GEETHANJALI INSTITUTE OF SCIENCE & TECHNOLOGY: NELLORE

(AUTONOMOUS)

NELLORE–524317 (A.P) INDIA

B. TECH IN CIVIL ENGINEERING

COURSE STRUCTURE AND SYLLABI UNDER

RG 22 REGULATIONS

GEETHANJALI INSTITUTE OF SCIENCE &TECHNOLOGY

(Autonomous)

Unit of USHODAYA EDUCATIONAL SOCIETY

An ISO 9001:2015 certified Institution: Recognized under Sec. 2(f)& 12(B) of UGC Act, 1956

3rd Mile, Bombay Highway, Gangavaram (V), Kovur(M), SPSR Nellore (Dt), Andhra Pradesh, India- 524137,

E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

VISION

To emerge as a learning resource- center producing accomplished civil engineers with strong ethical foundations & social values.

DEPARTMENT MISSION

DM_1: Adopting Conceptual and practical- oriented teaching- learning approaches in the civil engineering stream

DM_2: Arranging skill-based training through advanced and sustainable technologies.

DM_3: Organizing technical activities and promoting professional and interpersonal skills.

DM_4: Creating a conducive learning environment for enhancing environmental consciousness besides inculcating ethical values.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

Graduates of B. Tech in Civil Engineering Programme shall able to:

PEO 1: Gain proficiency in the fundamentals civil engineering concepts aligned with mathematical and computational skills relevant to civil engineering.

PEO 2: Build successful professional careers as practicing civil engineers as well as in allied streams leveraging their technical expertise, communication ability and leadership attributes

PEO 3: Engage actively in life-long learning process constantly updating and upgrading their technical capabilities through higher studies.

PEO 4: Develop team spirit in effective execution of Civil engineering projects

Program Specific Outcomes

The graduates will be able to

PSO 1: Provide practical and pragmatic solutions to the real time problems in the civil engineering stream.

PSO 2: Draw up sophisticated designs for construction projects using relevant Software tools keeping pace with latest Civil Engineering trends

Program Outcomes

PO1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
PO8	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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Semester 0
Induction Program: 3weeks
(Common for All Branches of Engineering)

S.No	CourseName	Category	L-T-P-C
1	Physical Activities-Sports, Yoga and Meditation, Plantation	MC	0-0-6-0
2	Career Counseling	MC	2-0-2-0
3	Orientation to all branches—career options, tools, etc.	MC	3-0-0-0
4	Orientation on admitted Branch – corresponding labs, tools and platforms	EC	2-0-3-0
5	Proficiency Units &Productivity Tools	ES	2-1-2-0
6	Assessment on basic aptitude and mathematical skills	MC	2-0-3-0
7	Remedial Training in Foundation Courses	MC	2-1-2-0
8	Human Values & Professional Ethics	MC	3-0-0-0
9	Communication Skills—focus on Listening, Speaking, Reading, Writing skills	BS	2-1-2-0
10	Concepts of Programming	ES	2-0-2-0

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B.Tech. I Year I Semester

Semester-1(Theory-5,Lab-3)							
Sl. No.	**Category**	**Course Code**	**Course Title**	**Hours per week**			**Credits**
				L	**T**	**P**	**C**
1	BSC	22A0001T	Linear Algebra and Calculus	3	0	0	3
2	BSC	22A0004T	Engineering Physics	3	0	0	3
3	HSMC	22A0013T	Communicative English	3	0	0	3
4	ESC	22A0518T	C-Programming & Data Structures	3	0	0	3
5	ESC	22A0302T	Engineering Drawing	1	0	4	3
6	HSMC (Lab)	22A0014P	Communicative English Lab	0	0	3	1.5
7	BSC(Lab)	22A0008P	Engineering Physics Lab	0	0	3	1.5
8	ESC(Lab)	22A0519P	C-Programming & Data Structures Lab	0	0	3	1.5
			Total credits				**19.5**

Category	**Credits**
Basic Science Course (BS)	7.5
Engineering Science Course (ES)	7.5
Humanities and Social Science Course (HM)	4.5
Total	19.5

Member Secretary

Head of the Department
Dept. of Civil Engineering
GEETHANJALI INSTITUTE OF SCIENCE & TECHNOLOGY
GANGAVARAM (V), Kovur (M),
S.P.S.R. Nellore Dt. A.P Pin 524137

Head of the department

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B.Tech. I Year I Semester

LINEAR ALGEBRA & CALCULUS					
Course Code	**L:T:P:S**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
22A0001T	**3: 0:0:0**	**3**	**CIE: 30 SEE:70**	**3Hours**	**BSC**

Course Objectives:

This course will illuminate the students in the concepts of calculus and linear algebra. To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their Applications.

Syllabus		**Total Hours:45**
Unit - I	**Matrices**	**9 Hrs**

Rank of a matrix by echelon form, normal form. Solving system of homogeneous and non- homogeneous equations linear equations. Applications: Finding the current in electrical circuits Eigen values and Eigenvectors and their properties, Cayley- Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, diagonalization of a matrix.

Unit - II	**Mean Value Theorems**	**9 Hrs**

Rolle's Theorem (Without Proof), Lagrange's mean value theorem (Without Proof), Cauchy's mean value theorem (Without Proof), related problems, Taylor's and Maclaurin theorems with remainders (without proof) - related problems, Taylor's and Maclaurin series (without proof) Expansions of functions by Taylors and Maclaurin's series.

Unit - III	**Multivariable Calculus**	**9 Hrs**

Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

Unit - IV	**Multiple Integrals**	**9 Hrs**

Double integrals, change of order of integration, change of variables. Evaluation of triple integrals, change of variables between Cartesian, cylindrical and spherical polar co-ordinates. Finding areas and volumes using double and triple integrals.

Unit - V	**Beta and Gamma functions**	**9 Hrs**

Beta and Gamma functions and their properties, relation between beta and gamma functions, evaluation of definite integrals using beta and gamma functions.

Course Outcomes (CO):

On completion of this course, student will be able to

- Solving the system of linear equations, find the eigen values and eigenvectors and use this informationto facilitate the calculation of matrix characteristics.
- Translate the given function as series of Taylor's and Maclaurin's with remainders, analyze the behavior of functions by using mean value theorems.
- Acquire the Knowledge maxima and minima functions of several variables. Utilize Jacobian of a coordinatetransformation to deal with the problems in change of variables.
- Apply multiple integration techniques in evaluating areas and volumes bounded by the region.
- Understand beta and gamma functions and its relations, conclude the use of special function in evaluating definite integrals.

Textbooks:

1. Higher Engineering Mathematics, B. S. Grewal , 44/e, Khanna Publishers, 2017.
2. Linear Algebra & Calculus by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad S. Chand publication.
3. Engineering Mathematics III by N.P. Bali, Dr. K.L. Sai Prasad, University Science Press.

Reference Books:

1. Advanced Engineering Mathematics", Erwin Kreyszig, Wiley India
2. B.V.Ramana, "Higher Engineering Mathematics", Mc Graw Hill publishers.
3. Mathematical Methods by T.K.V. Iyengar, B.Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad, S. Chand Publications.

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B.Tech. I Year I Semester

Engineering Physics
(Common to CE and ME)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0004T	3: 0:0:0	3	CIE: 30 SEE:70	3Hours	BSC

Prerequisite: Student should know about fundamental and basic principles in physics

Course Objectives:

- To make a bridge between the physics in school and engineering courses.
- To impart knowledge in basic concepts of optical phenomenon like interference, diffraction and Polarization.
- To understand the mechanisms of emission of light, the use of lasers as light sources for low and high energy applications, study of propagation of light wave through optical fibers along with engineering applications.
- To enlighten the periodic arrangement of atoms in crystals, Bragg's law and to provide fundamentals related to structural analysis through powder diffraction method.
- To familiarize the basic concepts of acoustics and ultrasonics with their Engineering applications.
- To explain the significant concept of magnetic materials leading to the emerging micro device applications.
- To familiarize the applications of nano and smart materials relevant to engineering branches.

Syllabus		Total Hours:45
Unit - I	**Wave optics**	**10 Hrs**

Interference- Principle of superposition – Interference of light – Types of Interference – Path difference – Phase difference – Conditions for sustained interference- Interference in thin films (Reflection Geometry) – Colors in thin films – Newton's Rings – Determination of wavelength and refractive index of liquid.

Diffraction- Introduction – Fresnel and Fraunhofer diffraction – Fraunhofer diffraction due to single slit, double slit and N-slits (qualitative) – Grating spectrum**.**

Polarization- Introduction – Types of polarization – Polarization by reflection, refraction and double refraction - Nicol's Prism - Half wave and Quarter wave plates with applications.

Unit - II	Lasers and Fiber optics	8 Hrs

Lasers- Introduction – Characteristics of laser – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Lasing action – Pumping mechanisms – Ruby laser – He-Ne laser – Applications of lasers.

Fiber optics- Introduction – Principle of optical fiber – Acceptance Angle – Numerical Aperture – Classification of optical fibers based on refractive index profile and modes – Propagation of electromagnetic wave through optical fibers – Propagation Losses (qualitative) – Applications.

Unit - III	Crystallography and X-ray diffraction	8 Hrs

Crystallography- Space lattice, Basis, unit cell and lattice parameters – Bravais Lattice – Crystal systems – Packing fraction – Coordination number – Packing fraction of SC, BCC & FCC – Miller indices – Separation between successive (hkl) planes.

X-Ray Diffraction- Bragg's law – Bragg's X-ray diffractometer – Crystal structure determination by Powder method.

Unit - IV	Acoustics and Ultrasonic's	10 Hrs

Acoustics- Introduction – Requirements of acoustically good hall – Reverberation – Reverberation time – Sabine's formula (Derivation using growth and decay method) – Absorption coefficient and itsdetermination – Factors affecting acoustics of buildings and their remedies.

Ultrasonics- Introduction – Properties – Production by magnetostriction and piezoelectric methods –

Detection – Acoustic grating – Non Destructive Testing – Pulse echo system through transmission and reflection modes – Applications.

Unit - V	Engineering Materials	12 Hrs

Magnetic Materials- Introduction- basic definitions – Origin of permanent magnetic moment – Classification of magnetic materials: Dia, para & Ferro –Hysteresis – Soft and Hard magnetic materials.

Nano materials- Introduction – Surface area and quantum confinement –Properties of Nano materials – Synthesis of nano materials: Top-down: Ball Milling – Bottom-up: Chemical Vapour Deposition – Applications of nano materials.

Smart Materials- Introduction to Smart Materials- Characteristics- Types of smart materials: Smart Memory alloys (SMA)- definition- two stable solid phases: Low temperature phase (martensite transformations) - High temperature phase (austenitic transformations)-Applications of SMA.

Course Outcomes (CO):

On completion of this course, student will be able to

- Describe the importance of Interference, Diffraction and Polarization and the engineering applications aswell (L2)
- Demonstrate the properties of lasers and fiber optics to various applications in science and technology(L2)
- Explain the important properties of crystals like the presence of long-range order and periodicity, structuredetermination using X-ray diffraction (L2)
- Explain the fundamental properties and propagation principles of ultrasonic and acoustics in divergeengineering applications (L2)
- Explain the fundamental concepts and theory related to magnetic materials (L1)
- Illustrate diverse principles and theories of Nano and smart materials and their technologicalapplications in diverse fields (L2)

Textbooks:

1. Engineering Physics – Dr. M.N. Avadhanulu & Dr. P.G. Kshirsagar, S. Chand and Company
2. Engineering physics – D.K. Battacharya and Poonam Tandon, Oxford University press.
3. Applied Physics for Engineers- K.Venkataramanan, R. Raja, M. Sundararajan(Scitech) [3,5] 2014

Reference Books:

1. Engineering Physics - Sanjay D. Jain, D. Sahasrambudhe and Girish, University Pres.
2. Engineering Physics – K. Thyagarajan, McGraw Hill Publishers.
3. Engineering Physics – D K Pandey, S. Chaturvedi, Cengage Learning 4. Engineering Physics – M.R.Srinivasan, New Age Publications.
4. T.Pradeep "A Text book of Nano Science and Nano Technology"- Tata Mc GrawHill 201
5. Melton K.N, Stockel,D.and Wayman, C.M., "Engineering aspects of ShapememoryAlloys", Butterworth – Heinemann, 1990.

E-resources:

- https://www.textbooks.com/Catalog/MG5/Applied-Physics.php
- https://edurev.in/courses/9596_Electromagnetic-Theory-Notes--Videos--MCQs--PPTs
- https://libguides.ntu.edu.sg/c.php?g=867756&p=6226561
- https://bookauthority.org/books/best-applied-physics-books
- https://www.electronicsforu.com/resources/16-free-ebooks-on-material-science/2

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B.Tech. I Year I Semester

COMMUNICATIVE ENGLISH

(Common to all Branches of Engineering)

Course Code	L:T: P: S	Credits	Exam marks	Exam Duration	Course Type
22A0013T	3: 0: 0: 0	3	CIE:30 SEE:70	3 Hours	HSMC

Course Objectives:

- Facilitate effective **listening skills** for better comprehension of academic lectures and English spoken by native speakers.
- Help improve **speaking skills** motivating the learners to participate in activities such as role plays, discussions and structured talks/oral presentations.
- Focus on appropriate **reading skills** for comprehension of various academic texts and authentic materials.
- Impart effective strategies for good **writing skills** in summarizing, writing well organized essays, drafting formal letters and designing well structured reports.
- Broaden the knowledge base of grammatical structures and vocabulary and encourage their appropriate use in speech and writing.

Syllabus		**Total Hours:48**
Unit - I	**On the Conduct of Life: William Hazlitt**	**9 Hrs**

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.

Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.

Reading: Skimming to get the main idea of a text Scanning to look for specific pieces of information.

Reading for Writing: Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph.

Grammar and Vocabulary: Parts of Speech,
Content words and function words;
Word order in sentences;
Basic sentence structures;
Types of questions - Wh- questions.

Unit - II	**The Brook: Alfred Tennyson**	**9Hrs**

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts.
Speaking: Discussion in pairs/small groups on specific topics followed by short structured talks**.**
Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.
Writing: Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters.
Grammar and Vocabulary: Use of Articles and zero Article
Prepositions
Punctuation, capital letters
Cohesive devices - linkers

Unit - III	**The Death Trap: Saki**	**11 Hrs**

Listening: Listening for global comprehension and summarizing what is listened to.
Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed
Reading: Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.
Writing: Paragraph Writing **,** Summarizing
Grammar and Vocabulary: Verbs – Tenses
Subject-Verb agreement Direct & Indirect speech

Unit - IV	**Ponnuthayi – Bama**	**10 Hrs**

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.
Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.
Reading: Read and Interpret graphic Information to reveal trends/patterns/relationships, communicate processes or display complicated data.
Writing: Letter Writing: Official Letters/Report Writing
Grammar and Vocabulary: Adjectives and Adverbs; Comparing and Contrasting
Voice - Active & Passive Voice.

Unit - V	**My Beloved Charioteer- Shasi Deshpande**	**9 Hrs**

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.
Speaking: Formal oral presentations on topics from academic contexts- without the use of PPT slides
Reading: Reading for Comprehension
Writing: Writing structured essays on specific topics using suitable claims and evidences.
Grammar and Vocabulary: Identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

Course Outcomes (CO):

On completion of this course, student will be able to

- Retrieve the knowledge of basic grammatical concepts.
- Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English.
- Apply grammatical structures to formulate sentences and correct word forms.
- Analyze discourse markers to speak clearly on a specific topic in informal discussions.
- Evaluate listening /reading texts and to write summaries based on global comprehension of these texts.
- Create and develop coherent paragraph interpreting graphical description.

Textbooks:

1) Language and Life: English Skills for Engineering Students - Orient Black Swan.

Reference Books:

1. 1. Bailey, Stephen. Academic Writing: A Handbook for International Students. Routledge, 2014.
2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
3. Raymond Murphy's English Grammar in Use Fourth Edition (2012) E-book
4. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.
5. Oxford Learners Dictionary, 12th Edition, 2011
6. Norman Lewis Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary (2014)

Web links:

- www.englishclub.com
- www.easyworldofenglish.com
- www.languageguide.org/english/
- www.bbc.co.uk/learningenglish
- www.eslpod.com/index.html

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B.Tech. I Year I Semester

C-PROGRAMMING & DATA STRUCTURES
Common to (ECE, EEE, ME, CE)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0518T	3: 0:0:0	3	CIE: 30SEE:70	3Hours	ESC

Course Objectives:

This course will enable students to:

- Illustrate the basic concepts of C programming language.
- Choose a suitable C-construct to develop C code for a given problem.
- Illustrate the fundamental concept of data structures and Arrays.
- Emphasize the importance of data structures in developing and implementing efficient algorithms.
- Illustrate a variety of data structures such as linked structures, stacks, queues, trees, and graphs.

