsky,PEI/PHI,9th Ed,2006.
2. Millman's Electronic Devices andCircuits – J. Millman andC.C. Halkias,Satyabrata Jit, TMH,2/e,1998.
3. Engineeringcircuitanalysis-byWilliamHaytandJackE.Kemmerly,McGrawHillCompany,6[th]edition.
4. Linearcircuitanalysis(timedomainphasorandLaplacetransformapproaches)-2[nd]editionbyRaymondA.De Carloand Pen-Min-Lin,Oxford UniversityPress-2004.
5. NetworkTheorybyN.C.Jagan&C. Lakshminarayana,B.S. Publications.
6. NetworkTheorybySudhakar,ShyamMohanPalli,TMH.
7. L.S.Bobrow,"FundamentalsofElectricalEngineering",OxfordUniversityPress,2011.
8. E.Hughes,"ElectricalandElectronicsTechnology",Pearson,2010.
9. V. D.Toro, "ElectricalEngineeringFundamentals",PrenticeHallIndia,1989

Course Outcomes:

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

DEPARTMENT OF CIVIL ENGINEERING
(J2240117)   CONCRETE TECHNOLOGY LABORATORY

B.Tech. II Year II Sem.

L	T	P	C
0	0	2	1

Course Objectives: The objectives of this course are to

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 EXERCISES:

1. Tests on Cement:
a) Soundness.
b) Compressive strength.

2. Tests on Aggregates:
a) Specific gravity of fine aggregate.
b) Specific gravity of coarse aggregate.
c) Bulking of fine aggregate.
d) Grading of fine aggregate

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 & Tensile strength tests.
 b) Modulus of elasticity of concrete.
c) Demonstration of Non-destructive testing of concrete (Rebound Hammer)

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

1. Perform various tests required to assess the characteristics of cement
2. Test and evaluate the properties of fine and coarse aggregates and determine its suitability for construction
3. Evaluate the fresh and hardened properties of concrete
4. Design the concrete mix for required strength and test its performance characteristics

B.Tech
CIVIL ENGG.,

III -Year

I –Semester

DEPARTMENT OF CIVIL ENGINEERING
(J2250119)   STRUCTURAL ANALYSIS – II

B.Tech. III Year I Sem.

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are to
1. Identify the various actions in arches.
2. Understand classical methods of analysis for statically indeterminate structures.
3. Differentiate the approximate and numerical methods of analysis for indeterminate structures.
4. Find the degree of static and kinematic indeterminacies of the structures.
5. Plot the variation of S.F and B.M when a moving load passes on indeterminate structure

UNIT–I

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

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

UNIT–II

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-Shearforce and bending moment diagrams - Elastic curve.

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.

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

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

Course Outcomes: At the end of the course, graduates will be able to
1. **Analyze** the two hinged arches.
2. **Solve** statically indeterminate beams and portal frames using classical methods.
3. **Sketch** the shearforce and bending moment diagrams for indeterminate structures.
4. **Formulate** the stiffness matrix and analyze the beams by matrix methods.

DEPARTMENT OF CIVIL ENGINEERING
(J2250120)   GEOTECHNICAL ENGINEERING

B.Tech. III Year I Sem.

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are to

1. Understand the formation of soil and classification of the soils.
2. Characterize the Index & Engineering Properties of Soils.
3. Determine the flow characteristics & stresses due to externally applied loads.
4. Estimate the consolidation properties of soils.
5. Determine the shear strength parameters

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: Characteristic sand 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—pre-consolidation pressure and its determination- Terzaghi's1-D consolidation theory—coefficient t 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-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.

Text Books:

1. Basic and Applied Soil Mechanics by Gopal Ranjan & A.S.R.Rao, 2^{nd}Edition, Newage International Publishers,2006
2. Soil Mechanics and Foundation Engineering by V.N.S.Murthy, CBS Publishers & Distributors/Alkem Company (S), 2011
3. Principals of Geotechnical Engineering by Braja, M. Das, Cengage Learning Publishers, 10th Edition, 2020

Reference Books:

1. An Introduction to Geotechnical Engineering by R.D.Holtz, W.D.Kovacs, and Thomas Sheahan, Pearson, 2^{nd}edition (2011).
2. Geotechnical Engineering by C.Venkataramiah, Newage International Pvt. Ltd, (2002).
3. Geotechnical Engineering Principles and Practices by Coduto and M. Y. Ronald, Pearson 2nd edition (2010).
4. Geotechnical Engineering by Manoj Dutta & Gulati S.K–Tata McGraw-Hill Publishers New Delhi (2017).
5. Foundation Engineering by P.C.Varghese, PHI (2005).

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

1. Characterize and classify the soils.
2. Estimate seepage, stresses under various loading conditions.
3. Understand laboratory and field compaction characteristics.
4. Analyze the compressibility of the soils.
5. Understand the strength of soils under various drainage conditions.

DEPARTMENT OF CIVIL ENGINEERING
(J2250121)   STRUCTURAL ENGINEERING – I (RCC)

B.Tech. III Year I Sem.

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are to

1. **Identify** the basic components of any structural system and the standard loading for the RC structure.
2. **Identify** and **tell** the various codal provisions given in IS.456.
3. **Describe** the salient feature of limit state method, compare with other methods and the concepts of limit state of collapse and limit state of serviceability.
4. **Evaluate** the behavior of RC member under flexure, shear and compression, torsion and bond.

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–Forces–What is meant by Design? –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—Behavior and Properties of Concrete and Steel-Stress Block Parameters as per IS456-2000.

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 IS 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-IS Code provisions.

UNIT–V

Design of foundation -Different types of footings—Design of flat isolated square, rectangular, combined footings for two columns.

Text Books:
1. Limit state designed of reinforced concrete–P.C.Varghese, PHI Learning Pvt. Ltd.
2. Reinforced concrete design by S.Unnikrishna Pillai & Devdas Menon,Tata McGrawHill.
3. Reinforced concrete design by N.Krishna Raju and R.N.Pranesh, Newage International Publishers.

Reference Books:
1. Reinforced concrete structures, Vol. 1, by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd.
2. Fundamentals of Reinforced concrete design by M.L.Gambhir, Prentice Hall of India Pvt.Ltd.,
3. Design of Reinforced Concrete Structures by N.Subramanian, Oxford University Press
4. Design of concrete structures by J.N.Bandhyopadhyay PHI Learning Private Limited.
5. Design of Reinforced Concrete Structures by I.C.Syaland A.K.Goel, S.Chand & company.
6. Design of Reinforced Concrete Foundations–P.C.Varghese, Prentice Hall of India.

*Course Outcomes***:** At the end of the course, graduates will be able to
1. **Compare** and **Design** the singly reinforced, doubly reinforced and flanged sections.
2. **Design** the axially loaded, uni-axial and bi-axial bending columns.
3. **Classify** the footings and **Design** the isolated square, rectangular and circular footings
4. **Distinguish** and **Design** the one-way and two-way slabs.

DEPARTMENT OF CIVIL ENGINEERING
(J2250122) TRANSPORTATION ENGINEERING

B.Tech. III Year I Sem.

L	T	P	C
3	0	0	3

Course Objectives:

This course aims at providing a comprehensive insight of various elements of Highway transportation engineering. Topics related to the highway development, characterization of different materials needed for highway construction, structural and geometric design of highway pavements along with the challenges and possible solutions to the traffic related issues will be covered as a part of this course

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

IntroductiontoHighwayGeometricDesign:WidthofPavement,FormationandLand,CrossSlopes 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:Designofhorizontalcurves,superelevation,extrawideningofpavementatcurves;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. Introduction to advanced concretes for road applications.

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, IRC37- 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.

Text Books:
1. Khanna,S.K,Justo,AandVeeraragavan,A,'HighwayEngineering',NemChand&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

Code of Provisions:

DesignCodes:IRC37-2012,IRC58-2015,IRC81-1997

Reference Books:
1. Papacoastas, C.S. and Prevedouros,Transportation Engineeringand Planning,Third Edition, Third Impression; Pearson Education, 2018.
2. KhistyCJ and LallBKent; Transportation Engineering: An Introduction, Third Edition,1st Indian Adaptation; Pearson India Education Service Pvt. Ltd, New Delhi 2017.
3. Subhash C Saxena, Text Book of Highway and Traffic Engineering; First Edition; CBS Publishers and Distributors. New Delhi, 2014
4. C Venkatramaih,Transportation Engineering Volume1–Highway Engineering, 1stEdition, Universities Press, 2016
5. Garber,N.J.andHoel,L.A.Traffic and Highway Engineering, Fourth Edition;Cengage Learning, Stamford, CT, USA, 2010
6. Partha chakroborty and Animesh Das,Principles of Transportation Engineering, PHI,2013
7. Nicholas J Garber and Lester AHoel, Traffic and Highway Engineering, 5thEdition, Cengage Learning India Private Limited, New Delhi, 5th Indian Reprint, 2011.

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

- An ability to apply the knowledge of mathematics, science and engineering in the areas of traffic engineering, highway development and maintenance.
- An ability to design, conduct experiments to assess the suitability of the highway materials like soil, bitumen, aggregates and a variety of bituminous mixtures. Also the students will develop the ability to interpret the results and assess the suitability of these materials for construction of highways.
- An ability to design flexible and rigid highway pavements for varying traffic compositions as well as soil sub grade and environmental conditions using the standards stipulated by Indian Roads Congress.
- An ability to evaluate the structural and functional conditions of in-service highway pavements and provide solution in the form of routine maintenance measures or designed overlays using Indian Roads congress guidelines.
- An ability to assess the issues related to road traffic and provide engineering solutions supported with an understanding of road user psychological and behavioural patterns.

DEPARTMENT OF CIVIL ENGINEERING
(J2250123) WATER RESOURCE ENGINEERING – I

B.Tech. III Year I Sem.

L	T	P	C
3	0	0	3

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

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 evapotranspiration over India, actual evapotranspiration, interception, depression storage, infiltration, infiltration capacity, measurement of infiltration, modelling 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 water shed 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

Ground water Hydrology: Occurrence, movement and application of ground water, 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 zone soil 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.