Syllabus		Total Hours:45
Unit - I	**Introduction to C Language**	**9Hrs**

Structure of C program, C Tokens, Data types, Operators, Precedence and Associativity of operators, Expressions and its evaluation, control structures – sequence, selection and Iteration statements, unconditional control structures – break, go to, continue. Arrays: Introduction to arrays, types of arrays, applications of arrays, Programming examples.

Unit - II	**Strings, Functions and Pointers**	**9Hrs**

String: Declaring and Initializing string, Printing and reading strings, string manipulation functions, String input and output functions, array of strings, Programming examples.

Functions: Defining function, user defined functions, standard functions, passing array as argument to function, recursion.

Pointers: declaring and initializing pointers, pointers and arrays, pointer to pointer, pointer arithmetic, dynamic memory allocation, Structures and Unions.

Unit - III	**Data Structures**	**9Hrs**

Introduction to Data Structures: Definitions, Concept of Data Structures, Overview of Data Structures, Implementation of Data Structures.

Linked Lists: Definition, Single Linked List, Circular Linked List, Double Linked List, Circular Double Linked List, Applications of Linked List.

Unit - IV	**Stacks & Queues**	**9Hrs**

Stacks: Introduction, Definition, Representation of Stack, Operations on Stacks, Applications of Stacks.
Queues: Introduction, Definition, Representation of Queues, Operations on Queues, Various Queue Structures, Applications of Queues.

Unit - V	Trees, Graphs ,Searching and Sorting	9Hrs

Trees: Basic Terminologies, Definition and Concepts, Binary Tree, Representation of Binary Tree, operations on Binary Tree, Binary Search Tree, Heap Tree.

Graphs: Introduction, Graph Terminologies, Representation of graphs, Operations on Graphs, Graph, Graph Traversal Techniques: BFS and DFS.

Searching and Sorting – sequential search, binary search, exchange (bubble) sort, selection sort, Insertion sort.

Course Outcomes (CO):

On completion of this course, student will be able to

- Illustrate and explain the basic computer concepts and programming principles of C language(L2)
- Select the best selection and loop construct for solving given problem(L2)
- Develop C programs to demonstrate the applications of derived data types such as arrays, pointers, strings. (L2)
- Implement basic operations on stack and queue using array representation(L2)
- Use linked structures, trees, and Graphs in writing programs(L2)
- Demonstrate different methods for traversing Graphs and Trees (L2)

Text Books:

1. C Programming & Data Structures – Behrouz A. Fourazan, Richard F. Gilberg.
2. Programming with C – Byron Gottfried, Third edition, Scham's Outlines
3. C Programming : A Problem Solving Approach- Behrouz A. Fourazan , E.V.Prasad, Richard F. Gilberg
4. Classic Data Structures , Second Edition, Debasissamanta, PHI Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S.Sahni and Susan Anderson Freed, Universities Press.

Reference Books:

1. Let us C,YashwantKanetkar, 6th Edition , BPB.
2. C Programming and Data Structures, P.Padmanabham, Third Edition, BS Publications.
3. C Programming, E.Balagurusamy, 3rd edition, TMHPublishers.
4. Programming in C, Ashok N. Kamthane, AmitKamthane, Pearson.
5. Data Structures: A Pseudo code Approach with C, 2nd Edition, R.F.Gilberg and B. A. Forouzan, Cengage Learning.
6. "Data Structures and Algorithm Analysis in C" by Weiss."Data Structure Through C" by Yashavant P Kanetkar.

E-resources:

- https://www.geeksforgeeks.org/c-programming-language/
- http://en.cppreference.com/w/c
- https://onlinecourses.nptel.ac.in/noc19_cs42/
- https://www.linuxtopia.org/online_books/programming_books/gnu_c_programming_tutorial/index.html
- https://codeforwin.org/

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B.Tech. I Year I Semester

Engineering Drawing					
Course Code	**L:T:P/D**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
22A0302T	**1: 0:0/4**	**3**	**CIE: 30 SEE:70**	**3Hours**	**ESC**

Prerequisite: Student should know about fundamental and basic principles in physics

Course Objectives:

- Bring awareness that Engineering Drawing is the Language of Engineers.
- Familiarize how industry communicates technical information.
- Teach the practices for accuracy and clarity in presenting the technical information.
- Develop the engineering imagination essential for successful design.

Syllabus		**Total Hours:45**
Unit-I	**Introduction to Engineering Drawing**	**10Hrs**

Introduction to Engineering Drawing: Principles of Engineering Drawing and its significance- Conventions in drawing-lettering - BIS conventions.

a) Draw the Conic sections including Ellipse, Parabola, Hyperbola, and the Rectangular hyperbola using general methods,

b) Draw the Cycloid, Epicycloids, and Hypocycloid

c) Draw the Involutes of circle, square, pentagon, and hexagon.

Unit-II	**Projections of points, lines and planes**	**10Hrs**

Projections of points, lines, and planes: Projection of points in any quadrant, lines inclined to one and both planes, finding true lengths, finding true inclinations, angle made by line. Projections of regular plane surfaces using rotating plane method.

Unit-III	**Projections of Solids**	**10Hrs**

Projections of solids: Projections of regular solids inclined to one and both the principle planes using auxiliary views method.

Unit-IV	**Sections of solids**	**10Hrs**

Sections of solids: Section planes and sectional view of right regular solids- prism, cylinder, pyramid and cone. True shapes of the sections.

Unit-V	**Development of surfaces**	**10Hrs**

Development of surfaces: Development of surfaces of right regular solids-prism, cylinder, pyramid, cone and their sectional parts.

Course Outcomes (CO):

On completion of this course, student will be able to

- Draw various curves applied in engineering. (l2)
- Show projections of solids and sections graphically. (l2)
- Draw the development of surfaces of solids. (l3)

Textbooks:

1. K.L.Narayana & P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.
2. N.D.Bhatt, Engineering Drawing, 53/e, Charotar Publishers, 2016.

Reference Books:

1. Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2009
2. Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers, 2000
3. Shah and Rana, Engineering Drawing, 2/e, Pearson Education, 2009
4. K.C.John, Engineering Graphics, 2/e, PHI, 2013
5. Basant Agarwal &C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008..

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E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

B.Tech. I Year I Semester

COMMUNICATIVE ENGLISH LAB
(Common to all Branches of Engineering)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0014P	0:0:3:0	1.5	CIE:30 SEE:70	3H	HS

This course will enable students to

- Students will be exposed to a variety of self-instructional, learner friendly modes of language learning.
- Students will learn better pronunciation through sounds, stress, intonation and rhythm.
- Students will be trained to use language effectively to face interviews, group discussions, public speaking.
- Students will be initiated into greater use of the computer in resume preparation, report writing, format making etc.

Syllabus **Total Hours: 48Hrs**

List of Experiments

1. Phonetics
2. Describing objects/places/persons
3. Role Play or Conversational Practice
4. JAM
5. Etiquettes of Telephonic Communication
6. Group Discussions
7. Debates
8. Oral Presentations
9. Interviews Skills
10. Reading comprehension
11. E-mail Writing
12. Resume Writing

Course Outcomes:

On completion of this course, the students are able to:

- Listening and repeating the sounds of English Language
- Understand the different aspects of the English language proficiency with emphasis on LSRW skills
- Apply communication skills through various language learning activities
- Analyze the English speech sounds, syllable division, stress, rhythm, intonation for better Listening and Speaking Comprehension.
- Evaluate and exhibit acceptable etiquette essential in social and professional settings
- Create awareness on mother tongue influence and neutralize it in order to Improve fluency in spoken English.

Suggested Software: Walden InfoTech / Young India Films

Reference Books:

1. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
4. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.
5. A Textbook of English Phonetics for Indian Students by T. Balasubramanyam.

Online Learning Resources/Virtual Labs:

- www.esl-lab.com
- www.englishmedialab.com
- www.englishinteractive.net

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B.Tech. I Year I Semester

Engineering Physics Lab
(Common to CE and ME)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0008P	0:0:3:0	1.5	CIE:30SEE:70	3H	BSC

Course Objectives:

This course will enable students to:

- Understand the role of Optical fiber parameters in engineering applications.
- Recognize the significance of laser by studying its characteristics and its application in finding the particle size.
- Illustrates the magnetic and dielectric materials applications.

Syllabus	Total Hours:48

Note: In the following list, out of 12 experiments, any 2 experiments must be performed in a virtual mode

List of Experiments

1. Determine the thickness of the wire using wedge shape method.
2. Determination of the radius of curvature of the lens by Newton's ring method.
3. Determination of wavelength by plane diffraction grating method.
4. Determination of dispersive power of prism.
5. Determination of wavelength of LASER light using diffraction grating.
6. Determination of particle size using LASER.
7. To determine the numerical aperture of a given optical fiber and hence to find its acceptance angle.
8. Determination of dielectric constant by charging and discharging method.
9. Magnetic field along the axis of a circular coil carrying current –Stewart Gee's method.
10. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
11. Rigidity modulus of material of a wire-dynamic method (Torsional pendulum).
12. Sonometer: Verification of the three laws of stretched strings.

Course Outcomes:

On completion of this course, the students are able to:

- Determine the radius of a curvature and / or thickness of thin wire using microscope with the help of interference concept (L2).
- Evaluate the wavelength of various colors of grating and also dispersive power of prism by spectrometer using the principle of diffraction (L2).
- Evaluate wavelength of light source and particle size with He-Ne laser using the principle of diffraction Estimate the numerical aperture of a given optical fiber and hence to find its acceptance angle (L2)
- Estimate the dielectric constant of a given material (L2).
- Examine the hysteresis loss of the magnetic material by B- H curve and Estimate the magnetic field of a circular coil carrying current along the axis (L2).
- Estimate the mechanical properties of given string using Torsional pendulum and sonometer (L2).

Text Books:

1. Engineering Practical Physics B Mallick S Panigrahi, 1st, Edition, Cengage Learning Publishers
2. A Text book of Engineering Physics Practical, Dr. Ruby Das, Dr. Rajesh Kumar, C. S. Robinson,Prashant Kumar Sah, UNIVERSITY SCIENCE PRESS (An Imprint of Laxmi Publications Pvt. Ltd.).

Reference Books:

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

E-resources:

http://vlab.amrita.edu/index.php -Virtual Labs, Amrita University
https://www.scribd.com/doc/81569075/Physics-Lab-Manual
http://www.mlritm.ac.in/assets/img/Lab%20manual%20Physics.p df
https://bmsit.ac.in/public/assets/pdf/physics/studymaterial/Physics%20lab%20manual_cbcs%20%20 %20kavichintu.pdf

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B.Tech. I Year I Semester

C-PROGRAMMING & DATA STRUCTURES LAB
(Common to ECE, EEE)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0519P	**0:0:3:0**	**1.5**	**CIE:30 SEE:70**	**3Hours**	**ES**

Course Objectives: This course will enable students to:

- Work with an IDE to create, edit, compile, run and debug programs
- Use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.
- Design & develop of C programs using arrays, strings, pointers & functions.
- Exploring basic data structures such as stacks and queues.
- Introduces variety of data structures such as hash linked list, trees and graphs.
- Introduces searching and sorting algorithms.

Syllabus **Total Hours: 48**

List of Experiments

1. a) Write an algorithm to calculate and display the volume of a CUBE having its height (h=10cm), width (w=12cm) and depth (8cm).
   b) Write an algorithm to calculate area and Circumference of a circle.
   c) Write an algorithm to calculate simple interest for a given P, T, and R (SI = P*T*R/100)

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

3. a) 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.

4. a) Write a C program to find sum and average of three numbers.
   b) Write C program to evaluate each of the following equations

5. a) Write a program in C to print individual characters of string in reverse order.
   b) Write a program in C to compare two strings without using string library functions.
   c) Write a C program to determine if the given string is a palindrome or not

6. a) Write C program to find GCD of two integers by using recursive function.

   b) Write C program to find GCD of two integers using non-recursive function

7. Write C programs that implement stack (its operations) using

   i) Arrays ii) Pointers

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

9. Write a C program that uses Stack operations to perform the following:

   i) Converting infix expression into postfix expression

   ii) Evaluating the postfix expression

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

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

11. Write a C program that uses functions to perform the following operations on Doubly linked list.

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

12. Write a C program that uses functions to perform the following operations on circular linked list.

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

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

    i) Creating a Binary Tree of integers

    ii) Traversing the above binary tree in preorder, in order and post order.

14. Write C programs that use both recursive and non-recursive functions to perform the

    following searching operations for a key value in a given list of integers:

    i) Linear search ii) Binary search

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

Course Outcomes:

On completion of this course, the students are able to:

- Use conditional and iterative statements for writing the C programs(L2)
- Make use of different data-structures like arrays, strings, structures for solving problems.(L2)
- Use basic data structures such as arrays, Stacks and Queues
- Programs to demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals
- Use various searching and sorting algorithms.
- Use linked structures, trees, and Graphs in writing programs

Text Books:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)
3. Classic Data Structures , Second Edition, Debasissamanta, PHI Fundamentals of Data Structures in C,

2nd Edition, E. Horowitz, S.Sahni and Susan Anderson Freed, Universities Press

Reference Books:

1. C Programming and Data Structures, P. Padmanabham, Third Edition, BS Publications
2. C Programming, E. Balagurusamy, 3rd edition, TMHPublishers
3. Programming in C, Ashok N. Kamthane, AmitKamthane, Pearson
4. Data Structures: A Pseudo code Approach with C, 2nd Edition, R.F.Gilberg and B. A. Forouzan, Cengage Learning.
5. "Data Structures and Algorithm Analysis in C" by Weiss
6. "Data Structure Through C" by Yashavant P Kanetkar "Problem Solving in Data Structures and Algorithms Using C: The Ultimate Guide to Programming Interviews" by Hemant Jain

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B.Tech. I Year II Semester

Semester-2(Theory-5,Lab-3)							
Sl. No.	**Category**	**Course Code**	**Course Title**	**Hours per week**			**Credits**
				L	**T**	**P**	**C**
1	BSC	22A0007T	Engineering Chemistry	3	0	0	3
2	BSC	22A0002T	Differential Equations and Vector Calculus	3	0	0	3
3	ESC	22A0203T	Basic Electrical & Electronics Engineering	3	0	0	3
4	ESC	22A0101T	Strength of Materials-I	3	0	0	3
5	ESC	22A0102T	Building Materials & construction	3	0	0	3
6	ESC(Lab)	22A0304T	Engineering Workshop	0	0	3	1.5
7	BSC(Lab)	22A0012P	Engineering Chemistry Lab	0	0	3	1.5
8	ESC(Lab)	22A0103P	Strength of Materials Lab	0	0	3	1.5
			Total credits				**19.5**

Category	Credits
Basic Science Course (BSC)	7.5
Engineering Science Course (ESC)	12
Total	19.5

Member Secretary

Head of the Department
Dept. of Civil Engineering
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GANGAVARAM (V), Kovur (M),
S.P.S.R. Nellore Dt. A.P Pin 524 137

Head of the department

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B.Tech. I Year II Semester

ENGINEERING CHEMISTRY
(ME and CE)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0007T	3:0:0:0	3	CIE:30 SEE:70	3H	BSC

Prerequisite: Student should know fundamental concepts about Engineering Chemistry

Course Objectives:

This course will enable students to:

- To familiarize engineering chemistry and its applications
- To impart the concept of soft and hard waters, softening methods of hard water
- To train the students on the principles and applications of electrochemistry, polymers, and cement.

Syllabus		Total Hours: 48
Unit I	**Water and its treatment**	**10 Hrs**

Introduction - hardness of water - causes of hardness - types of hardness: temporary and permanent - expression and units of hardness - Estimation of hardness of water by EDTA method. Numerical problems, Boiler troubles- Sludges, scales and Caustic embrittlement. Internal treatment of Boiler feed water - Calgon conditioning - Phosphate conditioning - Colloidal conditioning - Softening of water: Zeolite process, ion- exchange process, Desalination of water - Reverse osmosis and Electro dialysis.

Unit –II	**Electrochemistry and Applications**	**10**

Electrodes – concepts, electrochemical cell, Nernst equation, cell potential calculations.