Text Books:
1. Hydrology by K.Subramanya (TataMcGraw-Hill).
2. Irrigation Engineering and Hydraulic structures by Santhosh kumar Garg Khanna publishers.
3. GL Asawa, Irrigation Engineering, WileyEastern   .

Reference Books:
1. Elements of Engineering Hydrology by V.P.Singh (TataMcGraw-Hill).
2. Engineering Hydrology by Jaya Rami Reddy (LaxmiPublications)
3. Ground water Hydrology by David Keith Todd, John Wiley & Son, NewYork.
4. Elements of Water Resources Engineering by K.N.Duggal and J.P.Soni(NewAge International)
5. Manual on Storm Water Drainage System-2019,CPHEONewDelhi.

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

1. **Understand** the different concepts and terms used in engineering hydrology.
2. **Identify** and explain various formulae used in estimation of surface and Ground water hydrology components
3. **Demonstrate** their knowledge to **connect** hydrology to the field requirement.

DEPARTMENT OF CIVIL ENGINEERING
(J2250124)   TRANSPORTATION ENGINEERING LABORATORY

B.Tech. III Year I Sem.

L	T	P	C
0	0	2	1

Pre-Requisites: Building Materials, Highway Materials

Course Objectives: The objectives of this course are to

1. Learn laboratory tests and their procedures cement, fine aggregate, course aggregates and bitumen.
2. Evaluate fresh concrete properties.
3. Understand the test procedures for characterization of Concrete and bituminous mixes.

Tests on Aggregates

1. Impact test
2. Crushing value test
3. Los Angeles Abrasion test
4. Shape test

Tests on Bitumen

5. Penetration and softening point
6. Ductility and Elastic recovery
7. Flash and Fire points (Demo)

Traffic Lab

8. Volume Studies at Mid blocks
9. Volume Studies at Intersections
10. Speed Studies using Spot speeds
11. Speed Studies using Moving car method
12. Parking Studies
13. Road safety Audit with respect to Geometric design (video demonstration only)

Text Books:

1. Highway Material Testing manual, Khanna, Justo and Veeraraghavan, Nemchand Brothers

IS CODES:

1. IS1201-1220(1978)"Methods for testing tars and bituminous materials"
2. IRCSP53-2010"Guidelines on use of modified bitumen"

Course Outcomes: Student shall be able to

1. Categorize the test on materials used for Bituminous constructions.
2. Evaluate the tests performed for Bitumen and mixes.
3. Prepare a laboratory report

DEPARTMENT OF CIVIL ENGINEERING
(J2250125)   GEOTECHNICAL ENGINEERING LABORATORY

B.Tech. III Year I Sem.

L	T	P	C
0	0	2	1

Pre-Requisites: Soil Mechanics (Co-requisite)

Course Objectives: The objectives of this course are to obtain index and engineering properties of locally available soils, and to understand the behavior of these soil under various loads.

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. Un-confined compression test
8. Direct shear test
9. Vane shear test
10. Differential free swell index(DFSI) test

Reference Books:

1. Measurement of Engineering Properties of Soils by E. Saibaba Reddy & K.RamaSastri, New Age International, 2002.
2. Manual of Soil Laboratory Testing, K.H., Head, CRC Press,2006, 3rdEdition.

Course Outcomes: At the end of the course, the student will be able to Classify and evaluate the behavior of the soils subjected to various loads.

DEPARTMENT OF CIVIL ENGINEERING
(J225MC05) INTELLECTUAL PROPERTY RIGHTS

B.Tech. III Year I Sem.

L	T	P	C
3	0	0	0

Course Objectives:
1. Significance of intellectual property and its protection
2. Introduce various forms of intellectual property

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

UNIT – IV
Trade Secrets: Trade secret law, determination of trade secret status, liability for misappropriations of trade secrets, protection for submission, trade secret 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, copyright law, international patent law, and international development in trade secrets law.

Text Book:
1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning.

Reference Book:
1. Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, Tata McGraw Hill Publishing company ltd.

B.Tech
CIVIL ENGG.,

III -Year

II –Semester

DEPARTMENT OF CIVIL ENGINEERING
(J2260126)   ENVIRONMENTAL ENGINEERING

B.Tech. III Year II Sem.

L	T	P	C
3	0	0	3

Course Objectives: This subject provides the knowledge of water sources, water treatment, design of distribution system wastewater treatment, and safe disposal methods. The topics of characteristics of wastewater, sludge digestion are also included, basics of Air Pollution & Control.

UNIT–I

Introduction: Water borne 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 Digestiontank–Sludgedisposalbydrying– septictanksworkingprinciplesanddesign–soakpits.

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.

Text Books:

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

Reference Books:

Water and Waste Water Technology by Steel, Wiley
Wastewater engineering by Metcalf and Eddy, McGraw Hill, 2015.
Water and Waste Water Engineering by Fair Geyer and Okun, Wiley, 2011
Water and Waste Water Technology by Mark J Hammar and Mark J. Hammar Jr. Wiley, 2007.
Introduction to Environmental Engineering and Science by Gilbert Masters, Prentice Hall, New Jersey.
Introduction to Environmental Engineering by P. Aarne Vesilind, Susan M. Morgan, Thompson /Brooks/Cole; Second Edition 2008.
Integrated Solid Waste Management, Tchobanoglous, Theissen& Vigil. McGraw Hill Publication

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

1. Assess characteristics of water and waste water.
2. Estimate quantities of water and waste water and plan conveyance components.
3. Design components of water and waste water treatment plants.
4. Be conversant with issues of air pollution and control.

DEPARTMENT OF CIVIL ENGINEERING
(J2260127)   QUANTITY SURVEYING AND VALUATION

B.Tech. III Year II Sem.

L	T	P	C
3	0	0	3

Course Objectives: The subject provide process of estimations required for various work in construction. To have knowledge of using SOR & SSR for analysis of rates on various works and basics of planning tools for a construction projects.

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.

Note: Number Of Exercises Proposed:
1. Three in flat Roof & one in Sloped Roof
2. Exercises on Data – three Nos.

*Text Books***:**
1. Estimating and Costing by B.N. Dutta, UBS publishers, 2000.
2. Estimating and Costing by G.S. Birdie
3. Punmia, B.C., Khandelwal, K.K., Project Planning with PERT and CPM, Laxmi Publications, 2016
4. Chitkara, K. K. Construction Project Management. Tata McGraw-Hill Education, 2014

Reference Books:

1. Standard Schedule of rates and standard data book by public works department.
2. S. 1200 (Parts I to XXV – 1974/ method of measurement of building and Civil Engineering works a B.I.S.)
3. Estimation, Costing and Specifications by M. Chakraborthi; Laxmi publications.
4. Peurifoy, R.L. Construction Planning, Methods and Equipment, McGraw Hill, 2011
5. Nunnally, S.W. Construction Methods and Management, Prentice Hall, 2006
6. Jha, Kumar Neeraj., Construction Project management, Theory & Practice, Pearson Education India, 2015

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

1. **Understand** the technical specifications for various works to be performed for a project and how they impact the cost of a structure.

2. **Quantify** the worth of a structure by evaluating quantities of constituents, derive their cost rates and build up the overall cost of the structure.

3. **Understand** how competitive bidding works and how to submit a competitive bid proposal.

DEPARTMENT OF CIVIL ENGINEERING
(J2260128)   STRUCTURAL ENGINEERING – II (STEEL STRUCTURES)

B.Tech. III Year II Sem.

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are to
1. **Explain** the mechanical properties of structural steel, plasticity, yield
2. **Describe** the salient features of Limit State Method of design of Steel structures. **Identify** and explain the codal provisions given in IS. 800.
3. **Analyze** the behaviour of steel structures under tension, compression and flexure.
4. **Design** the tension, compression, flexural members and plate girder
5. **Design** the connection in steel structure, build - up member and (bolted and welded).

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 – pryingaction – Welded connections–Types of welded joints–Design requirements –Design of Beam – column connections – Eccentric connections –Type I and Type II 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 — 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.

Text Books:

1. Design of steel structures by S.K. Duggal, Tata McGraw-Hill publishers, 2000, 2nd Edition.
2. Design of steel structures by N. Subramanian, Oxford University press, 2008.
3. Design of steel structures by K.S. Sairam, Pearson Educational India, 2nd Edition, 2013.

Reference Books:

1. Design of steel structures by Edwin H. Gayrold and Charles Gayrold, Tata McGraw hill publishers, 1972

2. Design of steel structures by L.S. Jaya Gopal, D. Tensing, Vikas Publishing House.

Course Outcomes: On completion of the course, the students will be able to:
1. Analyze the tension members, compression members.
2. Design the tension members, compression members and column bases and joints and connections.
3. Analyze and Design the beams including built-up sections and beam and connections.
4. Identify and Design the various components of welded plate girder including stiffeners.

DEPARTMENT OF CIVIL ENGINEERING
(J2260138)   PRESTRESSED CONCRETE (PE-I)

B.Tech. III Year II Sem.

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are to

1. Understand the principles & necessity of pre-stressed concrete structures. Know different techniques of pre-stressing.
2. Get the knowledge on various losses of prestress.
3. Understand Analysis and design of pre-stressed concrete members.

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 Post-tensioning 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 pre-tensioned and post-tensioned 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 pre-stressed 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 pre-stressing 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 Pre-tensioned 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 Un-propped- stress distribution- Differential shrinkage- Analysis of composite beams- General design considerations.

Deflections: Importance of control of deflections- Factors influencing deflections—Short term deflections of un-cracked beams-prediction of long time deflections-IS code requirements.

Reference Books:
1. Prestressed concrete by Krishna Raju, Tata McGraw Hill Book–Co. NewDelhi.
2. Design of prestress concrete structures by T.Y.Lin and Burn, JohnWiley, NewYork.
3. Prestressed concrete by S.Ramamrutham, Dhanpat Rai & Sons, Delhi.
4. Prestressed Concrete by N.Rajagopalan Narosa Publishing House

Reference Codes: IS1343:2016

Course Outcomes: On completion of the course, the students will be able to:
1. Acquire the knowledge of evolution of process of pre-stressing.
2. Acquire the knowledge of various pre-stressing techniques.
3. Develop skills in analysis design of pre-stressed structural elements as per the IS-codal provisions.