Primary cells – Zinc-air battery, Secondary cells – Nickel-Cadmium (Ni Cad),and lithium ion batteries- working of the batteries including cell reactions; Fuel cells: hydrogen-oxygen, methanol-oxygen fuel cells – working of the cells.

Corrosion: Introduction to corrosion, electrochemical theory of corrosion, metal oxide formation by dry corrosion-Pilling Bedworth Rule, differential aeration cell corrosion, galvanic corrosion, Factors affecting the corrosion, cathodic and anodic protection, electroplating and electro less plating (Nickel and Copper).

Unit –III	**Polymers**	**10**

Introduction to polymers, functionality of monomers, Types of polymerization- Addition, condensation and coordination polymerization with Mechanism.

Plastics - Definition and characteristics- thermoplastic and thermosetting plastics. Preparation, properties and applications of PVC and Nylons.

Rubbers- Natural rubber and its vulcanization - compounding of rubber. Elastomers-Preparation, properties and applications of Buna S, Buna N,

Conducting polymers – polyacetylene, polyaniline, – mechanism of conduction and applications.

Bio degradable polymers : poly lactic acid, Nylon-2-Nylon-6.

Unit –IV	**Fuels and Combustion**	**8**

Fuels – Types of fuels, solid fuels-classification Calorific value of fuel - HCV, LCV and numerical problems based on calorific value, determination of calorific value by bomb calorimeter. Analysis of coal, Liquid Fuels-refining of petroleum, fuels for IC engines, knocking and anti-knock agents, Octane and Cetane values, cracking of oils, synthetic petrol - Fischer-Tropsch's process; Gaseous fuels - composition and uses of natural gas, Producer gas and water gas.

Unit –V	**Advanced Engineering Materials**	**10**

Composites: Definition, classification with examples and applications.

Cement: Composition, Classification, preparation (Dry and Wet processes), Setting and Hardening of Portland cement

Refractories: Classification, characteristics of good refractories, properties- Refractoriness, refractoriness under load, porosity and chemical inertness – applications of refractories.

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

Course Outcomes:

On completion of this course, the students are able to:

- Recognize the basic properties of water and its significance in domestic and industrial purposes. (L2)
- Discuss the principles of electrochemistry in batteries. (L2)
- Discuss the knowledge of corrosion of metals and methods for its prevention towards the technological applications. (L2)
- Explain polymerization and the preparation, properties, and applications of thermoplastics & thermosetting, elastomers, & conducting polymers. (L1)
- Explain calorific values, octane number, refining of petroleum and cracking of oils and Select suitable fuels for IC engines. (L1)
- Describe the various engineering materials. (L1)

Text Books:

1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

Reference Books:

1. Skoog and West G.V.Subba Reddy, K.N.Jayaveera and C. Ramachandraiah, Engineering Chemistry, McGraw Hill, 2020.
2. Principles of Instrumental Analysis, 6/e, Thomson, 2007.
3. H.F.W. Taylor, Cement Chemistry, 2/e, Thomas Telford Publications, 1997.
4. D.J. Shaw, Introduction to Colloids and Surface Chemistry, Butterworth-Heineman,1992.

E-resources:

1. https://libguides.humboldt.edu/openedu/chem
2. https://libraryguides.unh.edu/oer/chemistry
3. https://libraries.etsu.edu/research/guides/chemistry/oer

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B.Tech. I Year II Semester

Differential Equations & Vector Calculus

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
22A0002T	3:0:0:0	3	CIE:30 SEE:70	3 Hours	BSC

Course Objectives:

To enlighten the learners in the concept of differential equations and multivariable calculus, to furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

Syllabus **Total Hours:45**

Unit - I	**Linear Differential Equations of Higher Order (Constant Coefficients)**	**9 Hrs**

Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, Wronskean, method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit problems and Mass spring system.

Unit - II	**Partial Differential Equations**	**9 Hrs**

Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order equations using Lagrange's method. Non linear equations of first order – Type I, II, III, IV.

Unit - III	**Applications of Partial Differential Equations**	**9 Hrs**

Classification of PDE, method of separation of variables for second order equations. Applications of Partial Differential Equations: One dimensional Wave equation (Without Derivation), Solutions one Dimensional Wave equation by the method of separation of variables and related Problems.

Unit - IV	**Vector Differentiation**	**9 Hrs**

Scalar and vector point functions, vector operator del, del applies to scalar point functions- Gradient, del applied to vector point functions-Divergence and Curl, vector identities.

Unit - V	**Vector Integration**	**9 Hrs**

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and applications of these theorems.

Course Outcomes (CO):

On completion of this course, student will be able to

- Solve the linear differential equations with constant coefficients by appropriate method.
- Apply a range of techniques to find solutions of standard partial differential equations.
- Calcify the PDE, learn the applications of PDEs
- Apply del to Scalar and vector point functions, illustrate the physical interpretation of
- Apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals Gradient, Divergence and Curl..

Textbooks:

1. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.
2. Differential Equations & Vector Calculus by T.K.V. Iyengar, B.Krishna Gandhi, S. Ranganatham and M.V.S.S.N.Prasad S. Chand publication.

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B.V.Ramana, "Higher Engineering Mathematics", Mc Graw Hill publishers.
3. Engineering Mathematic I & II, by T.K.V. Iyengar, B.Krishna Gandhi, S.RanganathamandM.V.S.S. N. Prasad S. Chand publication.

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B.Tech. I Year II Semester

Basic Electrical and Electronics Engineering
(Common for all branches)

Course Code	L:T:P	Credits	Exam. Marks	Exam Duration	Course Type
22A0203T	3:0:0	3	CIE:30 SEE:70	3 Hours	ESC

Course Objectives:

To introduce the concept of electrical circuits and its components. To introduce the characteristics of various electronic devices. To impart the knowledge of various configurations, characteristics and applications of electrical & electronic components.

- To understand the basic principles of all semiconductor devices.
- To be able to solve problems related to diode circuits, and amplifier circuits.
- To analyze diode circuits, various biasing and small signal equivalent circuits of amplifiers.
- To be able to compare the performance of BJTs and MOSFETs.
- To design rectifier circuits and various amplifier circuits using BJTs and MOSFETs.

Syllabus		Total Hours: 48
Unit –I	DC&AC Circuits	9

DC&AC Circuits: Electrical circuit elements (R - L and C) - Kirchhoff laws - Series and parallel connection of resistances with DC excitation. Superposition Theorem - Representation of sinusoidal waveforms - peak and rms values - phasor representation - real power - reactive power - apparent power - power factor - Analysis of single-phase ac circuits consisting of RL - RC - RLC series circuits, Resonance.

Unit –II	DC & AC Machines	10

DC & AC Machines: A: DC Machines: Principle and operation of DC Generator - EMF equations - OCC characteristics of DC generator – principle and operation of DC Motor – Performance Characteristics of DC Motor - Speed control of DC shut Motor.

B: AC Machines: Principle and operation of Single-Phase Transformer-EMF equation - OC and SC tests on transformer - Principle and operation of 3-phase induction motor and alternator, [Elementary treatment only.

Unit –III	Basics of Power Systems	9

Basics of Power Systems: Layout & operation of Hydro, Thermal, Nuclear Stations - Solar & wind generating stations – Typical AC Power Supply scheme – Elements of Transmission line – Types of Distribution systems: Primary & Secondary distribution systems.

Unit –IV	Basic Electronic Devices	10

Basic Electronic Devices: P-N Junction Diode: Diode equation, Energy Band diagram, Volt-Ampere characteristics, Temperature dependence, Ideal versus practical, Static and dynamic resistances, Equivalent circuit, Diffusion and Transition Capacitances. Zener diode operation, Zener diode as voltage regulator.

Rectifiers: P-N junction as a rectifier - Half Wave Rectifier, Ripple Factor - Full Wave Rectifier, Bridge Rectifier.

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

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

Unit –V	**Digital Electronics & Micro processors**	**10**

Digital Electronics & Microprocessors:

Digital Electronics: Logic Gates, Simple combinational circuits–Half and Full Adders, BCD Adder. Latches and Flip-Flops (S-R, JK and D), Shift Registers and Counters

8085 Microprocessor: 8085 Microprocessors architecture

Text Books:

1. M.Surya Kalavathi, Ramana Pilla, Ch. Srinivasa Rao, Gulinindala Suresh, "Basic Electrical and Electronics Engineering", S.Chand and Company Limited, New Delhi, 1st Edition, 2017.
2. R.L.Boylestad and Louis Nashlesky, "Electronic Devices & Circuit Theory", Pearson Education, 2007.

References:

1. V.K. Mehtha and Rohit Mehta, "Principles of Electrical Engineering and Electronics", S.Chand & Co., 2009.
2. Jacob Milliman, Christos C .Halkias, Satyabrata Jit (2011), "Electronic Devices and Circuits",

Course Outcomes:

After the completion of the course students will able to

1. Apply KCL, KVL and network theorems to analyze DC circuit.
2. Analyze the single-phase AC Circuits, the representation of alternating quantities and determining the power and power factor in these circuits.
3. Comprehend the construction and Operation of DC and AC machines.
4. Understand the operation of PN Junction diode and its application in rectifier circuits.
5. Compare the different configurations of BJT and draw the V-I characteristics of BJT, JFET and MOSFET.

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B.Tech. I Year II Semester

STRENGTH OF MATERIALS-I					
Course Code	**L:T:P:S**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
22A0101T	**3: 0:0:0**	**3**	**CIE:30 SEE:70**	**3Hours**	**ESC**

Course Objectives:

This course will enable students to:

- To make the student understand how to resolve forces and moments in a given system.
- To analyse the trusses and determination of axial forces by Method of Joints.
- To demonstrate the student to determine the centroid and second moment of area.
- To understand the concepts of stresses and nature of stress development in simple objects.
- To impart procedure for drawing shear force and bending moment diagrams for beams.
- To make the student able to analyze flexural stresses in beams due to different loads.

Syllabus		**Total Hours: 48Hrs**
Unit–I	**Force System And Equilibrium**	**10**

Basic Concepts, system of Forces Coplanar Concurrent Forces - Components in Space Resultant Moment of Forces and its Application - Couples and Resultant of Force Systems. Equilibrium of system of Forces: Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial systems for concurrent forces. Lami's Theorem, Graphical method for the Equilibrium of coplanar forces, Converse of the law of Triangle of forces, converse of the law of polygon of forces, condition of equilibrium.

Unit –II	**Analysis Of Trusses**	**10**

ANALYSIS OF TRUSSES: Analysis of Trusses by method of Joints & method of Sections.

CENTRE OF GRAVITY AND MOMENT OF INERTIA: Introduction – Centroids of rectangular, circular, I, L and T sections - Centroids of built up sections-Definition of Moment of Inertia of rectangular, circular, I, L and T sections - Radius of gyration. Moments of Inertia of Composite sections.

Unit – III	**Simple Stresses & Strains**	**10**

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 volumetricstrain – Elastic moduli and the relationship between them – Bars of varying section – stresses in composite bars – Temperature stresses. Strain Energy – Resilience – Gradual, sudden, impact and shock loadings – simple applications.

Unit – IV	**Shear Force & Bending Moments**	**10**

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

Unit –V	**Flexural And Shear Stresses In Beams**	**08**

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

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

Course Outcomes:

On completion of this course, the students are able to:

1. Draw free body diagrams and use appropriate equilibrium equations, unknown forces in a plane by resolution of forces &equilibrium equations.
2. Determine the axial forces in the members of trusses.
3. Solve the centroid, center of gravity & moment of inertial problems.
4. Discuss the basic materials behavior under the influence of different external loading conditions.
5. Sketch the diagrams indicating the variation of the key performance features like bending moment and shear forces.
6. Calculate stresses developed in beams due to bending and shearing.

Textbooks:

1. Engineering Mechanics -S.Timoshenko&D.H.Young.,4thEdn , Mc Graw Hill publications.
2. Engineering Mechanics statics and dynamics – R.C.Hibbeler, 11thEdn – Pearson Publ.
3. A Textbook of Strength of Materials, by R. K. Rajput, 7e (Mechanics of Solids) SI Units S. Chand & Co, NewDelhi.
4. Strength of materials by R. K. Bansal, Lakshmi Publications.

Reference Books:

1. Engineering Mechanics, statics and Dynamics, J.L. Meriam, 6thEdn – Wiley India Pvt Ltd.
2. Engineering Mechanics: Statics and Dynamics 3rd edition, Andrew Pytel and JaanKiusalaas, Cengage Learning publishers.
3. Engineering Mechanics, dynamics, Bhavikatti S.S – NewAge International Publishers.
4. Mechanics of Materials- by R. C. Hibbler, Pearson publishers.
5. Mechanics of Solids – E P Popov, Prentice Hall.
6. Strength of Materials by B.S. Basavarajaiah and P. Mahadevappa, 3rd Edition, UniversitiesPress.
7. Mechanics of Structures Vol – I by H.J.Shah and S.B.Junnarkar, Charotar Publishing House Pvt. Ltd.

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B.Tech. I Year II Semester

BUILDING MATERIALS & CONSTRUCTION					
Course Code	**L:T:P:S**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
22A0102T	**3: 0:0:0**	**3**	**CIE:30 SEE:70**	**3Hours**	**ESC**

Course Objectives:

This course will enable students to:

- To impart knowledge on basic building materials such as stone and clay products.
- To teach properties of binding materials such as gypsum, lime and cement.
- To disseminate knowledge on ferrous and non-ferrous materials and its applications.
- To explain basic concepts of building components such as stair case and masonry.
- To give knowledge about various building elements and their specifications.
- To understand the building rules, building bye laws and acoustics of building.

Syllabus		**Total Hours: 48hrs**
Unit–I	**Basic Building Materials**	**10**

Properties and characteristics of Basic building materials – Stone –characteristics of good building stone- types of stone masonry - bricks –characteristics of good quality bricks manufacturing of bricks-types of bonds in brick work- Cavity wall & hollow block construction - tiles-types of tiles based on present scenario- sand – sources of sand – properties of sand-Timber & Wood based products-Aluminum and its uses.

Unit –II	**Gypsum, Lime, Cement and Other Materials**	**10**

Properties and characteristics of Binding materials – **Gypsum:** properties of gypsum plaster, Building products made of gypsum and their uses. **Lime:** Manufacture of lime, classifications of limes, properties of lime- putty- characteristics and usage **Cement:** Raw materials used, Process of Manufacturing, Chemical composition, Bogue 's Compounds - Types of cement, Tests on cement – Uses of cement.

Unit – III	**Ferrous & Non-Ferrous Materials**	**10**

Steel – characteristics of reinforcing steel – Hardness, Tensile, Compression, Impact, wear, and corrosion testing, Micro hardness and indentation fracture toughness, Creep and stress rupture tests, fatigue testing – steel fibers and its applications – **Plastics**: classification, advantages of plastics, Mechanical properties and use of plastic in construction – polypropylene fibers and its applications – **Glass**: Ingredients, properties, types and use in construction – Glass fibers and its Applications.

Unit – IV	**Building Components**	**10**

Lintels, Arches and Vaults – Staircases, Lifts – Types. Different types of flooring-Concrete, Mosaic, Terrazo floors; Different types of roofs- Pitched, Flat and Curved Roofs. Lean-to-Roof, Coupled Roofs, Trussed roofs - King and Queen Post Trusses. Doors & Windows- Types and Specifications.

Unit –V	**Building Rules and Bye-Laws**	**08**

Zoning regulations; Regulations regarding layouts or subdivisions; Building regulations; Rules for special type of buildings; Calculation of plinth, floor and carpet area; Floor space index. Building Information System – Green building concepts.

Course Outcomes:

On completion of this course, the students are able to:

1. Differentiate brick masonry, stone masonry construction and bonds used in construction of walls of buildings.
2. Understand the properties of binding materials Gypsum, Lime & cement.
3. Conduct various tests for determining the characteristics of steel.
4. Understand the properties of Plastics, glass as building material.
5. Discuss the importance of different building components used in construction practices.
6. Describe capable of understanding building rules and knowledge about, bye-laws and building elements.

Textbooks:

1. Engineering Materials by Rangawala, Charotar Publications, Fortieth Edition: 2013
2. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, ‚Building Construction' - Laxmi Publications (P) Ltd., New Delhi.
3. Building Drawing by M.G. Shah, C.M. Kale and S.Y. Patki, Tata McGraw-Hill, New Delhi, 2009.