DEPARTMENT OF CIVIL ENGINEERING
(J2260139)   REHABILITATION AND RETROFITTING OF STRUCTURES (PE-I)

B.Tech. III Year II Sem.

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are to
   1: Distress and damages of buildings.
   2: Types of NDT.
   3: Corrosion in Reinforcement.
   4: Repairs of Structures.
   5: Health monitoring of structures

UNIT – I
Introduction, Deterioration of Structures, Distress in the Structures, Causes and Prevention Mechanism of Damage, Types of Damage.

UNIT – II
Inspection and Testing, Symptoms and Diagnosis of Distress, Damage Assessment, Partially destructive Testing, Non- Destructive Testing (NDT) and Methods

UNIT – III
Corrosion of Steel Reinforcement, Causes, Mechanism and Prevention. Damage of Structure due to Fire, Fire rating Of Structures, Phenomena of Desiccation.

UNIT – IV
Repair of Structure, Common types of Repair, Repair in Concrete Structure, Repair in Under water Structures, Guniting, Shot Create, Underpinning, Strengthening of Structures, Strengthening Methods, Retrofitting, Jacketing

UNIT – V
Health Monitoring Of the Structures, Use of Sensors, Building Instrumentation.

Text Books:
   1. B.L.Gupta and Amit Gupta, "*Maintenance and repair of Civil Structures",* Standard Publication.
   2. A.R.Santakumar, "*Concrete Technology*" Oxford University Press.

References:
   1. Bungey, "*Non-Destructive Evaluation of concrete Structures*" Surrey University Press.
   2. W.H.Ranso, "*Concrete Repairs and Maintenance Illustrated"* RS Means Company.

Course Outcomes: After completion of this course, students will be able to….
1. Describe the distress & damage of structures.
2. Explain about the partial Destruction and Non Destruction Test .
3. Predict the Causes and prevention of corrosion of steel
4. Illustrate different techniques of repairs of Structures.
5. Develop the Monitoring of Structures by Sensors.

DEPARTMENT OF CIVIL ENGINEERING
(J2260140)   ADVANCED CONCRETE TECHNOLOGY (PE-I)

B.Tech. III Year II Sem.

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are to

1: Use different types of cement as per their properties for different field applications.
2: Learn the usage of different chemical admixture its application.
3: Learn about RMC and Curing process
4: Learn the properties creep and shrinkage.
5: Learn about Special Concrete properties and their applications.

UNIT-I
Cement: Cement, Types of Cement, Special Cements like, Rapid Hardening Cement, Sulpahte resisting Cement, Portland Slag Cement, Portland and Pozzolona cement, Air-Entraining Cement, Coloured Cement, Expansive Cement, High alumina cement,very high strength cement and their properties.

UNIT-II
Admixtures and Construction Chemicals: Admixture, Construction Chemicals, Plasticizers,Super Plasticizers, New generation plasticizers, Retarders, Accelrators, Air-entraining plasticizer, Mineral admixture, Natural pozzolona ,Artificial pozzolona, Flyash, High volume flyash concrete, Silica fume,Rice husk ash, Surkhi, Metakaolin, GGBS, Alcofine, Waterproofing Admixture, Gas forming agentsm alkali-aggregate expansion inhibitors, workability agents, Grouting agents, corrosion inhibiting agents, surface hardners.

UNIT-III
Ready Mix Concrete: RMC, Chemical admixture, sampling and testing of RMC, Information to be supplied by the purchaser, density of concrete and temperature.

Curing: Types and significance of curing

UNIT-IV
Creep: Rheological representation of creep, macroscopic and microscopic rheological approach, hydration under sustained load, measurement of creep, factors affecting creep, effects of creep.

Shrinkage: Plastic Shrinkage, Drying Shrinkage, Factors affecting Shrinkage, Moisture movement, Autogeneous shrinkage, Carbonation shrinkage, Thermal shrinkage.

UNIT-V

Special Concrete and Concreting Methods: Light Weight Concrete, Aerated Concrete, No-fines concrete, High density Concrete, Fiber reinforced concrete, slurry infiltrated concrete, Compact reinforced composites, polymer concrete, Cold weathering concreting, Hot weather concreting, Gunite or Shortcrete, ferrocement, Bacterial concrete, Geopolymer concrete, Pervious concrete and self compacting concrete.

Text books:
1. A.M.Neville "*Properties of Concrete*" Low priced Edition – 4th edition
2. M.S.Shetty *"Properties of Concrete"*S.Chand & Co. 2004
3. Relevant IS codes.

References:
1. M.L. Gambhir,"*Concrete Technology*" – Tata Mc. Graw Hill Publishers, New Delhi
2. A.R. Santha Kumar, "*Concrete Technology*" Oxford university Press, New Delhi
3. P.K.Mehta and J.M.Monteiro, *"Concrete: Micro structure, Properties and Materials"*
   McGrawHill Publishers

*Course Outcomes***:**After Completion of this course Students able to

1: Determine the application of different types of cement
2: Develop the advanced knowledge on admixture and chemical usage in construction.
3: Develop an advanced knowledge in Ready mix concrete and modern curing processes
4: To understand the rheology of creep and shrinkage
5: Understand the engineering properties of special concretes such as high-performance concrete, self-compacting concrete, fibre reinforced concrete, etc.

DEPARTMENT OF CIVIL ENGINEERING
(J2260129)   ENVIRONMENTAL ENGINEERING LABORATORY

B.Tech. III Year II Sem.

L	T	P	C
0	0	2	1

Course Objectives: The objectives of this course are to

1. **Perform** the experiments to determine water and waste water quality.
2. **Understand** the water & waste water sampling, their quality standards.
3. **Estimate** quality of water, waste water, Industrial water.

Practical Work: List of Experiments

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

Text / Reference Books:

1. B. Kotaiah and Dr. N. Kumara Swamy, "*Environmental Engineering Laboratory Manual*", Charotar Publishing House Pvt. Ltd.
2. Introduction to Environmental Engineering and Science by Gilbert Masters, Prentice Hall , New Jersey.
3. Introduction to Environmental Engineering by P.AarneVesilind, SusanM.Morgan, Thompson
/Brooks/Cole; Second Edition 2008.
4. Peavy,H.s, Rowe,D.R, Tchobanoglous,G. Environmental Engineering ,Mc-Graw-Hill International Editions, New York 1985.
5. MetCalfand Eddy. Wastewater Engineering, Treatment, Disposal and Reuse, Tata McGraw- Hill, New Delhi.
6. Manual on Water Supply and Treatment. Ministry of Urban Development, NewDelhi.
7. PlumbingEngineering.Theory,DesignandPractice,S.M.Patil,1999

8. IntegratedSolidWasteManagement,Tchobanoglous,Theissen&Vigil.McGra
   wHill Publication
9. Manual on Sewerage and Sewage Treatment Systems, PartA, Band
   C.Central Public Health and Environmental Engineering Organization,
   Ministry of Urban Development.

Course Outcomes: After Completion of this course Students able to

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

DEPARTMENT OF CIVIL ENGINEERING
(J2260130) STRUCTURAL ENGINEERING LABORATORY

B.Tech. III Year II Sem.

L	T	P	C
0	0	2	1

Course Objectives: The objectives of this course are to
> 1: Detailing of Beams, Slab, Columns' and Footings
> 2: Detailing of RCC Water Tank
> 3: Detailing of steel braced column and grillage foundation.
> .

List of Exercises:
> Preparation of working drawings using AUTO CAD for the following structural elements as per SP-34, the elements are to be designed prior to preparation of drawings.

1   Detailing of R.C.C beams
>   a) Simply Supported Beam.
>   b) Continuous Beam.
>   c) Cantilever Beam.
>   d) T-Beam.
>   e) L-Beam.

2   Detailing of R.C.C Slabs
>   a) One Way and Two Way Slabs.
>   b) Simply Supported Slab.
>   c) Continuous Slab.

3   Detailing of Tied Columns and Spirally Reinforced Columns.

4   Detailing of Footings for R.C.C Columns.
>   a) Combined Footings.
>   b) Isolated Footings.
>   c) Rectangular and Trapezoidal Footings.

5   Detailing of Beam Column steel joints.

6   Detailing of RCC Water tank/Retaining wall.

7   Detailing of steel braced column.

8   Detailing of grillage foundation.

Laboratory Manual:
1. "*Structural Engineering Detailing Laboratory Manual*", prepared by the faculty of Civil Engineering.

References:
1. "*Hand book on Concrete Reinforcement and Detailing-SP 34-1987*", Bureau of Indian Standards-New Delhi.
2. B.C Punmia, A.K.Jain. "*R.C.C Designs*", Laxmi publishers, New Delhi, 2013.
3. Arya and Ajmani , "*Design of steel structures*" Nem Chand and Bros, Roorkee, U.P.

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

1: Illustrate the working drawings for Beams, Slabs, Columns, and Footings

2: Summarize working drawings RCC Water Tank

3: Generate the working drawings for steel braced column and grillage foundation

B.Tech CIVIL ENGG.,

IV -Year

I –Semester

DEPARTMENT OF CIVIL ENGINEERING
(J2270132)   FOUNDATION ENGINEERING

B.Tech. IV Year I Sem.

L	T	P	C
2	0	0	2

Pre-Requisite–Geotechnical Engineering Course

Course Objectives: The objectives of this course are to

1. **Plan** and execute the Soil exploration program for civil Engineering Projects.
2. **Analyse** the stability of slopes.
3. **Determine** the lateral earth pressures and design retaining walls. To determine the Bearing capacity of Soils.
4. **Design** 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 – Pile under lateral loading - load carrying capacity of pile groups in sands and clays – Settlement of pile groups – negative skin friction.