Reference Books:

1. P.C. Varghese, ‚Building Materials and Construction' by Prentice-Hall of India Private Ltd, 3rd Edition, New Delhi. Ltd, 3rd Edition, New Delhi.
2. Building Materials, S. K. Duggal, New Age International Publications.
3. N. Kumaraswamy, A. Kameswara Rao, building planning and drawing, 7th Ed, Charotar.
4. Building Materials and Construction, S.S. Bhavikatti, Vices publications House private ltd.

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B.Tech. I Year II Semester

Engineering Workshop Lab

(Common to All Branches of Engineering)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0304T	0: 0:3:0	1.5	CIE:30 SEE:70	3Hours	ESC

Course Objectives:

To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills

Syllabus **Total Hours: 48Hrs**

Wood Working:

Familiarity with different types of woods and tools used in wood working and make following joints

a) Half – Lap joint

b) Mortise and Tenon joint

c) Corner Dovetail joint or Bridle joint

Sheet Metal Working: Familiarity with different types of tools used in sheet metal working, Developmentsof following sheet metal job from GI sheets

a) Tapered tray

b) Conical funnel

c) Elbow pipe

d) Brazing

Fitting:

Familiarity with different types of tools used in fitting and do the following fitting exercises

a) V-fit

b) Dovetail fit

c) Semi-circular fit

d) Bicycle tire puncture and change of two-wheeler tyre

Electrical Wiring:

Familiarities with different types of basic electrical circuits and make the following connections

a) Parallel and series

b) Two-way switch

c) Go down lighting

d) Tube light

e) Three phase motor f) Soldering of wires
Text books
Note: In each section a minimum of three exercises are to be carried out.

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B.Tech. I Year II Semester

ENGINEERING CHEMISTRY LAB

(ME and CE)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0012P	0:0:1.5:0	1.5	CIE:30 SEE:70	3H	BS

Course Objectives:

This course will enable students to:

- To Verify the fundamental concepts with experiments.

Syllabus **Total Hours: 36**

Note: In the following list, out of 13 experiments conduct any 10 experiments from the below list.

List of Experiments

1. Determination of Hardness of a groundwater sample and mineral water sample.
2. Determination of Copper by EDTA method.
3. Conductometric estimation of strong acid using standard sodium hydroxide solution.
4. Estimation of iron (II) using diphenylamine indicator (Dichrometry – Internal indicator method).
5. Determination of Corrosion rate and inhibition efficiency of an inhibitor for mild steel in hydrochloric acid medium.
6. PH metric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base.
7. Estimation of Dissolved Oxygen by Winkler's method.
8. Potentiometry - determination of redox potentials and emfs.
9. Determination of Strength of an acid in Pb-Acid battery.
10. Colorimetric estimation of manganese.
11. Preparation of a polymer.
12. Determination of Viscosity of lubricating oil by Redwood Viscometer- 1
13. Determination of Viscosity of lubricating oil by Redwood Viscometer -2
14. Determination alkalinity of water sample.

Course Outcomes:

On completion of this course, the students are able to:

- Measure the strength of an acid present in secondary battery and Determine the rate of corrosionfor mild steel in hydrochloric acid medium. (L2)
- Determine the Hardness of a groundwater sample and estimate the Copper by EDTA method. (L1)
- Determine the cell constant and conductance of solutions using conductivity meter and different

acid-base titrations by pH meter. (L1)

- Synthesize of advanced polymer materials. (L2)
- Determine the potentials and EMFs of solutions by Potentiometry and Estimate the iron (II) using diphenylamine indicator. (L1)
- Determine the viscosity of different lubricants using Redwood Viscometer. (L1)

Text Books:

- 1. Vogel's Text book of Quantitative Chemical Analysis, Sixth Edition – Mendham J et al, Pearson Education, 2012.

Reference Books:

1. Chemistry Practical– Lab Manual, First edition, Chandra Sekhar KB, Subba Reddy GV and Jayaveera KN, SM Enterprises, Hyderabad, 2014.
2. Engineering Chemistry Laboratory Manual, For B.Tech. I year (ME, CE) Students, Dr. A. Ravikrishna, Dr. B. Tirumalarao Sri Krishna Hitech Publishing company, Chennai, 2019.

E-resources:

1. https://guides.lib.purdue.edu/chemlabs.
2. https://chemcollective.org/.
3. http://chemistry.alanearhart.org/Lab/index.html.
4. https://www.acs.org/content/acs/en/education/students/highschool/chemistryclubs/activities/simulations.html.
5. https://instr.iastate.libguides.com/oer/chemistry.

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B.Tech. I Year II Semester

STRENGTH OF MATERIALS LABORATORY

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0103P	**0: 0:3:0**	**1.5**	**CIE:30 SEE:70**	**3Hours**	**ESC**

Course Objectives:

By performing this laboratory, the student will be able to know the structural behavior of Various materials.

Syllabus **Total Hours: 48Hrs**

List of Experiments

1. Tensile strength of steel bars.
2. Bending test on (Steel/Wood) Cantilever beam.
3. Bending test on simply supported beam.
4. Torsion test.
5. Hardness test.
6. Compression test on Open coiled springs
7. Compression test on Closely coiled springs
8. Compression test on wood/ concrete
9. Izod / Charpy Impact test on metals
10. Shear test on metals
11. Use of electrical resistance strain gauges.
12. Continuous beam – deflection test.

List of Major Equipment:

1. Universal Testing Machine
2. Torsion testing machine
3. Brinnell's / Rock well's hardness testing machine
4. Setup for spring tests
5. Compression testing machine
6. Izod Impact machine
7. Shear testing machine
8. Beam setup for Maxwell's theorem verification.
9. Electrical Resistance gauges
10. Simply Supported beam setup
11. Cantilever beam setup

Course Outcomes:

On completion of this course, the students are able to:

By performing the various tests in this laboratory the student will be able to know the structural behavior various structural elements when subjected to external loads.

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B.Tech. II Year I Semester

Semester-3 (Theory-7, Lab-3, SOC-1)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	BSC	22A0016T	Probability and Statistics	3	0	0	3
2	PCC	22A0104T	Strength of Materials-II	3	0	0	3
3	PCC	22A0105T	Surveying	3	0	0	3
4	PCC	22A0106T	Concrete Technology	3	0	0	3
5	PCC	22A0107T	Engineering Geology	3	0	0	3
6	HSMC	22A0022T	Managerial Economics & Financial Analysis	3	0	0	3
7	PCC Lab	22A0108P	Surveying Lab	0	0	3	1.5
8	PCC Lab	22A0109P	Concrete Materials Testing Lab	0	0	3	1.5
9	PCC Lab	22A0110P	Engineering Geology Lab	0	0	3	1.5
10	**SOC**	**22A0111P**	**Building Planning & Drawing**	**1**	**0**	**2**	**2**
11	MANC	22A0030T	Constitution of India	2	0	0	0
			Total credits				**24.5**

Category	CREDITS
Basic Science Course (BSC)	3
Professional Core Course (PCC)	16.5
Humanities and social science (HSMC)	3
Skill Oriented Course*(SOC)	2
TOTAL CREDITS	**24.5**

Member Secretary

Head of the Department
Dept. of Civil Engineering
GEETHANJALI INSTITUTE OF SCIENCE & TECHNOLOGY
GANGAVARAM (V), Kovur (M),
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Head of the department

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B.Tech. II Year I Semester

PROBABILITY AND STATISTICS

(Common to CSE, AI&ML, DS, CS, CE)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0016T	3: 0:0:0	3	CIE: 30 SEE:70	3Hours	BSC

Course Objectives:

- Summarize the basic concepts of data science and its importance in engineering analyze the data quantitatively or categorically, measure of averages, variability, adopt correlation methods and principle of least squares, regression analysis.

Syllabus		Total Hours:48
Unit - I	**Descriptive statistics**	**10 Hrs**

Statistics Introduction, Measures of Variability (dispersion) Skewness Kurtosis, correlation, correlation coefficient, rank correlation, principle of least squares, method of least squares, regression lines, regression coefficients and their properties.

Unit - II	Probability	10 Hrs

Probability, probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous), probability density functions, properties.

Unit - III	Probability distributions	9 Hrs

Discrete distribution - Binomial, Poisson approximation to the binomial distribution and their properties. Continuous distribution: normal distribution and their properties. Normal approximation to Binomial Distribution. Uniform distribution,

Unit - IV	Estimation and Testing of hypothesis, large sample tests	10 Hrs

Estimation-parameters, statistics, sampling distribution, point estimation, Formulation of null hypothesis alternative hypothesis, the critical and acceptance regions, level of significance, two types oferrors and power of the test. Large Sample Tests: Test for single proportion, difference of proportions, test for single mean and difference of means. Confidence interval for parameters in one sample and two sample problems.

Unit - V	Test of Significance	9 Hrs

Student t-distribution (test for single mean, two means and paired t-test), testing of equality of variances (F-test), $\chi 2$ - test for goodness of fit, $\chi 2$ - test for independence of attributes.

Course Outcomes (CO):
Student will be able to

- Define the terms trial, events, sample space, probability, and laws of probability, Make use of probabilities of events in finite sample spaces from experiments,
- Apply Baye's theorem to real time problems and explain the notion of random variable, distribution functions and expected value.
- Apply Binomial and Poisson distributions for real data to compute probabilities, theoretical frequencies, interpret the properties of normal distribution and its applications.
- Explain the concept of estimation, interval estimation and confidence intervals, apply the concept of hypothesis testing for large samples.
- Apply the concept of testing hypothesis for small samples to draw the inferences and estimate the goodness of fit.

Text Books:

1. B.S.Grewal , "Higher Engineering Mathematics", Khanna publishers.
2. Miller and Freunds, Probability and Statistics for Engineers,7/e, Pearson, 2008.
3. Probability & Statistics by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad S. Chand publication..

Reference Books:

1. B.V.Ramana, "Higher Engineering Mathematics", Mc Graw Hill publishers.
2 W. Feller, an Introduction to Probability Theory and its Applications, 1/e, Wiley, 1968.
3. Mathematical Foundations of Statistics by K. C. Kapoor & Gupta, S. Chand Publications.

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B.Tech. II Year I Semester

STRENGTH OF MATERIALS -II					
Course Code	**L:T:P:S**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
22A0104T	**3: 0:0:0**	**3**	**CIE: 30 SEE:70**	**3Hours**	**PCC**

Course Objectives:

Course Objectives:

- To demonstrate analytical methods for determining strength & stiffness and assess stability of structural members.
- To make the student analyze circular shafts subjected to torsion.
- To make the student determine critical loads for columns with different end conditions.
- To make the student determine energy absorption in springs.
- Estimate stresses in thin and thick cylinders.

Syllabus		**Total Hours:48**
Unit - I	**Deflection of Beams**	**10Hrs**

Pure bending – slope, deflection and radius of curvature – Differential equation for elastic curve of a beam – Double integration and Macaulay's methods. Determination of slope and deflection for cantilever and simply supported beams under point loads, U.D.L. uniformly varying load- Mohr's theorems – Moment area method – application to simply supported and overhanging beams.

Unit - II	**Theories of Failures & Analysis of Indeterminate Structures**	**10 Hrs**

Maximum Principal stress theory- Maximum shear stress theory- Maximum strain theory Maximum strain energy theory-Maximum distortion energy theory. Indeterminate Structural Analysis – Determination of static and kinematic indeterminacies - Analysis of fixed beams and propped cantilever beams.

Unit - III	**Thin &Thick Cylinders**	**9 Hrs**

Introduction - Thin Cylindrical shells - hoop stress - longitudinal stresses - Lame's theory – Design of thin & thick cylindrical shells- Wire wound thin cylinders - Compound cylinders.

Unit - IV	**Columns & Struts**	**10 Hrs**

Introduction – classification of columns – Axially loaded compression members – Euler's crippling load theory – derivation of Euler's critical load formulae for various end conditions – Equivalent length - Slenderness ratio – Euler's critical stress – Limitations of Euler's theory – Rankine – Gordon formula - eccentric loading and Secant formula – Prof. Perry's formula

Unit - V	**Torsion &Springs**	**9 Hrs**

Torsion: Theory of pure torsion – Assumptions and Derivation of Torsion formula for circular shaft – Torsional moment of resistance – Polar section modulus – power transmission through shafts – Combined bending and torsion.

Springs -Types of springs – deflection of close coiled helical springs under axial pull and axial couple –leaf springs -Axial load and torque on helical springs - stresses and deformations - strain energy – compound springs.

Course Outcomes (CO): Student will be able to

- Determine deflection at any point on a beam under simple and combined loads
- Analyze members under deformation in springs.
- Know the effect of eccentricity of load in column apply failure criteria to implement in design of structural members
- Know the crippling load for the columns.
- Analyze stresses across section of the thin and thick cylinders to arrive at optimum sections to withstand the internal pressure.

TEXT BOOKS:

1. A Textbook of Strength of Materials, by R. K. Rajput, 7e (Mechanics of Solids) SI Units S. Chand & Co, NewDelhi.
2. Strength of materials by R. K. Bansal, Lakshmi Publications.
3. B. C. Punmia Strength of Materials by.- Laxmi publications.

REFERENCES:

1. Strength of Materials by S. Ramamrutham.
2. Strength of Materials by B.S.Basavarajaiah and P. Mahadevappa, 3rd Edition,UniversitiesPress.
3. Mechanics of Structures Vol – I by H.J.Shah and S.B.Junnarkar, Charotar PublishingHouse Pvt. Ltd.

E-resources:

https://nptel.ac.in/courses/112106319 https://nptel.ac.in/courses/105105108

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B.Tech. II Year I Semester

SURVEYING					
Course Code	**L:T:P:S**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
22A0105T	**3:0:0:0**	**3**	**CIE:30 SEE:70**	**3Hours**	**PCC**

Course Objectives:

- To make the student to get well conversant with the fundamentals of various basic methods and instruments of surveying.
- To introduce to the students in identifying reduced level of the ground and its profile for finding areas and volumes of embankments and cuttings.
- To make the student to use angular measuring instruments for horizontal and vertical control.
- To enable the student to set simple horizontal curves.
- To introduce the knowledge construction surveys and usage of modern instrument such as total station and GPS.

Syllabus		**TotalHours:48**
Unit-I	**Basic Concepts of Surveying**	**10 Hrs**

Overview of surveying (chain, compass), Objectives, Principles and classifications.
Distances and Direction: Distance measurement, conventions and methods use of chain and tape, Meridians, Azimuths and Bearings, declination, computation of angle.

Unit -II	**Levelling & Contouring**	**10Hrs**

LEVELLING - 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.

Unit -III	**Computation of Areas & Volumes**	**10Hrs**

Computation of Areas and Volumes: Areas - Determination of areas consisting of irregular boundary and regular boundary, 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.

Unit -IV	**Theodolite &Tachometric Surveying**	**9Hrs**

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

Unit -V	**Curves & Total Station**	**9Hrs**

Curves: Types of curves and their necessity, elements of simple circular curve, setting out of simple horizontal circular curves.
Basics of Total Station - Methods of Measuring Distance, Basic Principles of Total Station, Historical Development, Classifications, applications and comparison with conventional surveying. Basic concepts of GPS – Historical perspective and development – applications - Geoid and Ellipsoid – satellite orbital motion – Keplerian motion – Kepler's Law – Perturbing forces -Geodetic satellite -Doppler effect- GPS receivers.

Course Outcomes(CO):
Student will be able to

- Calculate angles, distances and levels
- Define various conventional instruments involved in surveying with respect to utility and precision
- Estimate the volumes of earth work
- Understand the working principles of survey instruments
- Able to use modern survey instruments.
- plan a survey for applications such as road alignment and height of the building

TextBooks:

1. Surveying (Vol – 1,2 &3), by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain – Laxmi Publications (P) Ltd., New Delhi
2. Text book of surveying by C.Venkataramaiah, Universities Press..
3. Surveying (Vol – 1 & 2) by Duggal S.K, Tata McGraw Hill Publishing Co.Ltd. New Delhi, 2004..

ReferenceBooks:

1. S K Duggal, "Surveying" (Vol – 1 & 2), Tata McGraw Hill Publishing Co. Ltd. New Delhi, 2004.
2. R. Subramanian, "Surveying and levelling" Oxford university press, New Delhi
3. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain,"Surveying" (Vol – 1, 2 & 3), - Laxmi Publications (P) ltd., New Delhi.
4. R. Agor Khanna Publishers 2015 "Surveying and levelling
5. Arthur R Benton and Philip J Taety, "Elements of Plane Surveying", McGraw Hill – 2000

E Resources:
https://archive.nptel.ac.in/courses/105/104/105104101/

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B.Tech. II Year I Semester

CONCRETE TECHNOLOGY

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0106T	3:0:0:0	3	CIE:30 SEE:70	3Hours	PCC

Course Objectives:

- To explain the functional role of composition of concrete and apply this knowledge to mix design theory.
- To develop basic knowledge in the fresh and hardened concrete properties.
- To inculcate the knowledge on the behavior of concrete with response to stresses developed.
- To enhance the knowledge on the special concretes and design a concrete mix which fulfils the required properties for fresh and hardened concrete.
- To implement design a concrete mix by the required properties for fresh and hardened concrete.

Syllabus		**Total Hours:48**
Unit-I	**Concrete composition**	**10 Hrs**

Cement-chemical composition-hydration process-Bogue's Compound-Tests on properties of cement-Types of cement - I.S. Specifications. Aggregates- classification of aggregate – tests on properties of aggregates - characteristics of aggregate - I.S. Specifications.
Water-quality of water -characteristics of water - I.S. Specifications.
Admixtures – classification of chemical admixtures – properties and limitations – classification of mineral admixtures – properties and limitations - I.S. Specifications.

Unit -II	**Properties of concrete**	**10 Hrs**

Fresh concrete: Mixing of concrete-workability-factors influencing workability measurement of workability for conventional concrete (Slump Cone, Compaction Factor and Vee-Bee test)
Hardened concrete: Water/Cement Ratio (Abram's Law)-Gel Space Ratio-tests on hardened concrete -Destructive Tests (Compression, Split Tensile and Flexural)-Semi Destructive Tests (Core Cutter and Pull out test) and Nondestructive Tests (Rebound Hammer-UPV - Radiological methods).

Unit -III	**Elasticity, shrinkage & creep**	**9 Hrs**

Curing of concrete -methods of curing-effects of improper curing-self curing-Modulus of Elasticity-Poisson's Ratio-Static modulus of elasticity - Dynamic Modulus of Elasticity- Shrinkage and various types – Factors Affecting Shrinkage -Creep of Concrete-Factors Influencing Creep.

Unit -IV	**Special concrete**	**9 Hrs**

Light Weight Concretes - Cellular Concrete - No Fines Concrete-High Density Concrete – Fiber Reinforced Concrete-Polymer Concrete-Self Compacting Concrete.

Unit -V	**Concrete mix design**	**10 Hrs**

Concept of mix design; Variables in proportioning; Nominal mix and design mix -High Strength concrete – High Performance Concrete.

Course Outcomes (CO):
Student will be able to

- Understand various composition of concrete and their aspect.
- Explore knowledge on the fresh and hardened properties of concrete.
- Investigate the behavior of concrete with response to stresses developed
- Identify special concretes for accomplishing performance levels.
- Design concrete mixes using discrete methods.

Text Books:

1. M.S. Shetty, A. K. Jain, "Concrete Technology Theory and Practice", S. Chand and CompanyLimited, New Delhi.
2. A. M. Neville,"Properties of Concrete", Pearson Publication – 4th Edition.
3. N. Krishna Raju, "Design of Concrete Mixes", CBS Publishers.

Reference Books:

1. M. L. Gambhir, "Concrete Technology", Tata Mc. Graw Hill Publishers, New Delhi.
2. P. K. Mehta And J. M. Monteiro, "Concrete: Micro Structure, Properties and Materials"Mc-Graw Hill Publishers.
3. J. Prasad, C.G.K. Nair, "Non-Destructive Test and Evaluation of Materials", Tata Mcgraw Hill Publishers, New Delhi.

E Resources:

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

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B.Tech. II Year I Semester

ENGINEERING GEOLOGY

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0107T	3: 0:0:0	3	CIE: 30 SEE:70	3Hours	PCC

Course Objectives:

- To understand weathering process and mass movement
- To identify geological structures and process of rock mass quality.
- To identify subsurface information and groundwater potential sites through geophysical investigations
- To apply geological principles of mitigation of natural hazards and select sites for dams and tunnels

Syllabus		Total Hours:48
Unit - I	**Physical Geology**	**10 Hrs**

Geology in civil engineering – branches of geology – structure of earth and its composition weathering of rocks – scale of weathering – soils – landforms and processes associated with river, wind, groundwater and sea – relevance to civil engineering. Plate tectonics – Earth quakes – Seismic zones in India.

Unit - II	Minerology	9 Hrs

Physical properties of minerals – Quartz group, Feldspar group, Pyroxene – hypersthene and augite, Amphibole – hornblende, Mica – muscovite and biotite, Calcite, Gypsum and Clay minerals -Ore minerals - Iron ores; pyrite; Chlorite

Unit - III	Petrology	10 Hrs

Classification of rocks, distinction between Igneous, Sedimentary and Metamorphic rocks. Engineering properties of rocks. Description, occurrence, engineering properties, distribution and uses of Granite, Dolerite, Basalt, Sandstone, Limestone, Laterite, Shale, Quartzite, Marble, Slate, Gneiss and Schist.

Unit - IV	Structural Geology And Geophysical Methods	9 Hrs

Geological maps – attitude of beds, study of structures – folds, faults and joints – relevance to civil engineering. Geophysical methods – Gravity methods. Magnetic methods, Electrical methods. Seismic methods, Radio metric methods and Geothermal method. Electrical resistivity methods, and seismic refractionmethods

Unit - V	Application of Geological Investigations	10 Hrs

Remote sensing for civil engineering applications; site selection for dams and tunnels – Geological conditions necessary for design and construction of Dams, Reservoirs, Tunnels, and Road cuttings– Hydrogeological investigations and mining – Coastal protection structures. Investigation of Landslides, causes and mitigation.

Course Outcomes(CO): Student will be able to

- Gain basic knowledge on characteristics of rocks and
- Gain basic knowledge on characteristics of minerals.
- Identify and differentiate rocks using geological classification.
- Carry out geo physical investigations for infrastructural projects.
- Apply concepts of structural geology for civil engineering structures

Text Books:

1. N. Chenna Kesavulu, "Text Book of Engineering Geology", 2nd Edition (2009), MacmillanPublishers India.
2. Vasudev Kanithi, "Engineering Geology", Universities Press Pvt Ltd, Hyderabad. 2012

Reference Books:

1. Parbin Singh, "Engineering and General Geology", 8th Edition (2010), S K Kataria& Sons.
2. D.Venkata Reddy, "Engineering Geology, Second edition", Vikas Publishing house, Pvt, Ltd Richard E. Goodman, "Engineering Geology, Rock in Engineering Construction", John Wiley & Sons, Inc.1993.
3. S.K.Duggal, H.K Pandey, N.Rawal, "Engineering Geology", Mc.Graw Hill Education (India) Pvt. Ltd
4. Billings, M. P., "Structural Geology", Prentice-Hall India, 1974, New Delhi

E Resources:

1. https://nptel.ac.in/courses/105/105/105105106/
2. https://freevideolectures.com/course/87/engineering-geology
3. https://www.edx.org/course/geology-and-engineering-geology
4. https://courses.lumenlearning.com/geo/chapter/reading-the-branches-of-geology/
5. https://www.coursera.org/courses?query=geology

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B.Tech. II Year I Semester

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
22A0022T	3:0:0:0	3	CIE:30 SEE:70	3 Hours	HSMC

Course Objectives:

- To understand the concepts of managerial economics and financial analysis this helps in optimal decision making in business environment.
- To have a thorough knowledge on the production theories and cost while dealing with the production and factors of production.
- have a thorough knowledge regarding market structure and forms of business organizations in the market.
- To understand the concept of capital and capital budgeting in selecting the proposals.
- To have a thorough knowledge on recording, classifying and summarizing of transactions in preparing of final accounts.

Syllabus		Total Hours:48
Unit-I	**Introduction to Managerial Economics &Demand**	**9 Hrs**

Managerial Economics – Definition – Nature & Scope - Contemporary importance of Managerial Economics - Demand Analysis - Concept of Demand - Demand Function - Law of Demand - Elasticity of Demand - Significance - Types of Elasticity - Measurement of Elasticity of Demand - Demand Forecasting - Factors governing Demand Forecasting - Methods of Demand Forecasting - Relationship of Managerial Economics with Financial Accounting and Management.

Unit -II	**Theory of Production & Cost Analysis**	**9 Hrs**

Production Function – Least-cost combination - Short-run and Long-run Production Function - Isoquants and is costs, MRTS - Cobb-Douglas Production Function - Laws of Returns - Internal and External Economies of scale - Cost concepts and Cost behavior - Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems) - Managerial significance and limitations of Break-Even Analysis.

Unit -III	**Introduction to Markets And forms of Business Organizations**	**10 Hrs**

Market structures - Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition – Monopoly - Monopolistic Competition – Oligopoly - Price-Output Determination - Pricing Methods and Strategies - Forms of Business Organizations – Sole Proprietorship - Partnership - Joint Stock Companies - Public Sector Enterprises-.

Unit -IV	**Capital And Capital Budgeting**	**10 Hrs**

Concept of Capital - Significance - Types of Capital - Components of Working Capital Sources of Short-term and Long-term Capital - Estimating Working capital requirements – Capital Budgeting – Features of Capital Budgeting Proposals – Methods and Evaluation of Capital Budgeting Projects – Pay Back Method – Accounting Rate of Return (ARR) – Net Present Value (NPV) – Internal Rate Return (IRR) Method (simple problems)

Unit -V	**Introduction to Financial Accounting &Analysis**	**10 Hrs**

Accounting Concepts and Conventions - Introduction Double-Entry Book Keeping, Journal, Ledger, and Trial Balance - Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). Financial Analysis - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

Course Outcomes(CO):

On completion of this course, student will be able to

- Outline the Managerial Economic concepts for decision making and forward planning. Also know law of demand and its exceptions, to use different forecasting methods for predicting demand for various products and services. (L2)
- Assess the functional relationship between Production and factors of production and list out various costs associated with production and able to compute breakeven point to illustrate the various uses of breakeven analysis. (L5)
- Outline the different types of business organizations and provide a framework for analyzing money in its functions as a medium of exchange. (L2)
- Interpret various techniques for assessing the proposals of project for financial position of the business. (L2)
- Identify the principles of accounting to record, classify and summarize various transactions in books of accounts for preparation of final accounts. (L3)

Textbooks:

1. Managerial Economics, PL Mehata, Sulthan Chand Publications

Reference Books:

1. Ahuja Hl “Managerial economics” 3 rd edition, Schand, ,2013
2. S.A. Siddiqui and A.S. Siddiqui: “Managerial Economics and Financial Analysis”, New Age International,. 2013.
3. Joseph G. Nellis and David Parker: “Principles of Business Economics”, 2nd edition, Pearson, New Delhi.
4. Domnick Salvatore: “Managerial Economics in a Global Economy”, Cengage, 2013.
5. Managerial Economics, Varshney &Maheswari, Sultan Chand, 2013.
6. Managerial Economics and Financial Analysis, Aryasri, 4th edition, MGH, 2019.

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B.Tech. II Year I Semester

SURVEYING LABORATORY

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0108P	0:0:3:0	1.5	CIE:30SEE:70	3Hours	PCC LAB

Course Objectives:

- By performing the various tests in this laboratory, the student will be able to know the principles of surveying in chain surveying, compass surveying, plane table surveying, levelling, theodolite surveying and total station

Syllabus **TotalHours:48Hrs**

List of Experiments

1. Chaining across obstacles
2. Determination of area using chain surveying
3. Determination of area using Compass surveying
4. Fly levelling: Height of the instrument method and rise and fall method
5. Fly levelling; Longitudinal Section and Cross sections of a given road profile.
6. Developing a Contour map
7. Theodolite Survey: Determining the Horizontal and Vertical Angles
8. Finding the distance between two inaccessible points using Theodolite
9. Tachometric survey: Heights and distance problems using tachometric principles.
10. Exercises on Curve setting.

Course Outcomes:

On completion of this course, the students are able to:

- Apply theoretical considerations in field and other engineering projects.
- Able to survey the area using different methods of plane tabling and compass survey and to adjust the compass traverse graphically.
- Able to record the reduced levels using various methods of levelling and measurement of horizontal & vertical angles by Theodolite
- Able to determine the location of any point horizontally and vertically using Tachometry

Reference Books:

1. S K Duggal, “Surveying” (Vol – 1 & 2), Tata McGraw Hill Publishing Co. Ltd. New Delhi, 2004.
2. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain,“Surveying” (Vol – 1, 2 & 3), - Laxmi Publications (P) ltd., New Delhi.

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B.Tech. II Year I Semester

Concrete Materials Testing Lab

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0109P	0:0:3:0	1.5	CIE:30 SEE:70	3 Hours	PCC LAB

Course Objectives:

This course will enable students to:

- To find the various physical characteristics of cement, coarse and fine aggregates
- To find the various properties of fresh and hardened concrete.

Syllabus **Total Hours:48**

Note: In the following list, out of 12 experiments, any 2 experiments must be performed in a virtual mode

List of Experiments

1. Normal Consistency and fineness of cement.
2. Determination of Initial setting time and final setting time of cement.
3. Specific gravity and soundness of cement
4. Determination of compressive strength of cement
5. Determination of aggregate specific gravity and water absorption
6. Bulking of Sand
7. Workability test on concrete by slump cone, Vee-bee & compaction factor.
8. Determination of compressive strength of concrete.
9. Determination of Tensile strength of concrete.
10. Determination of Flow test of SCC by Flow table,
11. Determination of Flow test of SCC by V-Funnel & L-box
12. Non-Destructive testing on concrete. (Demo-Rebound Hammer)

Course Outcomes:

On completion of this course, the students are able to:

- Determine the characteristics of fine and coarse aggregates.
- Evaluate the properties of the binding materials for their suitability in building construction.
- Understand the workability behavior of concrete through various tests.
- Determine whether correct mix proportions of various mix proportions of various materials were used to get the desired strength.
- Evaluate the strength of hardened concrete through non-destructive tests.

Text Book(s):.

1. Concrete Manual by M.L.Gambhir, Dhanpat Rai&co., Fourth edition
2. S.K. Khanna and C.E.G Justo, Highway Materials Testing Laboratory Manual, Nem Chand Bros Roorkee

Reference Book(s):

1. Building construction and materials (Lab Manual) by Gambhir, TMH publishers.
2. Lab manual on High way Engineering by Ajay.K.Duggal & Vijay .P.Puri, New Age Publications, New Delhi**.**

E-resources:

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

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B.Tech. II Year I Semester

ENGINEERING GEOLOGY LAB

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0110P	0:0:3:0	1.5	CIE:30 SEE:70	3 Hours	PCC LAB

Course Objectives:
This course will enable students to:
- Enable the students to identify the physical characteristics various rocks
- Enable the students to identify the physical characteristics various Minerals
- Draw various structural geological parameters

Syllabus **Total Hours:48**

List of Experiments

1. Physical properties of minerals: Mega-scopic identification of Rock forming minerals – Quartz group, Feldspar group,
2. Identification of Rock forming minerals Garnet group, Mica group
3. Physical properties of minerals: Mega-scopic identification of Talc, Chlorite, Olivine, Kyanite, Asbestos, Tourmelene, Calcite, Gypsum, etc
4. Physical properties of minerals: Mega- scopic identification of Ore forming minerals – Magnetite, Hematite, Pyrite, Pyralusite, Graphite, Chromite, etc
5. Megascopic description and identification of Igneous rocks – Types of Granite, Pegmatite, Gabbro, Dolerite, Syenite, Granite Poryphery, Basalt, etc
6. Megascopic description and identification of Sedimentary rocks – Sand stone, Ferruginous sand stone, Lime stone, Shale, Laterite, Conglamorate, etc
7. Megascopic description and identification of Metamorphic rocks – Biotite – Granite Gneiss, Slate, Muscovite &Biotite schist, Marble, Khondalite, etc
8. Interpretation and drawing of sections for geological maps showing tilted beds.
9. Interpretation and drawing of sections for geological maps showing faults.
10. Interpretation and drawing of sections for geological maps showing unconformities etc.
11. Simple Structural Geology problems.

Course Outcomes:

On completion of this course, the students are able to:

- Identify the classifications of the mineral
- Identify the classifications of the mineral
- Draw the geological maps showing tilted beds
- Draw the geological maps showing folds and faults

Text Book(s):.