Text Books:
1. Basic and Applied Soil Mechanics by Gopal Ranjan & A. S. R. Rao, New age International Publishers, 2016.
2. Soil Mechanics and Foundation Engineering by V. N. S. Murthy, CBS Publishers and Distributors, 2007.
3. Bowles, J.E., (2001) Foundation Analysis and Design – 4th Edition, McGraw-Hill Publishing
   Company, Newyork.
4. Principals Of Foundation Engineering By Braja, M. Das, Cengage Learning Publishers, 8th Edition, 2016

Reference Books:
1. Analysis And Design Of Substructures – Swami Saran, Oxford And IBH Publishing Company Pvt Ltd (1998).
2. Geotechnical Engineering By S. K. Gulhati & Manoj Datta – Tata Mcgraw Hill Publishing Company New Delhi. 2005.
3. Poulos, H. G. & Davis, E. H. - Pile Foundation Analysis And Design John Wiley & Sons Inc (1980)
4. Donald P Coduto – Foundation Design Principles And Practices, 2nd Edition, Pearson, Indian Edition, 2012.

Course Outcomes: On completion of the course, the students will be able to:
1. Understand the principles and methods of Geotechnical
2. Exploration assess the stability of slopes
3. Calculate lateral earth pressures and check the stability of retaining walls
4. Analyse and design the shallow and deep foundations

DEPARTMENT OF CIVIL ENGINEERING
(J2270133)   CONSTRUCTION PROJECT MANAGEMENT

B.Tech. IV Year I Sem.

L	T	P	C
2	0	0	2

Course Objective: The Objective of this course is to lay on important foundation to student in managing projects with a special focus on every phase such as project planning, execution, monitoring and evaluation.

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 project management, participative management, team building approach. Conflict Management in Projects, Stress Management.

Suggested Reading:

1. Join M. Nicholas and Herman Steyn, Project Management for Engineering. Business and Technology, 5e, Routledge, 2017
2. Prasanna Chandra, Projects. Planning, Analysis. Selection. Financing Implementation and review, 6e, TATA Mc Gaw Hill 2008.
3. K. Nagrajan, Project Management, New Age International publishers, 7e 2015.
4. Jack Gido, Jim Clements Rose Baker. Successful Project Management. Cengage Learning, 7e 2015.
5. R Pancerselvam. P. Senthil Kumar, Project Management. PHI, 2009.

Course Outcome: Students will be able to understand

1. Importance of Project Management.

2. Project Planning, Execution and implementation.

3. Significance of teams in projects.

4. Project evaluation techniques.

DEPARTMENT OF CIVIL ENGINEERING
(J2270141)   GREEN BUILDING TECHNOLOGIES (PE-II)

B.Tech. IV Year I Sem.

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are to
1. Learn about the environmental Implications of building construction materials.
2. Learn about suitable Industrial waste materials including Biomass materials that can be used as construction material for various Infra Projects.
3. Understand Thermal characteristics and heat flow characteristics of building materials.
4. Study about the non-conventional energy resources like solar energy and different case studies.
5. 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: 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: 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.

Text Books:
1. K.S. Jagadish, B.U. Venkatarama Reddy and K.S. Nanjundarao. Alterative Building Materials and Technologies. New Age International, 2007.
2. Michael Bauer, Peter Mosle and Michael Schwarz "Green Building-Guide book for Sustainable Architecture "Springer, 2010.

Reference Books:
1. Osman Attmann Green Architecture Advanced Technologies and Materials. McGraw Hill,2010.
2. Michael F.Ash by Materials and the Environment,Elsevier,2009.
3. Jerry Yudels on Green building Through Integrated Design McGrawHill,2009.
4. Mili Majumdar (Ed) Energy Efficient Building in India.Teriand Mnes,2001/2002
5. Low Energy Cooling for Sustainable Buildings John Wiley and Sons Ltd.2009.
6. Green My Home':10 Steps to Lowering Energy Costs and Reducing Your Carbon Foot print by Dennis.
7. C.Brewer,ISBN:97814227798411,Publisher:KaplanPublishing.PublicationsDate
8. B.GivoniMan, Climate and ArchitectureElsevier,1969.
9. T. A Markus and E. N. Morris Buildings Climate and Energy. Pitman, London Arvind kishan et al (Ed)

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

1. Relate safety to Green Technology.
2. Identify Renewable Energy systems.
3. Understand the impact of continued use of non – renewable energy resources.
4. Investigate renewable energy systems.
5. Understand energy consumption, efficiency & waste management.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
Autonomous & Accredited Institution
Narsampet, Warangal 506 332

DEPARTMENT OF CIVIL ENGINEERING
(J2270142) GEOMATIC APPLICATIONS IN CIVIL ENGINEERING (PE-II)

B.Tech. IV Year I Sem.

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are to

1. Know the concepts of Remote Sensing, its interpreting Techniques and concepts of Digital images.
2. Know the concept of Geographical Information System (GIS) ,coordinate system GIS Data and its types
3. Understand the students managing the spatial Data Using GIS.
4. Understand Implementation of GIS interface for practical usage.

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.

UNIT-III

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-IV

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-V

Applications: Land use and land cover mapping determination of crop characteristics, ground water potential identification, pollutant mapping, snow mapping, rainfall runoff modelling, soil erosion, soil classification, water shed prioritization, solid waste collection, water supply.

Text Books:
1. Remote Sensing and GIS by Basudeb Bhatta,Oxford University Press,2nd Edition,2011.
2. Introduction to Geographic Information systems by Kang-tsung Chang, McGraw-Hill 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.Lilles and RalphW.Kiefer,Wiley Publishers, 7th Edition, 2015.\
2. Geographic Information systems – An Introduction by Tor Bernhardsen, Wiley India Publication, 3rd Edition, 2010.
3. Advanced Surveying: TotalStation, GIS and Remote Sensing by Satheesh Gopi, R.Sathi Kumar, N. Madhu, Pearson Education, 1st Edition, 2007.
4. Text book of Remote Sensing and Geographical Information systems by M.Anji Reddy.

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

1. **Describe** different concepts and terms used in Remote Sensing and its data.
2. **Understand** the Data conversion and Process in different coordinate systems of GIS interface.
3. **Evaluate** the accuracy of Data and implementing a GIS.
4. **Understand** the applicability **of** RS and GIS for various applications

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
Autonomous & Accredited Institution
Narsampet, Warangal 506 332

DEPARTMENT OF CIVIL ENGINEERING
(J2270143) SMART CITIES PLANNING AND MANAGEMENT (PE-II)

B.Tech. IV Year I Sem.

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are to

1. Introduce students on smart city basic concepts, global standards and Indian context of smart cities.
2. Understand smart community, smart transportation and smart buildings.
3. Understand Energy demand, Green approach to meet Energy demand and their capacities.
4. Identify Smart Transportation Technologies in cities and concepts towards smart city.

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.

Text Books:
1. Internet of Things in Smart Technologies for Sustainable Urban Development,G.R. Kanagachidambaresan, R. Maheswar,
2. V.Manikandan,K.Ramakrishnan,Springer,20202.Society5.0:APeople-centricSuper-smart Society, Hitachi-UTokyo Laboratory (HUTokyo Lab), Springer, 2020
3. The Routledge Companion to Smart Cities, Katharine S. Willis, Alessandro Aurigi, Routledge International Handbooks, 2020

Reference Books:
1. Smart Cities in Asia: Governing Development in the Era of Hyper-Connectivity Yumin Joo, Yu- Min Joo, Teck- Boon Tan, Edward Elgar Pub, 2020.
2. Urban Systems Design: Creating Sustainable Smart Cities in the Internet of Things Era, Yoshiki Yamagata, Perry P. J. Yang, Elsevier, 2020.
3. Smart Cities and Artificial Intelligence: Convergent Systems for Planning, Design, and Operations, Christopher Grant Kirwan, Zhiyong Fu, Elsevier. 2020.

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

1. Recognize smart city concepts and their international and national standards.
2. Recognize smart community, transportation and building concepts.
3. Develop and calibrate energy demand and their capacity limits.
4. Predict the various smart urban transportation systems and the transition from existing city towards a smart city.

DEPARTMENT OF CIVIL ENGINEERING
(J2270144) DESIGN OF HYDRAULIC STRUCTURES (PE-III)

B.Tech. IV Year I Sem.

L	T	P	C
3	0	0	3

Pre-Requisites: Hydraulics, Hydrology & Water Resources Engineering

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

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 Dissipater sand 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- Various Correction Factors – Design principles of weirs on permeable foundations using Creep theories-exit gradient, U/sand D/s Sheet Piles-Launching Apron.

UNIT-V

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

Text Books:

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

Reference Books:

1. Theory and Design of Hydraulic structures by Varshney, Gupta & Gupta
2. Irrigation Engineering by R.K.Sharma and T.K.Sharma, S.Chand Publishers2015.
3. Irrigation Theory and Practice by A.M.Micheal Vikas Publishing House 2015.
4. Irrigation and water resources engineering by G.L.Asawa, NewAge International Publishers.

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

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

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
Autonomous & Accredited Institution
Narsampet, Warangal 506 332

DEPARTMENT OF CIVIL ENGINEERING
(J2270145) ADVANCED WATER RESOURCES ENGINEERING (PE-III)

B.Tech. IV Year I Sem.

L	T	P	C
3	0	0	3

Course Objectives:

1. Over view of Statistical applications in Hydrology.
2. General Idea of Flood routing.
3. Summary of various flood mitigation measures.
4. Over view of climate and causes of climate change.
5. Summary of Optimization models and applications.

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.

Text Books:

1. VedulaS.and.Mujumdar P.P.'*Water resources Systems'*, McGraw-Hill Publishing Company, New Delhi. 2005
2. VenTeChow,' *Hand book of Applied Hydrology'* McGraw –Hill Book Company, NewYork.,1964
3. Subramanya,K.'*Hydrology for Engineers'*,TataMcGraw-Hill Publishing Company, NewDelhi. (1984)
4. Raja Sekharan S. and Vijaya Laxmi Pai G. A., '*Neural Networks, Fuzzy Logic, and Genetic Algorithm'*, Prentice-Hall of India, New Delhi. 2003

Reference Books:

1. Snedecor,G.W.,andW.G.Cochran,'*Statistical Methods'*,EastWestPress,NewDelhi.1994
2. Alfredo, H.S.andTangWah,'*Probability Concepts in Engineering Planning and Design: Vol-I (Basic Principles),* John Wiley & Sons, New York. 1975
3. RL Wilby, SP charles, EZoritaa, BTimbal,P WHetton,LOMearns-*Guidelines for use of climate science from Statistical Modeling models.* 2004
4. *Physical science basis of AR 5 report of IPCC - working group I contribution to Assessment Report-* https://ipcc.ch/report/ar5/wg1/2013.