1. N. ChennaKesavulu, "Text Book of Engineering Geology", 2nd Edition (2009), Macmillan Publishers India
2. Vasudev Kanithi, "Engineering Geology", Universities Press Pvt Ltd, Hyderabad. 2012

Reference Book(s):

1. Parbin Singh, "Engineering and General Geology", 8th Edition (2010), S K Kataria & Sons.

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B.Tech. II Year I Semester

BUILDING PLANING AND DRAWING

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0111P	1: 0:2:0	2	CIE: 30 SEE:70	3Hours	SOC

SYLLABUS

1. Drawing of Conventional signs for building materials and symbols for Electrical, sanitary installations and fittings.
2. Drawing of Various Bonds in Brick Work.
3. Structural detailing of Beam, isolated footing and column
4. Drawing of Fully paneled door / Window – Elevation and cross Section
5. Drawing of Dog legged staircase – Plan and Sectional Elevation
6. Drawing of King post / Queen post trusses
7. Draw Plan, Elevation & Section of the Residential building – Single Bedroom and Hall (Loadbearing wall structure) for the given line sketch and specifications
8. Draw Plan, Elevation & Section of the Residential building- double bedroom, living room, Kitchen with (Load bearing wall structure) for the given line sketch and specifications
9. Draw Plan, Elevation & Section of the office building for the given line sketch and specifications.
10. Draw Plan, Elevation & Section of the School building for the given line sketch and specifications
11. Draw Plan, Elevation & Section of the two storied residential building for the given line sketch and specifications
12. Drawing plan, elevation and section of an industrial building for the given line sketch and specifications

Course Outcomes (CO): Student will beable to

- To impart the practical knowledge in detailing and drawing of various components of building and Different types of Buildings.
- Interpret the symbols, signs and conventions from the given drawing.
- The student should be able to distinguish the relation between the plan, elevation and cross sectionand identify the form and functions among the buildings.
- The student is expected to learn the skills of drawing building elements and plan various types of buildings as per requirements.
- Student should be able to plan various buildings as per the building by-laws

Test Books:

1. Planning and Designing and Scheduling – Gurucharan Singh and Jagadish Singh- Standard publishers 2020 edition
2. Building Planning and Design – N. Kumara Swamy and A. Kameswara Rao. Charotar publications 9th edition 2019

References:

1. Building by laws by state and Central Governments and Municipal corporations. National Building Code
2. Building drawing with an integrated approach to building environment - M.G.Saha, G.M.Kale, S.Y.patki-Tata Mc Graw Hill

Online Learning Resources:

https://www.studocu.com/row/document/jamaa%D8%A9-byrzyt/building-construction/lecture-notes- types- of-drawings-building-construction-aa-20152016/790480

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B.Tech. II Year I Semester

CONSTITUTION OF INDIA
(Common to all branches of Engineering)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
22A0030T	2:0:0:0	-	CIE:30	-	MANC

Course Objectives:

- To Enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and Election Commission of India.
- To understand the central-state relation in financial and administrative control

Syllabus		Total Hours:48
Unit -I	**Introduction to Indian Constitution**	**10 Hrs**
Introduction to Indian Constitution – Constitution -Meaning of the term - Indian Constitution Sources and constitutional history - Features– Citizenship – Preamble - Fundamental Rights and Duties -Directive Principles of State Policy.		
Unit -II	**Union Government and its Administration Structure of the Indian Union**	**9 Hrs**
Union Government and its Administration Structure of the Indian Union - Federalism – Centre State relationship – President's Role, power and position - PM and Council of ministers - Cabinet and Central Secretariat –Lok Sabha - Rajya Sabha - The Supreme Court and High Court - Powers and Functions		
Unit -III	**State Government and its Administration**	**10 Hrs**
State Government and its Administration - Governor - Role and Position -CM and Council of ministers - State Secretariat-Organization Structure and Functions.		
Unit -IV	**Local Administration**	**10 Hrs**
Local Administration - District's Administration Head - Role and Importance - Municipalities - Mayor and role of Elected Representatives -CEO of Municipal Corporation Pachayati Raj - Functions– PRI –Zilla Parishath - Elected officials and their roles – CEO, Zilla Parishath - Block level Organizational Hierarchy - (Different departments) - Village level - Role of Elected and Appointed officials - Importance of grass root democracy		
Unit -V	**Election Commission**	**9 Hrs**
Election Commission - Election Commission- Role of Chief Election Commissioner and Election Commissionerate - State Election Commission -Functions of Commissions for the welfare of SC/ST/OBC and Women		

Course Outcomes (CO):

On completion of this course, student will be able to

- Understand historical background of the constitution making and its importance for building a democratic India.
- Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
- Understand the value of the fundamental rights and duties for becoming good citizen of India.
- Analyze the decentralization of power between central, state and local self-government
- Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy

Textbooks:

1. Durga Das Basu, "Introduction to the Constitution of India", Prentice – Hall of India Pvt. Ltd.. New Delhi
2. Subash Kashyap, "Indian Constitution", National Book Trust 3. R R Gaur, R Asthana, GP

Reference Books:

1. H.M.Sreevai, "Constitutional Law of India", 4th edition in 3 volumes
2. J.A. Siwach, "Dynamics of Indian Government & Politics"
3. M.V. Pylee, "Indian Constitution", Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi
3. J.C. Johri, Indian Government and Politics Hans
4. M.V. Pylee, "Indian Constitution)

E-RESOURCES:

1. nptel.ac.in/courses/109104074/8
2. nptel.ac.in/courses/109104048/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series- indian- constitution

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B.Tech. II Year II Semester

IV Semester B.Tech. Civil – Course Structure							
Sl. No.	**Category**	**Course Code**	**Course Title**	**Hours per week**			**Credits**
				L	**T**	**P**	**C**
1	ESC	22A0112T	Mechanics of Fluids	3	0	0	3
2	BSC	22A0018T	Transforms& Numerical Methods	3	0	0	3
3	PCC	22A0113T	Environmental Engineering	3	0	0	3
4	PCC	22A0114T	Structural Analysis-I	3	0	0	3
5	HSMC	22A0021T	Universal Human Values	3	0	0	3
6	ESC Lab	22A0115P	Mechanics of Fluids Lab	0	0	3	1.5
7	PCC Lab	22A0116P	Environmental Engineering Lab	0	0	3	1.5
8	PCC Lab	22A0117P	CAD Lab	0	0	3	1.5
9	**SOC**	**22A0029P**	**Soft Skills Lab**	**1**	**0**	**2**	**2**
10	MANC	22A0028T	Environmental Studies	2	0	0	0
			Total credits				**21.5**
Community service project 2 months (mandatory) during summer vacation							

Category	**CREDITS**
Basic Science Courses (BSC)	3
Professional core Courses (PCC)	9
Engineering Science Courses (ESC)	4.5
Skill oriented course*(SOC)	2
Humanities and Social Sciences (HSMC)	3
TOTAL CREDITS	**21.5**

Member Secretary

Head of the Department
Dept. of Civil Engineering
GEETHANJALI INSTITUTE OF SCIENCE & TECHNOLOGY
GANGAVARAM (V), Kovur (M),
S.P.S.R. Nellore Dt. A.P Pin 524 137

Head of the department

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B.Tech. II Year II Semester

MECHANICS OF FLUIDS					
Course Code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
22A0112T	**3: 0:0:0**	**3**	**CIE: 30 SEE:70**	**3Hours**	**ESC**

Course Objectives:

- To impart ability to solve engineering problems in fluid mechanics
- To explain basics of statics, kinematics and dynamics of fluids and various measuring techniques of hydrostatic forces on objects.
- To enable the students measure quantities of fluid flowing in orifice & Mouthpiece
- To enable the students measure quantities of fluid flowing in pipes, tanks and channels
- To Introduce concepts of uniform and non-uniform flows through open channel.

Syllabus		**Total Hours:48**
Unit-I	**Properties of Fluids**	**10 Hrs**

Definitions, Types of Fluids, Pascal's law, Hydrostatic law, Measurement of simple and differential manometers, Problems on Total Pressure & Centre of pressure: Horizontal. Vertical & inclined surfaces

Unit -II	**Fluid Kinematics**	**9 Hrs**

Fluid Kinematics: Classification of flows: Steady, unsteady, uniform and non-uniform flows; Laminar and turbulent flows; Streamline; Path line; Streak line; Continuity equation; Velocity potential and stream function.

Fluid Dynamics: Euler's equation of motion; Bernoulli's equation, Momentum equation, Force exerted by flowing fluid on pipe-bend

Unit -III	**Orifice and Mouthpiece**	**10 Hrs**

Orifice and Mouthpiece: Introduction to orifices (Small and large) and mouth pieces. Notches: Discharge over a Rectangular, Triangular notch & Trapezoidal Notches

Unit -IV	**Flow through pipes**	**10 Hrs**

Flow through pipes: Major and minor energy losses, Hydraulic gradient and total energy line. Relation between shear and Pressure Gradients in Laminar Flow; Reynold's experiment; Critical velocity; Steady laminar flow through a circular pipe – Hagen Poiseuille's Law. Turbulent flow: shear stress in Turbulentflow, Prandtl mixing length theory, Velocity distribution in pipes.

Unit -V	**Open Channel Flow**	**9 Hrs**

Open Channel Flow (Uniform Flow): Comparison between open channel flow and pipe flow, Types of channels, Chezy's and Manning's equation, Flow through a Rectangular, Trapezoidal. Most efficient channel section- Rectangular, Trapezoidal.

Open Channel Flow **(Non-uniform Flow):** Specific energy, Specific energy diagram, Critical flow, critical flow in rectangular channel.

Course Outcomes (CO):

On completion of this course, student will be able to

- Understand the principles of fluid statics, kinematics and dynamics
- Understand flow characteristics of fluid
- Calculate the forces exerted on the surface in static & dynamic condition
- Apply the continuity, momentum and energy principles
- Estimate various losses in flow through channels
- Understand the flow in open channel of different sections.

Textbooks:

1. P. M. Modi and S. M. Seth, "Hydraulics and Fluid Mechanics", Standard Book House
2. R. K. Bansal, A text of "Fluid Mechanics and Hydraulic Machines", Laxmi Publications (P)Ltd., New Delhi

Reference Books:

1. C. S. P. Ojha, R. Berndtsson and P. N. Chadramouli, "Fluid Mechanics andMachinery", Oxford University Press, 2010.
2. K. Subrahmanya, "Theory and Applications of Fluid Mechanics", Tata McGraw Hill – Hall of India Pvt. Ltd.. New Delhi

E-RESOURCES:

1. http://onlinecourses.nptel.ac.in/noc21_ce31/preview
2. https://www.udemy.com/topic/fluid-mechanics/

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B.Tech. II Year II Semester

TRANSFORMS& NUMERICAL METHODS (CE)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0018T	3: 0:0:0	3	CIE: 30 SEE:70	3Hours	BSC

Course Objectives:

Our emphasis will be more on conceptual understanding and application of Fourier series, Fourier, Z and Laplace transforms and random variables and probability distributions.

Syllabus **Total Hours:48**

Unit - I	**Laplace Transforms**	**10 Hrs**

Definition-Laplace transform of standard functions-existence of Laplace Transform – Inverse transform – First shifting Theorem, Transforms of derivatives and integrals – Unit step function – Second shifting theorem – Dirac's delta function – Convolution theorem – Laplace transform of Periodic function. Differentiation and integration of transform – Application of Laplace transforms to ordinary differential equations of first and second order.

Unit – II	**Fourier series**	**10 Hrs**

Determination of Fourier coefficients (Euler's) – Dirichlet conditions for the existence of Fourier series – functions having discontinuity-Fourier series of Even and odd functions – Fourier series in an arbitrary interval – Half-range Fourier sine and cosine expansions- Parseval's formula-Complex form of Fourier series.

Unit – III	**Fourier transforms**	**9 Hrs**

Fourier integral theorem (without proof) – Fourier sine and cosine integrals-complex form of Fourier integral. Fourier transform – Fourier sine and cosine transforms – Properties – Inverse transforms – convolution theorem.

Unit – IV	**Z - Transforms**	**10 Hrs**

Z-transform – Inverse z-transform – Properties – Damping rule – Shifting rule – Initial and final value theorems. Convolution theorem – Solution of difference equations by z-transforms.

Unit – V	**Interpolation & Numerical Solution of Ordinary Differential Equations**	**9 Hrs**

Finite differences-Newton's forward and backward interpolation formulae – Lagrange's formulae.
Numerical Integration: Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule.
Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Euler's Method, Modified Euler's Method-Runge-Kutta Methods.

Course Outcomes (CO):
Student will be able to

- Understand the concept of Laplace transforms, find the Laplace transforms of different function.
- Apply Laplace & Inverse Laplace transforms to solve Differential Equations.
- Find the Fourier series expression for the different periodic functions.
- Find Fourier Sine and cosine integrals. Understand Fourier transforms. Apply propertiesof Fourier transforms.
- Understand Z transforms, apply Z transforms, to solve difference equations.
- Solve differential and integral equations numerically.

Text Books:

1. B.S.Grewal , "Higher Engineering Mathematics", Khanna publishers.

2. Mathematics II by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad S. Chand publication.

3. Introductory Methods of Numerical Analysis by S. S. Sastry, PHI Learning Pvt. Ltd., New Delhi.

Reference Books:

1. B.V. Ramana, "Higher Engineering Mathematics", Mc Graw Hill publishers.

2. Mathematical Methods by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad S. Chand publication.

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B.Tech. II Year II Semester

ENVIRONMENTAL ENGINEERING

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0113T	3: 0:0:0	3	CIE: 30 SEE:70	3Hours	PCC

Course Objectives:

- To teach requirements of water and its treatment.
- To impart knowledge on distribution system
- To enable with design concepts of water treatment
- To Know the disposal of water

Syllabus **Total Hours:48**

Unit - I	Sources, Quality And Quantity	10 Hrs

Sources, Characteristics - physical, chemical and biological, water demands – types and factors affecting water demand, fluctuations in rate of water demand, design period, population forecasting methods, estimation of dry weather flow and wet weather flow.

Unit - II	Water Treatment Methods	10 Hrs

General layout of water treatment plant, Aeration, Sedimentation, Sedimentation aided with Coagulation, Filtration – Rapid sand filters, Disinfection – methods, Chlorination – types and forms, Membrane processes, Ion exchange process.

Unit - III	Distribution System	9 Hrs

Intakes, types of Intakes, factors governing selection of location for intakes. Requirements of a good distribution system, methods of distribution, systems of supply of water, Distribution reservoirs, layout of distribution system, design and analysis of pipe networks of distribution system – Hardy cross method.

Unit - IV	Hydraulic Design of Sewers	9 Hrs

Hydraulic formulae for design of circular sewers, minimum and maximum velocity of flow in sewers Factors affecting the selection of material, materials for sewers, shapes of sewers, valves and joints, sewer appurtenances.

Unit - V	Sludge Management, Effluent Disposal	10 Hrs

Sludge - Types, Sludge treatment – Thickening, Stabilization/Digestion, Conditioning, Dewatering – Drying/Incineration, Sludge disposal methods. Methods – Dilution, Marine disposal, Land disposal, Self-purification of water bodies, Oxygen Sag Curve, Sewage Sickness. Design of septic tank, Septictank effluent disposal methods.

Course Outcomes (CO): Student will be able to

- Identify the sources of water and wastewater and determine the quality of water
- Identify the intake structures; Analyze and design pipe network system.
- Design circular sewers; Select materials and appurtenances for sewers.
- Select appropriate technique for treatment of water.
- Understand the sludge treatment methods;
- Understand the effluent disposal method and design a septic tank.

Text Books:

1. B.C. Punmia, Wastewater engineering – environmental engineering II, laxmi publications, 2nd edition, 2016.
2. S.K. Garg, Water supply engineering – Environmental Engineering I), Khanna Publishers, 33rd edition, 2019.
3. G. S. Birdi,"Water supply and sanitary Engineering", Dhanpat Rai & Sons Publishers.

Reference Books:

1. Metcalf & Eddy, Inc., Waste water Engineering Treatment and Reuse, McGraw Hill education, 4rth edition, 2017.
2. Ruth F. Weiner and Robin A. Matthews, Environmental Engineering, Butterworth- Heineman. Publishers, 4th edition 2003.
3. B.C. Punmia, Water supply engineering - Environmental engineering I, laxmi publications, 2nd edition, 2016

E Resources:

1. https://nptel.ac.in/courses/103/107/103107084/
2. https://ocw.mit.edu/courses/environment-courses/
3. https://learningpath.org/articles/Free_Online_Environmental_Engineering_Courses_from_Top_Universities.html
4. https://nptel.ac.in/noc/courses/noc19/SEM2/noc19-ge22

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B.Tech. II Year II Semester

STRUCTURAL ANALYSIS-I					
Course Code	**L:T:P:S**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
22A0114T	**3: 0:0:0**	**3**	**CIE: 30 SEE:70**	**3Hours**	**PCC**

Course Objectives:

- To demonstrate analytical methods for determining strength & stiffness and assess stability of structural members.
- To make the student to understand the analysis procedures for analyzing fixed and Continuous beams.
- To enable the student to undergo analysis procedure using slope deflection method andmoment distribution method.
- The concepts of moving loads and influence lines are imparted for assessment of maximumSF and BM at a given section.