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

1. Ability to apply statistical techniques for flood frequency studies and hydrological events and Applications of Regression Models for estimation of various parameters.
2. Applications of flood routing, flood forecasting techniques for real time flood studies.
3. Understanding of various mitigation measures for control of floods.
4. Understanding of climate change using GCM models.
5. Ability to formulate optimization models and soft computing applications

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
Autonomous & Accredited Institution
Narsampet, Warangal 506 332

DEPARTMENT OF CIVIL ENGINEERING
(J2270146) ENGINEERING HYDROLOGY (PE-III)

B.Tech. IV Year I Sem.

L	T	P	C
3	0	0	3

Pre-Requisites: Hydraulics & Fluid Mechanics

Course Objectives: The objectives of this course are to
1. **Explain** the concepts of Ground water Development and Management.
2. **Demonstrate** and derive the basic equations used in Ground water development and management and the corresponding equations.
3. **Know** the investigations, field studies to conduct basic ground water studies.

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.

Text Books:
1. Ground water Hydrology by David Keith Todd, John Wiley & Son, NewYork.
2. Ground water by H.M.Raghunath,Wiley Eastern Ltd.
3. Ground water System Planning & Management,R.Willes&W.W.G.Yeh,PrenticeHall.

Reference Books:
1. Ground water by Bawvwr, John Wiley & Sons.
2. Applied Hydro geology by C.W.Fetta, CBS Publishers & Distributors.
3. Ground Water Assessment, Development and Management by KR Karanth, McGraw Hill Publications.

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

1. **Identify** different fundamental equations and concepts as applied in the Ground water studies.
2. **Discuss** and derive differential equation governing ground water flow in three dimensions.
3. **Solve** ground water mathematical equations and analyze pumping tests in steady and non- steady flow cases.
4. **Distinguish** and understand the saline water intrusion problem in costal aquifers.

DEPARTMENT OF CIVIL ENGINEERING
(J2270147) EARTH RETAINING STRUCTURES (PE-IV)

B.Tech. IV Year I Sem.

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are to

1. Estimate earth pressure under different loads and conditions.
2. Determine the stability of gravity and cantilever Retaining walls.
3. Design sheet pile wall sand bracings.
4. Design Reinforced soil walls.

UNIT-I

Earth Pressure Theories: Rankine's and Coulomb's Earth pressure theories for cohesive and cohesion less 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, Back fill material and drainage.

UNIT- III

Flexible Walls: Sheet pile walls, Construction methods‑Cantilever and Anchored (Free and Fixed support methods) sheet pile wall sin 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 Stabilized Earth: -Introduction to geo-synthetics—Functions and applications-Failure mechanisms of Reinforced soil walls-bond and rupture failures-Internal and external stability by Static analyses - Soil Nailing.

Text Books:

1. Das, B.M.-Principles of Foundation Engineering 5th Edition Nelson Engineering(2004)
2. Koerner, R.M (1994)– Designing with Geosynthetics–Prentice Hall, NewJersey

Reference Books:

1. Bowles, J.E.-Foundation Analysis & Design 5th Edition McGraw-Hill Companies, Inc.(1996)
2. Rowe, R.K.-Geotechnical & Geo-environmental Engineering Hand Book-Springer(2001)
3. Hans Friedrich Winterkorn, Hsai-Yang Fang Foundation Engineering Handbook, VanNostrand Reinhold, 1975
4. Donald PCoduto–Foundation Design Principle sand Practices,2nd edition, Pearson, Indian edition, 2012.
5. Geotechnical Engineering by Manoj Dutta & Gulati S.K–Tata McGraw-Hill Publishers New Delhi.

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

1. Calculate the earth pressures under different applied loads and ground conditions.
2. Assess stability of conventional retaining walls.
3. Design flexible retaining walls under different soil and fixity conditions.
4. Design the supporting systems for excavations.
5. Design geosynthetic reinforced earth walls.

DEPARTMENT OF CIVIL ENGINEERING
(J2270148) GROUND IMPROVEMENT TECHNIQUES (PE-IV)

B.Tech. IV Year I Sem.

L	T	P	C
3	0	0	3

Pre-requisites: Geo-Technical Engineering, Foundation Engineering

Course Objectives: The objectives of this course are to
1. Identify difficult ground conditions in engineering practice.
2. Select suitable ground improvement techniques for problematic soils.
3. Assess suitable physical, chemical, mechanical and hydraulic modifications

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 Geo-synthetics, Preloading and vertical drains.

UNIT-IV
Physical and chemical modification: Stabilization 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.

Text Books:
1. Hausmann,M.R.(1990)—Engineering Principles of Ground Modifications, McGraw Hill publications
2. M.P.Moseley and K.Krisch (2006) – Ground Improvement, II Edition, Taylor and Francis
3. Koerner, R.M(1994)–Designing with Geosynthetics–Prentice Hall,New Jersey.

Reference Books:
1. Jones C.J.F.P.(1985)–Earth Reinforcement and soil structures–Butterworths,London.
2. Xianthakos, Abreimson and Bruce - Ground Control and Improvement, John Wiley& Sons,1994.
3. K. Krisch & F. Krisch (2010) - Ground Improvement by Deep Vibratory Methods, Spon Press, Taylor and Francis.
4. Donald PCoduto–Foundation Design Principles and Practices, 2nd edition, Pearson,Indian edition, 2012.

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

1. Understand the various ground improvement methods.
2. Assess different compaction methods for ground modification.
3. Design dewatering systems to reduce the settlements.
4. Comprehend stabilizations with chemical and grouting techniques.
5. Understand the principles of soil reinforcement and confinement in engineering constructions.

DEPARTMENT OF CIVIL ENGINEERING
(J2270149) STABILITY ANALYSIS OF SLOPES (PE-IV)

B.Tech. IV Year I Sem.

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are to
1. Know the basic concepts of slope stability.
2. Identify various causes of failure of slopes.
3. Analyse and design the slopes under various loading.
4. Adopt slope protection methods

UNIT-I
Earth and Rock fill Dams: General features, Selection of site; Merits and demerits of the earth and rock fill dams, Classification of earth dams, Causes of failure, Safe design criteria. Instrumentation in earth dams: Pore pressure measurements, Settlement gauges, Inclinometers, Stress measurements, Seismic measurements.

UNIT- II
Failures, Damage sand Protection of Earth Dams: Nature and importance of failure, piping through embankment and foundations, Methods of seepage control through embankments and foundations, Design Criteria for filters.

UNIT- III
Slope Stability Analysis: Types of Failure: Failure surfaces-Planar surfaces, Circular surfaces, Non circular surfaces, Limit equilibrium methods, Total stress analysis versus effective Stress analysis, Use of Bishop's pore pressure parameters, Short term and Long term stability in slopes. Taylor Charts.

UNIT-IV
Methods of Slope Stability: Method of Slices, Effect of Tension Cracks, Vertical Cuts. Bishop's Analysis, Bishop and Morgenstern Analysis, Non-circular Failure Surfaces: Janbu Analysis, Sliding Block Analysis, Introduction to Seismic stability, Stabilization of slopes: Soil reinforcement (geosynthetics /soil nailing/micro piles etc), soil treatment (cement/lime treatment), surface protection (vegetation/erosion control mats/ shotcrete).

UNIT-V

Slope Protection and Rock fill Dams: Stabilization of slopes: Soil reinforcement (geosynthetics /soil nailing/micro piles etc), soil treatment (cement/lime treatment), surface protection (vegetation/erosion control mats/shotcrete). Requirements of compacted rockfill, Shear strength of rockfill, Rockfill mixtures, Rockfill embankments, Earth-core Rockfill dams, Stability, Upstream & Downstream slopes.

Text Books:
1. Engineering for Embankment Dams, B.Singh and R.S.Varshney, A.A.Balkema,1995.
2. Embankment Dams, H.D.Sharma, Oxford and IBH Publishing Co.,1991.

Reference Books:
1. Earth and Earth Rock Dams, J.L.Sherard, JohnWiley & Sons Inc,1963.
2. Earth and Rock fill Dams, Christian Kutzner, A.A.Balkema,1997
3. Bharat Singh and Sharma, H.D.–Earth and Rock fill Dams,1999.
4. Sowers, G.F.and Salley, H.I.–Earth and Rock fill Dams, Willams, R.C.,and Willace,T.S.1965.
5. Abramson, L.W., Lee, T.S. and Sharma, S.-Slope Stability and Stabilization methods–John Wiley & sons. (2002).
6. Bromhead, E. N. (1992). The Stability of Slopes, Blackie academic and professional, London.

Course Outcomes: At the end of the course, the student will be able to:
1. Select suitable site and materials for the construction of earth / rock fill dams.
2. Analyse seepage through a given earth / rock fill dam section and propose suitable seepage control measures.
3. Analyse the stability of earthen dams.
4. Design the slopes by using different analytical methods.
5. Implement slope protection methods.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES

Autonomous & Accredited Institution
Narsampet, Warangal 506 332

DEPARTMENT OF CIVIL ENGINEERING
(J2270134) COMPUTER AIDED DESIGN LABORATORY

B.Tech. IV Year I Sem.

L	T	P	C
0	0	2	1

Pre-Requisites: Computer Aided Civil Engineering Drawing Principles – Excel-Structural Engineering

- 1 & 2

Course Objectives: The objectives of this course are to

1. **Learn** the usage of any fundamental software for design.
2. **Create** geometries using pre-processor.
3. **Analyse** and Inter pretthe results using post processor.
4. **Design** the structural elements.

List of Experiments

1. Analysis & Design determinate structures using a software
2. Analysis & Design of fixed & continuous beams using a software
3. Analysis & Design of Plane Frames
4. Analysis & Design of space frames subjected to DL & LL
5. Analysis & Design of residential building subjected to all loads(DL,LL,WL,EQL)
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: At the end of the course, the student will be able to:

- Model the geometry of real –world structure Represent the physical model of structural element / structure.
- Perform analysis.
- Interpret from the Post processing results.
- Design the structural elements and a system as per IS Codes.

B.Tech CIVIL ENGG.,

IV -Year

II –Semester

DEPARTMENT OF CIVIL ENGINEERING
(J2270150)ENVIRONMENTAL IMPACT ASSESSMENT FOR CIVIL ENGG (PE-V)

B.Tech. IV Year II Sem.

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are to
1. **Define and Classify** Environmental Impacts and the terminology.
2. **Understands** the environmental Impact assessment procedure.
3. **Explain** the EIA methodology.
4. **List and describe** environmental audits.

UNIT-I

Introduction: The Need for EIA, Indian Policies Requiring EIA, The EIA Cycle and Procedures, Screening, Scoping, Baseline Data, Impact Prediction, Assessment of Alternatives, Delineation of Mitigation Measure and EIA Report, Public Hearing, Decision Making, Monitoring the Clearance Conditions, Components of EIA, Roles in the EIA Process. Government of India Ministry of Environment and Forest Notification (2000), List of projects requiring Environmental clearance, Application form, Composition of Expert Committee, Ecological sensitive places, International agreements.

UNIT- II

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

UNIT- III

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

UNIT-IV

Environmental Legislation and Life cycle Assessment: Environmental laws and protection acts, Constitutional provisions-powers and functions of Central and State government, The Environment (Protection) Act 1986, The Water Act 1974, The Air act 1981, Wild Life act 1972,

Guide lines for control of noise, loss of biodiversity, solid and Hazardous waste management rules. Life cycle assessment: Life cycle analysis, Methodology, Management, Flow of materials-cost criteria-case studies.

UNIT-V

Case Studies: Preparation of EIA for developmental projects- Factors to be considered in making assessment decisions, Water Resources Project, Pharmaceutical industry, thermal plant, Nuclear fuel complex, Highway project, Sewage treatment plant, Municipal Solid waste processing plant, Airports.

Text Books:
1. Anjaneyulu.YandManickam.V.EnvironmentalImpactAssessmentMethodologies,B.S. Publications, Hyderabad, 2007
2. Barthwal,R.R.,EnvironmentalImpactAssessment,NewAgeInternationalPublishers,2002

Reference Books:
1. Jain, R.K., Urban, L.V., Stracy, G.S., Environmental Impact Analysis, Van No strand Reinhold Co., New York, 1991.
2. Rau, J.G. and Wooten, D.C., Environmental Impact Assessment, McGraw Hill Pub. Co., New York, 1996.

Course Outcomes: On completion of the course, the students will be able to:
1. Identify the environmental attributes to be considered for the EIA study.
2. Formulate objectives of the EIA studies.
3. Identify the methodology to prepare rapid EIA.
4. Prepare EIA reports and environmental management Plans.

DEPARTMENT OF CIVIL ENGINEERING
(J2270151)   SOLID WASTE MANAGEMENT (PE-V)

B.Tech. IV Year II Sem.

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are to
1. **Define** the terms and understand the necessity of solid waste management.
2. **Explain** the strategies for the collection of solid waste.
3. **Describe** the solid waste disposal methods.
4. **Categorize** 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; Prolepsis, 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 land fills – Land fill Problems – Lining of land fills– Types of liners–Leachate pollution and control – Monitoring land fills –Land fills reclamation.

UNIT-V
Hazardous waste Management: Sources and characteristics, Effects on

environment, Risk assessment – Disposal of hazardous wastes – Secured landfills, incineration - Monitoring – Biomedical wastedisposal,E-wastemanagement,NuclearWastes,IndustrialwasteManagement

Text Books:
1. Tchobanoglous G, Theisen Hand Vigil SA' Integrated Solid Waste Management, Engineering Principles and Management Issues' McGraw-Hill, 1993.
2. Vesilind P A, Worrell Wand 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. QianX, Koerner R MandGrayDH, 'Geotechnical Aspects of Landfill Design and Construction' Prentice Hall, 2002.

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

1. Identify the physical and chemical composition of solid wastes.
2. Analyze the functional elements for solid waste management.
3. Understand the techniques and methods used in transformation, conservation, and recovery of materials from solid wastes.
4. Identify and design waste disposal systems

DEPARTMENT OF CIVIL ENGINEERING
(J2270152) AIR & NOISE POLLUTION AND CONTROL   (PE-V)

B.Tech. IV Year II Sem.

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are to
1. Know about Air pollution
2. Learn control of Particulates in air
3. Learn control of gaseous emission in air
4. Know about air quality a management
5. Know noise pollution and its control

UNIT-I
Air Pollution: Definition, scope, significance and episodes, air pollutants- classification-Natural and Artificial-Primary and Secondary air pollutants, Point, Line and areal sources of air pollution- Stationary and mobile sources, Effect of air pollutants on man, material and vegetation: Global effects of air pollution- Green house effect, Heat Islands, Acid Rains, Ozone hole etc.

UNIT-II
Control of Particulates: Control of particulates at sources, Process changes, Equipment modifications, Design and operation of Control; Equipments: Setting Chambers, Cyclone sepraters, filters, Dry and wet scrubbers, Electro static precipitators.

UNIT-III
Control of Gaseous Emission: General methods of control of NOx and Sox emissions- In plant control measures, process changes, dry and wet methods of removal and recycling-Adsorption-Absorption-Combustion.

UNIT-IV
Air Quality Management: Monitoring of SPM, SOx; NOx and CO emission standards- Air sampling , Sampling Techniques-High Volume air sampler-Stack sampling-Analysis of air Pollutants - Air Quality standards-Air Pollution Control Act.

UNIT- V
Noise Pollution: Basics of acoustics and specification of sound; Sound power, sound intensity and sound pressure levels; plane, point and line sources, multiple sources; outdoor and indoor noise propagation; psychoacoustics and noise criteria, effects of noise on health, annoyance rating scheme; Special noise environments: Infrasound, ultrasound, Impulsive sound and sonic boom; noise standards and limit values; noise instrumentation and monitoring procedure. Noise indices.Noise control methods.

Text Books:
1. Rao.M.N and Rao H.V.N, "Air Pollution" – Tata McGrawhill Company.
2. Aggarwal S.K, "Noise Pollution and Control" APH Publication – 2005.

References:
1. Trivedy R.K. and Goel P.K., " An Introduction to Air Pollution" B.S Publications.
2. Wark and Warner, "Air Pollution"- Harper & Row. NewYork.

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

1. Define the type's air pollution.
2. Discuss about the Control of Particulates in air and its procedures.
3. Identify the Control of gaseous emission in air and its procedures.
4. Evaluate the air quality management and its application.
5. Understanding about the Noise pollution and its control methods.

DEPARTMENT OF CIVIL ENGINEERING
(J2270153) AIRPORTS, RAILWAYS AND WATERWAYS (PE-VI)

B.Tech. IV Year II Sem.

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are to

1. Deal with the characteristics of aircrafts related to airport design; runway and taxiway design, runway orientation, length, grading and drainage.
2. Introduce component of railway tracks, train resistance, crossing, signaling, high speed tracks and Metro Rail.
3. Explain the classes of harbors, features, planning 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 or 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, Sub grade 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. Signaling and Interlocking - Track Circuiting - Track Maintenance.

Dock& Harbour Engineering : Water Transportation: Ports and Harbours - Types of water transportation, water transportation in India, Ports and harbours: requirements, classification. Harbour works: breakwaters, jetties, fenders, piers, wharves, dolphins, etc., 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, Lock sand lock gates: materials, size, Dredging: classification, dredgers, uses of dredged materials.

Text Books:

1. VenkataramaiahC(2016),"TransportationEngineeringVolII–Railways,Airports,Docks, Harbors,BridgesandTunnels",UniversitiesPress(India)PrivateLimited,Hyderabad

2. J S Mundrey, Railway Track Engineering McGraw Hill Education 2017

Reference Books:

1. Subhash C. Saxena (2008) Airport Engineering, Planning and Design, CBS Publishers and Distributors, New Delhi. (Reprint 2015)

2. R.Srinivasan(2016),Harbour,DockandTunnelEngineering28th Edition, Charotar Publishing House Pvt. Ltd.

3. SaxenaSCandAroraSC(2010)ATextBookofRailwayEngineeringPaperback—2010, Dhanpat Rai Publications (Reprint2015)

4. Robert Horonjeff, Francis X. McKelvey, Willian J Sproule, Seth B. Young (2010), Planning & Design of Airports, McGraw-Hill Professional.

5. Transportation Engineering by R.Srinivasa Kumar,University Press India.

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

1. An ability to design of runways and taxiways.
2. An ability to design the infrastructure for large and small airports.

3. An ability to design Super elevation and transition curve for railway horizontal curves.
4. An ability to design various crossing sturnout and signals in Railway Projects.
5. An ability plan the harbours and ports projects including the infrastructure required for new ports and harbours.

DEPARTMENT OF CIVIL ENGINEERING
(J2270154) PAVEMENT ASSET MANAGEMENT (PE-VI)

B.Tech. IV Year II Sem.

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are to
1. Understand the role of Pavement Asset Management.
2. Understand the Flexible pavement failures and importance of maintenance.
3. Understand the Rigid pavement failures and importance of maintenance.
4. Understand pavement evaluation.
5. Understand pavement performance and deterioration modeling.

UNIT - I
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 - II

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.

Importance of maintenance: Homogeneous sections by AASHTO's cumulative difference approach, types of maintenance – Preventive maintenance, minor rehabilitation, major rehabilitation, reconstruction; planning of maintenance activities.

UNIT - III

Rigid Pavement Failures and Maintenance
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 - IV

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 - V

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.