Syllabus	**Total Hours:48**

Unit - I	**Energy Theorms**	**10 Hrs**

Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear force – Castigliano's first theorem - Deflections of simple beams and pin jointed trusses-Castigliano's second theorem- Solution of trusses up to two degrees

Unit - II	**Kani 'S Method**	**10 Hrs**

Analysis of continuous beams with and without settlement of supports -Single Bay single storey portal frames with and without side sway.

Unit - III	**Slope-Deflection Method**	**9 Hrs**

Introduction- derivation of slope deflection equation- application to continuous beams with and without settlement of supports- Analysis of single bay, single storey, portal frame including side sway.

Unit - IV	**Moment Distribution Method**	**9 Hrs**

Introduction to moment distribution method- application to continuous beams with and without settlement of supports. Analysis of single storey, portal frames – including Sway

Unit - V	**Moving Loads and Influence Lines**	**10 Hrs**

Introduction maximum SF and BM at a given section and absolute maximum S.F. and B.M due to single concentrated load, U. D load longer than the span, 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 SF, Influence line for BM- load position for maximum SF at a section-Load position for maximum BM at a section, single point load, U.D. load longer than the span, shorter than the span- Influence lines for forces in members of Pratt and Warren trusses.

Course Outcomes (CO): Student willbe able to

- Determine deflection at any point on a beam under simple and combined loads.
- Apply energy theorems for analysis of indeterminate structures
- Analyze indeterminate structures with yielding of supports
- Analyze beams and portal frames using slope deflection and moment distribution methods
- Draw the influence line diagrams for various types of moving loads on beams/bridges

Text Books:

1. C. S. Reddy, "Basic Structural Analysis", Tata McGraw Hill
2. S. Ramamurtham, "Theory of Structures", Dhanpat Rai Publishing Company (p) Ltd,2009

Reference Books:

1. Timoshenko & Young, "Theory of Structures", Tata McGraw Hill
2. S.S. Bhavikatti, "Structural analysis", Volume 1 and 2, Vikas publishing house pvt. Ltd.
3. Dr.Vaidyanathan, Dr.P.Perumal, "Comprehensive structural analysis", Vol-II, Laxmi Publications(P) Ltd.
4. Junarkar S. B., "Structural Mechanics", Vol I & II, Charotar Publishers

E Resources:

1. https://onlinecourses.nptel.ac.in/noc23_ce28

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B.Tech. II Year II Semester

UNIVERSAL HUMAN VALUES
(Common to all branches of Engineering)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
22A0021T	3:0:0:0	3	CIE:30 SEE:70	3 Hours	HSMC

Course Objectives:

1. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
2. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

Syllabus **Total Hours:48**

Unit-I	**Course Introduction - Need, Basic Guidelines, Content and Process for Value Education**	**10 Hrs**

Purpose and motivation for the course, recapitulation from Universal Human Values-I
Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration Continuous Happiness and Prosperity- A look at basic Human Aspirations Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario Method to fulfil the above human aspirations: understanding and living in harmony at various levels. Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as
arbitrariness in choice based on liking-disliking

Unit -II	**Understanding Harmony in the Human Being -Harmony in Myself!**	**9 Hrs**

Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
Understanding the needs of Self ('I') and 'Body' - happiness and physical facility
Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
Understanding the characteristics and activities of 'I' and harmony in 'I'
Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail
Programs to ensure Sanyam and Health.
Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease

Unit-III	**Understanding Harmony in the Family and Society-Harmony in Human-Human Relationship**	**10 Hrs**

Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
Understanding the meaning of Trust; Difference between intention and competence
Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.
Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives

Unit -IV	**Understand the Nature and Existence hole existence as Coexistence**	**9 Hrs**

Understanding the harmony in the Nature
Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature
Understanding Existence as Co-existence of mutually interacting units in all- pervasive space
Holistic perception of harmony at all levels of existence.
Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

Unit -V	**Implications of the above Holistic Understanding of Harmony on Professional Ethics**	**10 Hrs**

Natural acceptance of human values Definitiveness of Ethical Huma Conduct
Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco - friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems.
Case studies of typical holistic technologies, management models and production systems
Strategy for transition from the present state to Universal Human Order:
a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers
b. At the level of society: as mutually enriching institutions and organizations Sum up.
Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. To discuss the conduct as an engineer or scientist etc.

Course Outcomes(CO):

On completion of this course, student will be able to

- Students are expected to become more aware of themselves, and their surroundings (family, society, nature)
- They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
- They would have better critical ability.
- They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
- It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this

direction.

Textbooks:

1. R R Gaur, R Asthana, G P Bagaria, "A Foundation Course in Human Values and Professional Ethics", 2nd
2. Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
3. R R Gaur, R Asthana, G P Bagaria, "Teachers' Manual for A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

Reference Books:

1. Jeevan Vidya: EkParichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantak, 1999.
2. A. N. Tripathi, "Human Values", New Age Intl. Publishers, New Delhi, 2004.TheStory of Stuff (Book).
3. Mohandas Karamchand Gandhi "The Story of My Experiments with Truth"
4.E. FSchumacher. "Small is Beautiful"Slow is Beautiful –Cecile AndrewsJ C Kumarappa "Economy of Permanence" Pandit Sunderlal "Bharat Mein Angreji Raj" Dharampal, "Rediscovering India"
5. Mohandas K. Gandhi, "Hind Swaraj or Indian Home Rule"India Wins Freedom - Maulana Abdul Kalam Azad Vivekananda - Romain Rolland(English) Gandhi - Romain Rolland (English)

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B.Tech. II Year II Semester

MECHANICS OF FLUIDS LAB

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0115P	0:0:3:0	1.5	CIE:30 SEE:70	3H	ESC (Lab)

Course Objectives:

- By performing this laboratory, the student will be able to know the fluid flow measurements by considering different types flow measurement devices and working principles of various pumps and motors.

Syllabus **Total Hours:48**

List of Experiments

1. Verification of Bernoulli's equation
2. Calibration of Venturi meter.
3. Calibration of Orifice meter.
4. Determination of Coefficient of discharge for a small orifice by constant head method
5. Determination of Coefficient of discharge for a small orifice by variable head method
6. Determination of Coefficient of discharge for an external mouth piece by Constant head method
7. Determination of Coefficient of discharge for an external mouth piece by variable head method.
8. Calibration of contracted Rectangular Notch
9. Calibration of contracted Triangular Notch.
10. Determination of major and minor losses.
11. Impact of jets
12. Performance test on Impulse turbines
13. Performance test on centrifugal pumps, determination of operating point and efficiency

List of Equipment:

1. Bernoulli's Apparatus
2. Venturi meter.
3. Orifice Meter
4. Orifice and Mouth piece setup
5. Notch of V and rectangular shape
6. Impulse turbine
7. Single stage & Multi stage centrifugal pump

Course Outcomes:

On completion of this course, the students are able to:

- By performing the various tests in this laboratory the student.
- will be able to know the principles of discharge measuring devices and head loss due to sudden contraction and expansion in pipes and working principles of various pumps and motors.

Text Book(s):.

1. Fluid Mechanics & Hydraulic Machines A Lab Manual by Ts Desmukh (Author), Laxmi Publications (P Ltd 2. Fluid Mechanics & Machinery Laboratory Manual by N Kumara Swamy (Author), Charotar Book Distributors
3. Lab. Manual of Fluid Mechanics & Machines by Gupta, Chandra (Author), cbspd (Publisher)

E-resources:

1. **https://www.youtube.com/watch?v=8iZe_UiBtTc&list=PLZ5iF05Ly-kgGWarGh0iIdUIu4cz7Hrdw**
2. http://eerc03-iiith.vlabs.ac.in/

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B.Tech. II Year II Semester

ENVIRONMENTAL ENGINEERING LAB

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0116P	0:0:3:0	1.5	CIE:30 SEE:70	3H	PCC (Lab)

Course Objectives:

- Identify the characteristics of water sample
- Determine the Physical Parameters of water
- Know the chlorine demand in the water

Syllabus **Total Hours:48**

List of Experiments

1. Determination of pH and Electrical Conductivity (Salinity) of Water and Soil.
2. Determination and estimation of Total Hardness–Calcium & Magnesium.
3. Determination of Alkalinity/Acidity
4. Determination of Chlorides in water and soil
5. Determination and Estimation of total solids, organic solids and inorganic solids and settleable solids by Imhoff Cone.
6. Determination of Iron.
7. Determination of Dissolved Oxygen with D.O. Meter &Wrinklers Method and B.O.D.
8. Physical parameters – Temperature, Colour, Odour, Turbidity, Taste.
9. Determination of C.O.D.
10. Determination of Optimum coagulant dose.
11. Determination of Chlorine demand.

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

- Understand about quality of water and purification process
- Select appropriate technique for treatment of waste water.

Text Book(s)

1. G. S. Birdi "Water supply and sanitary Engineering", Dhanpat Rai & Sons Publishers.
2. Peavy, H.S, Rowe, D. R. Tchobanoglous, "Environmental Engineering", Mc-Graw –Hill International Editions, New York 1985

References:

1. B.C. Punmia, Ashok Jain & Arun Jain, "Water Supply Engineering, Vol. 1, Waste water Engineering, Vol. II", Laxmi Publications Pvt. Ltd, New Delhi.
2. MetCalf and Eddy. "Wastewater Engineering, Treatment, Disposal and Reuse", Tata McGraw- Hill, New Delhi

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B.Tech. II Year II Semester

COMPUTER AIDED DRAFTING LAB					
Course Code	**L:T:P:S**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
22A0117P	**0: 0:3:0**	**1.5**	**CIE:30 SEE:70**	**3Hours**	**PCC LAB**

Course Objectives:

- Introduces Autodesk's AutoCAD software as a design and drafting tool.
- Know the importance of Computer Aided Drafting (CAD) and to Practice CAD, drawing editor and to perform different operations using CAD Commands.
- Provide lectures using AutoCAD software, demonstrating commands via user interface and typed commands.
- Create, manipulate and edit 2D drawings and figure.
- Prepare drawings of different components of building, site plans, single storied buildings, line drawings of public & industrial buildings, working drawings by using CAD 2D and 3D.

Syllabus	**Total Hours: 48Hrs**

List of Experiments

1. Introduction to Computer Aided Drafting.
2. Practice on CAD Software.
3. Detailing of Building Components Using CAD Software.
4. Drawing of Plan, Elevation, Section and Site Plan Of 2BHK Building Using CAD Software.
5. Drawing of Plan, Section & Elevation for Residential Multi Storey Buildings Using CAD Software.
6. Drawing of Plan, Section & Elevation for Primary School Building Using CAD Software.
7. Drawing of Plan, Section & Elevation for Rural Hospital Using CAD Software.
8. Drawing of Plan, Section & Elevation for Industrial Buildings Using CAD Software.
9. Practices 3-D Commands Using CAD Software.
10. Preparation of 3-D Drawings Using CAD Software.

Course Outcomes:

On completion of this course, the students are able to:

- Dimensions a given drawing using standard notation and desired system of dimensioning, Practices drawing different components of buildings.
- A student will know what is plan and how it should be drawn in auto CAD software.
- Practices drawing plan, elevation and section and site plan of residential buildings, and framed structures as per local bye laws.
- Practices drawings to be submitted to Panchayat/Municipality/Corporation for Residential and Commercial building approval.
- Practices 3-D drawings using CAD software.

Reference Books:

1. Drafting and Design (Engineering Drawing Using Manual and CAD Techniques), Kicklighter & Brown – Goodheart-Willcox Publisher.
2. Engineering graphics with Auto CAD - R.B. Choudary , Anuradha Publishes.

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B.Tech. II Year II Semester

Soft Skills Lab					
Course Code	**L:T:P:S**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
22A0029P	**1: 0:2:0**	**2**	**CIE: 30 SEE:70**	**3Hours**	**SOC**

Course Objectives:

- To encourage all round development of the students by focusing on soft skills.
- To make the students aware of critical thinking and problem-solving skills.
- To develop leadership skills and organizational skills through group activities.
- To function effectively with heterogeneous teams.

Syllabus		**Total Hours:48Hrs**
Unit -I	**Soft Skills & Communication Skills**	**10 Hrs**

Introduction, meaning, significance of soft skills –Vital Components of communication skills - Inter-personal skills - Verbal and Non-verbal Communication.

Activities: Narration about self- strengths and weaknesses- clarity of thought - Interpersonal Skills- Group Discussion – Debate – Mutual Understanding - Book and film Reviews by groups - Group leader presenting views (non- controversial and secular) on contemporary issues or on a given topic. Verbal Communication- Oral Presentations- Extempore- brief addresses and speeches- Negotiation skills –Role Play- Non-verbal communication – Public speaking – Mock interviews – Anchoring Skills.

Unit - II	**Critical Thinking**	**9 Hrs**

Active Listening – Observation – Curiosity – Introspection – Analytical Thinking – Open mindedness – Creative Thinking.

Activities: Gathering information and statistics on a topic - sequencing – assorting – reasoning – critiquing issues – placing the problem – finding the root cause - seeking viable solution – judging with rationale – evaluating the views of others - Case Study, Story Analysis.

Unit - III	**Problem Solving & Decision Making**	**9 Hrs**

Meaning & features of Problem Solving – Managing Conflict – Conflict resolution – Methods o decision making – Effective decision making in teams – Methods & Styles.

Activities: Placing a problem which involves conflict of interests, choice and views – formulating the problem – exploring solutions by proper reasoning – Discussion on important professional, career and organizational decisions and initiate debate on the appropriateness of the decision. Case Study & Group Discussion.

Unit - IV	**Emotional Intelligence & Stress Management**	**10 Hrs**

Managing Emotions – Thinking before Reacting – Empathy for Others – Self-awareness – Self-Regulation – Stress factors – Controlling Stress – Tips.

Activities: Providing situations for the participants to express emotions such as happiness, enthusiasm, gratitude, and sympathy, and confidence, compassion in the form of written or oral presentations. Providing opportunities for the participants to narrate certain crisis and stress – ridden situations caused by failure, anger, jealousy, resentment and frustration in the form of written and oral presentation, Organizing Debates.

Unit - V	**Leadership Skills**	**10 Hrs**

Team-Building – Decision-Making – Accountability – Planning – Public Speaking Motivation – Risk Taking - Team Building - Time Management. Activities: Forming group with a consensus among the participants- choosing a leader- encouraging the group members to express views on leadership- democratic attitude- sense of sacrifice – sense of adjustment – vision – accommodating nature- eliciting views on success and failures of leadership using the past knowledge and experience of the participants, Public Speaking,

Activities on Time Management, Motivation, Decision Making, Group discussion etc.

Course Outcomes (CO): Student willbe able to

- Understand the importance of soft skills
- Identify the methods of improving soft skills
- Develop positive thinking
- Develop creative thinking and decision-making skills
- Understand the importance of interpersonal skills
- Analyze various tactics in negotiation skills

Text Books

1. Meenakshi Raman &ShaliniUpadhyay “Soft Skills”,Cengage Learning, 2018.
2. S. Balasubramaniam, “Soft Skills for Interpersonal Communication”,Orient Black Swan,2017.

References

1. Barun K. Mitra, “Personality Development and Soft Skills”, –OXFORD Higher Education2018.
2. AlkaWadkar, “Life Skills for Success“, Sage Publications 2016.
3. Robert M Sheffield, “Developing Soft Skills”, Pearson, 2010.
4. DianaBooher, “Communicate With Confidence”,Tata McGrawhill, 2012.

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B.Tech. II Year II Semester

ENVIRONMENTAL STUDIES (Common to CE, CSE, AI&ML, ECE, EEE, ME)					
Course Code	**L:T:P:S**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
22A0028T	**2: 0:0:0**	**0**	**CIE: 30**	**-**	**MANC**

Course Objectives:

- To make the students to get awareness on environment.
- To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life
- To save earth from the inventions by the engineers.