Text Books:

Ralph Haas, Ronald Hudson, Zanieswki with Lynne Cowe Falls, "Pavement Asset Management', Wiley, 2015.
Shahin, M.Y., "Pavement Management for Airports, Roads and Parking Lots", Springer, 2nd Edition, 2005

Reference 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
3. Feng Li, Jinyan Feng, Youxin Li, Siqi Zhou, Preventive Maintenance Technology for Asphalt Pavement, Springer, 2021
4. ACRP Synthesis 22, Common Airport Maintenance Practices, Transportation Research Board, Washington DC, 2011
5. R. Keith Moble, An Introduction to Predictive Maintenance, Second Edition, Butterworth Heinemann Publications, 2002

6. NCHRP 523 – "Optimal Timing of Pavement Preventive Maintenance Treatment Applications", Transport Research Board, 2004
7. NCHRP Synthesis 501 – "Pavement Management Systems: Putting data to work – A Synthesis of Highway Practice, Transport Research Board, 2017
8. Highway Rating manuals
9. HDM 4 manuals
10. Derek Pearson, "Deterioration and Maintenance of Pavements, Ice Publishing, 2012
11. Rajib Basu Mallick and Tahar El-Kochi, Pavement Engineering: Principles and Practice, CRC Press 2013

Course Outcomes: After completion of this course, students will be able to
1. Understand the role of Pavement Asset Management.
2. Understand the Flexible and Rigid pavement failures and importance of maintenance.
3. Understand importance of pavement evaluation.
4. Understand pavement performance and deterioration modeling.

DEPARTMENT OF CIVIL ENGINEERING
(J2270155) PAVEMENT ANALYSIS & DESIGN (PE-VI)

B.Tech. IV Year II Sem.

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are to

1. Engineering analysis of stresses and strains in typical highway pavement structures due to loading from traffic and climate.
2. Characterization of paving materials; structural pavement design by IRC, and AASHTO for flexible and rigid pavement are discussed.
3. 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 Stabilization 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.

Text Books:

1. Concrete Pavements, AF Stock, Elsevier, Applied Science Publishers.
2. Pavement Analysis & Design, Yang H. Huang, Prentice Hall Inc.

Reference Books:

1. Design of Functional Pavements, Nai C. Yang, McGraw Hill Publications
2. Principles of Pavement Design, Yoder.J. &Witzorac Mathew, W. John Wiley & Sons Inc
3. Pavement and Surfacings for Highway & Airports, Micheal Sargious, Applied Science Publishers Limited.
4. IRC Codes 37,58,62,81 for Flexible and Rigid Pavements design, low volume roads and over lays.

Course Outcomes: After completion of this course, students will be able to
1. Understand Factors Affecting Pavement Design.
2. Understand Stresses In Pavements and Material Characteristics.
3. Design Flexible and Rigid Pavements.
4. Design of Pavement for Low Volume Roads

B.Tech CIVIL ENGG.,

OPEN ELECTIVES

DEPARTMENT OF CIVIL ENGINEERING

(Applicable for the batches admitted from the Academic Year 2022-23)

Open Electives:

Sl.No	Course Code	Course Name	Periods / Week			Credits
			L	T	P	C
1	J22-01—56	Disaster Preparedness & Planning Management	3	0	0	3
2	J22-01—57	Building Management Systems	3	0	0	3
3	J22-01—58	Environmental Impact Assessment	3	0	0	3
4	J22-01--59	Remote Sensing & Geographical Information Systems	3	0	0	3
5	J22-01--60	Sustainable Infrastructure Development	3	0	0	3
6	J22-01—61	Solid Waste Management	3	0	0	3
7	J22-01—62	Energy Efficient Buildings	3	0	0	3
8	J22-01—63	Multi Criterion Decision Making	3	0	0	3
9	J22-01—64	Environmental Pollution	3	0	0	3

DEPARTMENT OF CIVIL ENGINEERING
(J22-01—56) DISASTER PREPAREDNESS & PLANNING MANAGEMENT
(Open Elective)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are to
1. Understand basic concepts in Disaster Management.
2. Understand Definitions and Terminologies used in Disaster Management.
3. Understand Types and Categories of Disasters.
4. Understand the Challenges posed by Disasters.
5. Understand Impacts of Disasters Key Skills.

UNIT - I

Introduction - Concepts and definitions: disaster, hazard, vulnerability, resilience, risks severity, frequency and details, capacity, impact, prevention, mitigation, disaster phenomena, events-global National & Regional.

UNIT - II

Disasters- Disasters classification; natural disasters (floods, draught, cyclones, volcanoes, earthquakes, tsunami, landslides, coastal erosion, soil erosion, forest fires etc.); manmade disasters (industrial pollution, artificial flooding in urban areas, nuclear radiation, chemical spills, transportation accidents, terrorist strikes, etc.); hazard and vulnerability profile of India, Covid 2019 in India , mountain and coastal areas, ecological fragility, coping with disaster- strategies , safety norms & survival kits.

UNIT - III

Disaster Impacts- Disaster impacts (environmental, physical, social, ecological, economic, political, etc.); health, psycho-social issues; demographic aspects (gender, age, special needs); hazard locations; global and national disaster trends; climate change and urban disasters, capacity building – concepts, assessment –structural & nonstructural measures, legislative support.
.

UNIT - IV

Disaster Risk Reduction (DRR) - Disaster management cycle – its phases; prevention, mitigation, preparedness, relief and recovery; structural and non-structural measures; risk analysis, vulnerability and capacity assessment; early warning systems, Post

disaster environmental response (water, sanitation, food safety, waste management, disease control, security, communications); Roles and

responsibilities of government, community, local institutions, NGOs and other stakeholders; Policies and legislation for disaster risk reduction, DRR programmes in India and the activities of National Disaster Management Authority.

UNIT - V

Disasters, Environment and Development- Factors affecting vulnerability such as impact of developmental projects and environmental modifications (including of dams, landuse changes, urbanization etc.), sustainable and environmental friendly recovery; reconstruction and development methods.

Text Books:
1. Pradeep Sahni, 2004, Disaster Risk Reduction in South Asia, Prentice Hall.
   2. Singh B.K., 2008, Handbook of Disaster Management: Techniques & Guidelines, Rajat Publication.
   3. Ghosh G.K., 2006, Disaster Management, APH Publishing Corporation.
   4. Manual on Natural Disaster Management plans.
   5. Disaster Management in India, Rajendra Kumar Pandey, SAGE Publications, TEXTS.

Reference Books:
   1. http://ndma.gov.in/ (Home page of National Disaster Management Authority).
   2. http://www.ndmindia.nic.in/ (National Disaster management in India, Ministry of Home Affairs).
   3. Disaster Medical Systems Guidelines. Emergency Medical Services Authority, State of California, EMSA no.214, June 2003.
   4. Inter-Agency Standing Committee (IASC) (Feb. 2007). IASC Guidelines on Mental Health and Psychosocial Support in Emergency Settings. Geneva: IASC.

Course Outcomes: On completion of the course, the students will be able to:
1. The Application of Disaster Concepts to Management.
2. Analyzing Relationship between Development and

   Disasters.
3. Ability to Understand Categories of Disasters.
4. Realization of the Responsibilities to Society.

DEPARTMENT OF CIVIL ENGINEERING
(J22-01—57) BUILDING MANAGEMENT SYSTEMS
(Open Elective)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are to
1. Understand the concepts and applications of Building management systems.
2. Understand the fundamentals of fire alarm, access control and security systems.
3. Understand the concepts and methods of energy management in buildings.

UNIT - I

Introduction: Concept and application of Building Management System (BMS) and Automation, requirements and design considerations and its effect on functional efficiency of building automation system, architecture and components of BMS.

UNIT - II

Fire Alarm System Fundamentals: What is Fire? Fire modes, History, Components, and Principles of Operation. FAS Components: Different fire sensors, smoke detectors and their types, Fire control panels, design considerations for the FA system. Field Components, Panel Components.

UNIT - III

Access Control System: Access Components, Access control system Design. CCTV: Camera: Operation & types, Camera Selection Criteria, Camera Applications, DVR Based system, DVM, Network design, Storage design. Components of CCTV system like cameras, types of lenses, typical types of cables, controlling system. CCTV Applications: CCTV Applications.

UNIT - IV

Security Systems Fundamentals: Introduction to Security Systems, Concepts. Perimeter Intrusion: Concept, Components, Technology, Advanced Applications. Security Design: Security system design for verticals.

Concept of automation in access control system for safety, Physical security system with components, RFID enabled access control with components, Computer system access control – DAC, MAC, RBAC.

UNIT - V

Energy Management Building Management System : ASHRAE Symbols Energy Management: Energy Savings concept & methods, Lighting control, Building Efficiency improvement, IBMS (HVAC, Fire & Security) project cycle, Project steps BMS. Verticals: Advantages & Applications of BMS.

Text Books:

1. Intelligent Building Systems by Albert Ting-Pat So, WaiLok Chan, Kluwer Academic publisher
2. HVAC Controls and Systems by Levenhagen, John I. Spethmann, Donald H., McGraw-Hill Pub.

Reference Books:

1. Smart Buildings by Jim Sinopoli, Butterworth-Heinemann imprint of Elsevier,
2. Uder standing Building Automation Systems by Reinhold A. Carlson, Robert A. Diian domenico, pub. By R.S. Means Company.
3. Design of Special Hazards and Fire Alarm Systems by Robert Gagnon, Thomson Delmar Learning;
4. Process Control- Instrument Engineers Handbook by Bela G. Liptak, Chilton book co
5. HVAC Control in the New Millennium by Hordeski, Michael F, Fairmont press.

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

1. Analyze current philosophy, technology, terminology, and practices used in building
2. Automation Evaluate different fire standards, FAS Components.
3. Select hardware and software for HVAC system.
4. Evaluate energy management system.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
Autonomous & Accredited Institution
Narsampet, Warangal 506 332

DEPARTMENT OF CIVIL ENGINEERING
(J22-01—58) ENVIRONMENTAL IMPACT ASSESSMENT
(Open Elective)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of this course are to
1. Define and Classify Environmental Impacts and the terminology.
2. Understands the environmental Impact assessment procedure.
3. Explain the EIA methodology.
4. List and describe environmental audits.

UNIT- I
Introduction: The Need for EIA, Indian Policies Requiring EIA, The EIA Cycle and Procedures, Screening, Scoping, Baseline Data, Impact Prediction, Assessment of Alternatives, Delineation of Mitigation Measure and EIA Report, Public Hearing, Decision Making, Monitoring the Clearance Conditions, Components of EIA, Roles in the EIA Process. Government of India Ministry of Environment and Forest Notification (2000), List of projects requiring Environmental clearance, Application form, Composition of Expert Committee, Ecological sensitive places, International agreements.

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

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

UNIT- IV

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

Life cycle assessment: Life cycle analysis, Methodology, Management, Flow of materials-cost criteria-case studies.

UNIT- V

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

Text Books:

1. Anjaneyulu. Y and Manickam. V., Environmental Impact Assessment Methodologies, B. S. Publications, Hyderabad, 2007

   2. Barthwal, R. R., Environmental Impact Assessment, New Age International Publishers 2002

Reference Books:

1. Jain, R.K., Urban, L.V., Stracy, G.S., Environmental Impact Analysis, Van Nostrand Reinhold Co., New York, 1991.

2. Rau, J.G. and Wooten, D.C., Environmental Impact Assessment, McGraw Hill Pub. Co., New York, 1996.

Course Outcomes: On completion of the course, the students will be able to:
1. Identify the environmental attributes to be considered for the EIA study.
2. Formulate objectives of the EIA studies.
3. Identify the methodology to prepare rapid EIA.
4. Prepare EIA reports and environmental management plans.

DEPARTMENT OF CIVIL ENGINEERING
(J22-01—59) REMOTE SENSING & GEOGRAPHICAL INFORMATION SYSTEMS
(Open Elective)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to
1. Know the concepts of Remote Sensing, its interpreting Techniques and concepts of Digital images.
2. know the concept of Geographical Information System (GIS), coordinate system GIS Data and its types.
3. Understand the students managing the spatial Data Using GIS.
4. Understand Implementation of GIS interface for practical usage.

.

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.

Text Books:
1. Remote Sensing and GIS by Basudeb Bhatta, Oxford University Press, 2nd Edition, 2011.
2. Introduction to Geographic Information systems by Kang-tsung Chang, McGraw-Hill 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, 2010.
3. Advanced Surveying: Total Station, GIS and Remote Sensing by Satheesh Gopi, R. Sathi Kumar, N. Madhu, Pearson Education, 1st Edition, 2007.
4. Textbook of Remote Sensing and Geographical Information systems by M.Anji Reddy

Course Outcomes: After the completion of the course student should be able to
1. Describe different concepts and terms used in Remote Sensing and its data.
2. Understand the Data conversion and Process in different coordinate systems of GIS interface.
3. Evaluate the accuracy of Data and implementing a GIS.
4. Understand the applicability of RS and GIS for various applications

DEPARTMENT OF CIVIL ENGINEERING
(J22-01—60) SUSTAINABLE INFRASTRUCTURE DEVELOPMENT
(Open Elective)

L	T	P	C
3	0	0	3

Course Objectives:

Presenting elements and components of sustainable infrastructure creation and management. Introducing practices of water management, greenhouse gas reduction, and green city planning.

UNIT - I

Process of Sustainable Engineering Design: Key principle of sustainability; Integration of architecture and engineering; Design drivers for sustainable infrastructure system; implementation.

UNIT - II

Sustainable infrastructure framework: Green building rating system; Sustainable Infrastructure
frameworks: Pillars of sustainability, scale-density framework, transect, built form-ecology framework.

UNIT - III

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 - IV

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 - V

Sustainable site planning: Built systems, and Material flows: Sustainable site planning; Green streets and transportation network; working with the land, material and waste flows.

Text Books:
1. S. BrySarté (2010) Sustainable Infrastructure. John Wiles & Sons, Inc. ISBN 978-0-470-912
2. Sustainable Infrastructure: Sustainable Buildings – Elisabeth Green, Tristram Hope & Alan Yates.
3. Sustainable Development spiritual dimension – Krishnan Saigal

Reference Books:
1. Dredging for sustainable infrastructure – aarninkhof, Stefan laboyrie polite/koningsveld, mark van – cedaiadc
2. Sustainable infrastructure: Breakthrough in Research & Practice.

Course Outcomes:
1. The students will acquire fundamentals and principles of sustainable engineering design.
2. Knowledge of existing frameworks to achieve long-term sustainability.
3. Methods and techniques for waste water management and greenhouse gas emission reduction.
4. Knowledge on the civil engineering aspects overall green city planning.

DEPARTMENT OF CIVIL ENGINEERING
(J22-01—61) SOLID WASTE MANAGEMENT
(Open Elective)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to
1. Define the terms and understand the necessity of solid waste management.
2. Explain the strategies for the collection of solid waste.
3. Describe the solid waste disposal methods. .
4. Categorize 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

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

Course Outcomes: At the end of the course the student will able to:
1. Identify the physical and chemical composition of solid wastes.
2. Analyze the functional elements for solid waste management.
3. Understand the techniques and methods used in transformation, conservation, and recovery of materials from solid wastes.
4. Identify and design waste disposal systems.

DEPARTMENT OF CIVIL ENGINEERING
(J22-01—62) ENERGY EFFICIENT BUILDINGS
(Open Elective)

L	T	P	C
3	0	0	3

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. Studying the Nation Building Code (NBC 2005) code with respect to the Chapter 11 on Sustainability.

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)

Text Books:
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.

Reference Books:
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.

4. Ganesan T P, "Energy Conservation in Buildings", ISTE Professional Center, Chennai, 1999.

5. John Littler and Randall Thomas, "Design with Energy: The Conservation and Use of Energy in Buildings", Cambridge University Press, 1984.

6. Nation Building Code (NBC 2005)

7. ECBC code book.

Course Outcomes: The students completing the course will have ability to describe the concepts of sustainable design and green building techniques including energy efficiency and indoor environmental quality management.

DEPARTMENT OF CIVIL ENGINEERING
(J22-01—63) MULTI CRITERION DECISION MAKING
(Open Elective)

L	T	P	C
3	0	0	3

Course Objectives: To introduce Normalization approaches, cluster analysis. Understand the role of optimization and analyze data using various techniques.

UNIT - I

Introduction to the course and role of optimization, data mining, MCDM methods in sustainable and effective decision making, Linear Programming Nonlinear Programming and other methods, Introduction to Fuzzy Logic, Membership development, Various types of membership functions.

UNIT - II

Normalization approaches: Rating method, Entropy method, Analytic Hierarchy Process, Fuzzy Analytic Hierarchy Process; MATLAB perspective; Weighting methods: Constraint method, Case study, MATLAB perspective.

UNIT - III

K-Means Cluster Analysis, Fuzzy Cluster Analysis, Artificial Neural Networks, Kohonen Neural Networks, Cluster Validation Techniques, Case Study, SPSS perspective, MATLAB perspective, Introduction to Discrete MCDM methods, Compromise Programming, Co-Operative Game Theory, TOPSIS, PROMETHEE, Weighted average, Multi Attribute Utility Theory, Analytic Hierarchy Process, Case Studies, MATLAB perspective.

UNIT - IV

Role of uncertainty in decision making, Normalization techniques, Fuzzy TOPSIS, MATLAB perspective, Spearman rank correlation coefficient, Kendall rank correlation coefficient, Group decision making algorithms, SPSS perspective, MATLAB perspective, Data Envelopment Analysis (DEA): Methodology, Drawbacks and remedial measures, further topics in DEA.

UNIT - V

Taguchi methodology: Description, ranking process, Ant colony optimization, Particle swarm optimization, Expert systems, Web-based decision making, Geographic Information System, MATLAB perspective, Case Studies.

Text Book:

1. K. Srinivasa Raju, D. Nagesh Kumar, Multicriterion Analysis in Engineering and Management, PHI Learning Private Limited, New Delhi, 2014.

Reference Books:

1. S. N. Sivanandam and S. N. Deepa, Principles of Soft Computing, Wiley, 2013.
2. Ross TJ, Fuzzy Logic with Engineering Applications, John Wiley and Sons, 2013.

Course Outcomes: The students completing the course will have ability to:

1. Understand role of Optimization.
2. Understand Normalization approaches.
3. Analyze data using various techniques.
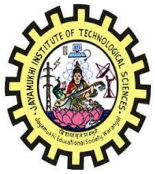
JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
Autonomous & Accredited Institution
Narsampet, Warangal 506 332

DEPARTMENT OF CIVIL ENGINEERING
(J22-01—64) ENVIRONMENTAL POLLUTION
(Open Elective)

L	T	P	C
3	0	0	3

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:
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.

Text Books:

1. Peavy, H. S., Rowe, D. R, Tchobanoglous, "Environmental Engineering", Mc-Graw Hill International Editions, New York 1985.
2. J. G. Henry and G.W. Heinke, "Environmental Science and Engineering", Pearson Education.

Reference Books:

1. G. L. Karia and R.A. Christian, "Waste water treatment- concepts and design approach", Prentice Hall of India
2. M. N. Rao and H. V. N. Rao, "Air pollution", Tata McGraw Hill Company.
3. Ruth F. "Weiner and Robin Matthews Environmental Engineering", 4th Edition Elsevier, 2003.
4. K. V. S. G. Murali Krishna, "Air Pollution and Control" by, Kousal & Co. Publications, New Delhi.

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

1. Understand the fundamentals of solid waste management, practices adopted in his town/village and its importance in keeping the health of the city.

2. Identify the air pollutant control devices and have knowledge on the NAAQ standards and air emission standards.

3. Differentiate the treatment techniques used for sewage and industrial wastewater treatment.

4. Inventing the methods of environmental sanitation and the management of community facilities without spread of epidemics.

5. Appreciate the importance of sustainable development while planning a project or executing an activity.