	Syllabus	**Total Hours: 48 Hrs**
Unit- I	**Multidisciplinary Nature of Environmental Studies and Natural Resources**	**10Hrs**

Definitions, components of Environment, Scope and Importance –Need for Public Awareness

Renewable and non-renewable resources –Forest resources – Use and over – exploitation, deforestation, – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

Unit-II	**Ecosystems**	**9Hrs**

Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers– Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem

a. Grassland ecosystem.
b. Desert ecosystem

Unit-III	**Biodiversity and Its Conservation**	**10Hrs**

Introduction Definition: genetic, species and ecosystem diversity – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values — India as a mega-diversity nation – Hot-spots of biodiversity – Threatto biodiversity: habitat loss, poaching, Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Unit-IV	**Environmental Pollution**	**9Hrs**

Definition, Cause, effects and control measures of:

a. air pollution
b. water pollution
c. noise pollution

Solid Waste Management: Causes, effects and control measures of urban and industrial wastes

Unit-V	**Social Issues and The Environment**	**10Hrs**

From Unsustainable to Sustainable development – Urban problems related to energy –Environment Protection Act. – Air (Prevention and Control of Pollution) act

Definition, Cause, effects and control measures of:
Global warming
Acid rain
Ozone layer depletion
Field Work: Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc.

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

- Recognize the knowledge about environment, natural resources and different techniques involved in its conservation.
- Describe the information about different eco-systems and its functions.
- Explain the different types of bio-diversity along with values and conservation methods.
- Predict various environmental pollutions and able to design the environmentally friendly process in engineering.
- Apply the sustainable development concepts in life, society and industry.

Textbooks:

1. Text book of Environmental Studies for Undergraduate Courses- Erach Bharucha for University Grants Commission, Universities Press.
2. Environmental Studies- Kaushik & kaushik, New Age Pubilishers.

Reference Books:

1. Environmental studies- R.Rajagopalan, Oxford University Press
2. Comprehensive Environmental studies- J.P.Sharma, Laxmi publications.

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B.Tech. III Year I Semester

Semester-5 (Theory-6, Lab-1, SOC-1)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	PCC	22A0118T	Structural Analysis-II	3	0	0	3
2	PCC	22A0119T	Design and Drawing of RCC Structures	3	0	0	3
3	PCC	22A0120T	Soil Mechanics	3	0	0	3
4	OEC/JOE		**Open Elective-I**	3	0	0	3
5	PEC		**Professional elective course-I**	3	0	0	3
6	PCC Lab	22A0124P	Advanced Surveying Lab	0	0	3	1.5
7	PCC Lab	22A0125P	Soil Mechanics Lab	0	0	3	1.5
8	**SOC (Advanced)**	**22A0126P**	**Building Information Modeling**	**1**	**0**	**2**	**2**
9	MANC	22A0032T	Research Methodology	2	0	0	0
Community service project 2 Months (Mandatory) after second year (to be evaluated during V semester)				0	0	0	1.5
				Total credits			**21.5**

Member Secretary

Head of the Department
Dept. of Civil Engineering
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GANGAVARAM (V), Kovur (M),
S.P.S.R. Nellore Dt. A.P Pin 524 137

Head of the department

Open Elective-I

SL. No	Course Code	Branch	Course Name
1	22A0512T	CSE & Allied branches	Data Base Management system
2	22A0216T	EEE	Power electronics
3	22A0430T	ECE	Principles of Communication system
4	22A0323Ta	MECH	Automobile Engineering
5	22A0334Tc		Fundamentals of Drone Technology

Professional Elective I

SL. No	Course Code	Course Name
1	22A0121T	Water resources engineering
2	22A0122T	Air Pollution & Control
3	22A0123T	Construction Technology & Project Management

Category	CREDITS
Professional core Courses(PCC)	12
Professional Elective courses(PEC)	3
Open Elective Course/Job oriented elective(OEC/JOE)	3
Skill advanced course/ soft skill course*(SOC)	2
Summer Internship	1.5
TOTAL CREDITS	**21.5**

Member Secretary

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Head of the department

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B.Tech. III Year I Semester

STRUCTURAL ANALYSIS-II

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	CourseType
22A0118T	3:0:0:0	3	CIE:30 SEE:70	3Hours	PCC

Course Objectives:

- Ability the behaviour of arches and their methods of analysis
- Ability to analyse the beam and frames for vertical and horizontal loads and draw SFD and BMD
- To ability the effect of support settlements for indeterminate structures. Able to calculate forcesin members of truss due to load by stiffness method.
- Ability to analyse and perform plastic analysis on various structural elements.

Syllabus		TotalHours:48Hrs
Unit-I	**Arches**	**9 Hrs**

Introduction- hinges-transfer of load to arches-linear arch-hinges in the arch-arch action-Horizontal force – three hinged arches – circular arches – springs at different level-Two hinged arches- two hinged circular arches – fixed arches (only theory) - Temperature stresses in arches.

Unit-II	Cables & Suspension Bridges	10Hrs

Cables Equation of the cable subjected to uniformly distributed load, Horizontal tension in the cable, Tension in the cable supported at different levels, Length of the cable, Effect of change in temperature, Introduction to suspension bridges

Unit-III	Flexibility Method	9Hrs

Flexibility methods- Introduction- Application to continuous beams including support settlements- Analysis of Single Bay single storey portal frames without and with side sway.

Unit-IV	Stiffness Method	10Hrs

Stiffness methods- Introduction-application to continuous beams including support settlements- Analysisof Single Bay single storey portal frames without and with side sway.

Unit-V	Plastic Analysis	10Hrs

Introduction- definition of plastic hinge and plastic moment capacity – Assumptions- shape factor- shapefactor for general sections – collapse load – basic theorems for finding collapse loads-methods of plastic analysis-static method-kinematic method kinematic method applied to beams and simple frames- beam mechanism-sway mechanism combined mechanism.

Course Outcomes (CO): Student will be able to

- To demonstrate the behaviour of arches and their methods of analysis
- To use various classical methods for analysis of indeterminate structures
- Ability to analyse the beam and frames for vertical and horizontal loads and draw SFD and BMD
- To determine the effect of support settlements for indeterminate structures.
- Able to Calculate forces in members of truss due to load by stiffness method.
- Ability to analyse and perform plastic analysis on various structural elements.

Text Books:

1. S.S. Bhavikatti, "Structural analysis", Volume 1 and 2, Vikas publishing house pvt. Ltd.
2. Analysis of structures by Vazrani&Ratwani – Khanna Publications.
3. Theory of structures by Ramamuratam, jain book depot , New Delhi 9th edition 2015

Reference Books:

1. Structural Analysis: A Unified Approach, by D S Prakash Rao, Universities Press
2. Structural analysis by R.S.Khurmi, S.Chand Publications, New Delhi 2020 edition
3. Basic Structural Analysis by K.U.Muthu*et al.*,I.K.International Publishing House Pvt.Ltd 3rd edition 2017
4. Theory of Structures by Gupta S P, G S Pundit and R Gupta, Vol II, Tata Mc Graw Hill Publications company Ltd.

E Resources:

1. https://archive.nptel.ac.in/courses/105/105/105105166/
2. https://archive.nptel.ac.in/courses/105/101/105101086/
3. https://www.youtube.com/watch?v=KSRwZVh00q8

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B.Tech. III Year I Semester

DESIGN AND DRAWING OF RCC STRUCTURES					
Course Code	**L:T:P:S**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
22A0119T	**3: 0:0:0**	**3**	**CIE: 30 SEE:70**	**3Hours**	**PCC**

Course Objectives:

- To teach the students about the design of reinforced concrete beam, column, slab, footing and retaining wall.
- To enable the students to understand the various design philosophies based on both working stress and limit state methods.
- To enhance competence in design of reinforced concrete structures.
- To understands the concepts of designing reinforced cement concrete structures.
- To familiarize the students with the concepts of designing concrete mixes using different methods of proportioning and to understand the effects of various parameters.

Syllabus		**Total Hours:48Hrs**
Unit - I	**Introduction to RCC**	**10 Hrs**

Concepts of Reinforced concrete Design – Introduction to Working Stress Method - Limit State method – Material Stress- Strain Curves – Safety factors – Characteristic values. Stress Block parameters – IS – 456:2000 (Reaffirmed 2021)

Beams: Limit state analysis and design of singly reinforced, doubly reinforced, T beam section.

Unit - II	**Shear and Torsion**	**10 Hrs**

Limit state analysis and design of section for shear and torsion – Concept of bond, anchorage and Development length, I.S. code provisions. Design examples in simply supported and continuous beam detailing. Limit state design for serviceability for deflection, cracking and codal provision.

Unit - III	**Slabs & Staircase**	**10 Hrs**

Design of one-way slab, Two-way slabs and continuous slab using I.S. Coefficients, Limit state Design for serviceability for deflection, cracking and IS code provision. Design of doglegged staircase.

Unit - IV	**Columns**	**9 Hrs**

Short and Long columns – Under axial loads, Uniaxial bending and biaxial bending – I S Code Provisions.

Unit - V	**Footings**	**9 Hrs**

Different types of footings – Design of isolated, square, rectangular, Trapezoidal footings

Codes/Tables: IS – 456:2000 (Reaffirmed 2021) and relevant sheets (Pertaining to columns) of SP 16 Code books to be permitted into the examinations Hall.

FINAL EXAMINATION PATTERN:

The end examination paper should consist of Part A and Part B. Part A consists of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions on design out of which three are to be answered. Weightage for Part – A is 40% and Part-B is 60%.

NOTE : All the designs to be taught in Limit State Method

Following plates should be prepared by the students: 1. Reinforcement particulars of T-beams andL-beams. 2. Reinforcement detailing of continuous beams. 3. Reinforcement particulars of columns and footings. 4. Detailing of One way, two way and continuous slabs.

Course Outcomes (CO):

On completion of this course, student will be able to

- Classify the basic concepts of reinforced concrete analysis and design.
- Classify the behavior and various modes of failure of reinforced concrete members.
- Analyze and design various reinforced concrete members such as beams, columns, footings and slabs
- Draw the section and reinforcement details for columns using IS code provisions,
- Draw the section and reinforcement details for the footings and stair cases.

Textbooks:

1. Limit state designed of reinforced concrete by P. C. Varghese, Prentice Hall of India, New Delhi.
2. Structural Design and Drawing: Reinforced Concrete and Steel, Fourth Edition, N Krishna Raju, Universities Press, 2022.

Reference Books:

1. Limit State Design of Reinforced Concrete by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, Publications Pvt. Ltd., New Delhi
2. Fundamentals of reinforced concrete by N. C. Sinha and S. K Roy, S. Chand publishers
3. Design of Reinforced concrete structures by N.Subramanian, Oxford university press.
4. IS 456- 2000 Code of practice for Reinforced Concrete Structures.

E Resources:

https://nptel.ac.in/courses/105105105

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B.Tech. III Year I Semester

Soil Mechanics					
Course Code	**L:T:P:S**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
22A0120T	**3:0:0:0**	**3**	**CIE:30 SEE:70**	**3Hours**	**PCC**

Course Objectives:

- To enable the student to find out the index properties of the soils and their classification.
- To enable the student to determine permeability of soils using various methods, and to understand the concept of seepage of water through soil
- To concept of seepage of water through soil
- To enable the students to find understand the difference between compaction and consolidation.
- To impart knowledge on shear strength and its importance

Syllabus		**Total Hours:48**
Unit-I	**Soil Classification**	**10 Hrs**
Soil formation – Soil structure – Adsorbed water – Mass- Volume relationship – Relative density. Index Properties Of Soils: Moisture Content, Specific Gravity, In-situ density, Grain size analysis – Sieve and Hydrometer methods – Consistency limits and indices – I.S. Classification of soils.		
Unit-II	**Permeability**	**10 Hrs**
Soil water – Capillary rise – flow of water through soils – Darcy's law. permeability – Factors affecting – Laboratory determination of coefficient of permeability – Permeability of layered systems. Total, neutral and effective stresses –Quick sand condition –Seepage through soils – Flownets: Characteristics and Uses.		
Unit-III	**Stress Distribution & Compaction**	**9 Hrs**
Boussinesq's and Wester guard's theories for point loads and areas of different shapes – Newmark's influence chart. Compaction: Mechanism of compaction – Factors affecting – effects of compaction on soil properties. – Field compaction Equipment – Compaction control		
Unit-IV	**Consolidation**	**10 Hrs**
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's 1-D consolidation theory – coefficient of consolidation: square root time and logarithm of time fitting methods.		
Unit-V	**Shear Strength of Soils**	**9Hrs**

Importance of shear strength – Mohr's– Coulomb Failure theories – Types of laboratory tests for strength parameters – strength tests based on drainage conditions – strength envelops – Critical void ratio –Liquefaction

Course Outcomes (CO): Student will be able to

1. Classify soils based on their physical and index properties as per IS classification systems.
2. Analyse soil permeability and seepage problems using Darcy's law and flow net concepts.
3. Apply stress distribution theories and settlement analysis to predict soil behavior under loading.
4. Evaluate shear strength of soils using experimental methods and interpret test results.
5. Apply different compaction methods for enhancing soil properties

TEXT BOOKS:

1. Soil Mechanics and Foundation Engg. By K.R. Arora, Standard Publishers and Distributors Delhi 7th edition 2009
2. Geotechnical Engineering by C. Venkataramiah, New age International Pvt . Ltd, (2002).

REFERENCE BOOKS:

1. Soil Mechanics and Foundation by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi 17th edition 2017
2. Geotechnical Engineering by Iqbal H.Khan, PHI pubilishers 4th edition.
3. Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New age International Pvt . Ltd, New Delhi 3rd edition 2016

E Resources:

https://nptel.ac.in/courses/105101201 **https://nptel.ac.in/courses/105105185**

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B.Tech. III Year I Semester

WATER RESOURCES ENGINEERING

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0121T	3: 0:0:0	3	CIE: 30 SEE:70	3Hours	PE-I

Course Objectives:

- To Illustrate hydrologic cycle and its relevance to Civil engineering
- To teach students understand physical processes in hydrology & components of the hydrologic cycle
- To demonstrate concepts and theory of physical processes and interactions
- To impart on measurement and estimation of the components hydrologic cycle.
- To provide an overview and understanding of Unit Hydrograph theory, flood frequency and its analysis

Syllabus		**Total Hours:48**
Unit- I	**Introduction & Precipitation**	**10 Hrs**

Introduction: Engineering hydrology and its applications, Hydrologic cycle, hydrological data-sources of data. **Precipitation:** Types and forms, measurement, rain gauge network, presentation of rainfall data, average rainfall, continuity and consistency of rainfall data, frequency of rainfall, Intensity-Duration-Frequency (IDF) curves, Depth-Area-Duration (DAD) curves, Probable Maximum Precipitation (PMP), design storm

Unit - II	**Abstractions from Precipitation**	**10 Hrs**

Initial abstractions. Evaporation: factors affecting, measurement, reduction Evapo-transpiration: factors affecting, measurement, control - Infiltration: factors affecting, Infiltration capacity curve, measurement, infiltration indices.

Unit - III	**Runoff and Hydrograph analysis**	**10 Hrs**

Runoff: Catchment characteristics, Factors affecting runoff, components, computation- empirical formulae, tables and curves, stream gauging, rating curve, flow mass curve and flow duration curve. **Hydrograph analysis:** Components of hydrograph, separation of base flow, effective rainfall hyetograph and direct runoff hydrograph, unit hydrograph, assumptions, derivation of unit hydrograph, hydrographs of different durations, principle of superposition and S-hydrograph methods, limitations and applications of unit hydrograph, synthetic unit hydrograph – Floods: Causes and effects

Unit - IV	**Ground water**	**9 Hrs**

Groundwater: Occurrence, types of aquifers, aquifer parameters, porosity, specific yield permeability, transmissivity and storage coefficient, types of wells, Darcy's law, Dupuit's equation- steady radial flow to wells in confined and unconfined aquifers, yield of an open well-recuperation
test

Unit - V	**Introduction to Irrigation**	**9 Hrs**

Introduction-necessity and impotence of irrigation-advantages and ill-effects of irrigation; types of irrigation; methods of application of water; quality for irrigation water; duty and delta; duty at various places; relation between duty and delta; factors affecting duty; methods of improving duty soil-water-plant relationship, limiting soil moisture conditions, depth and frequency of irrigation.

Course Outcomes (CO): Student will be able to

- Understand of the theories and principles governing the hydrologic processes.
- Identify major hydrologic components and apply key concepts to several practical areas of engineering hydrology and related design aspects.
- Develop Intensity-Duration-Frequency and Depth-Area Duration curves to design hydraulic structures.
- Determine aquifer parameters, yield of wells and model hydrologic processes.
- Understand duty and delta & soil, water, plant relationships.
- Understand Design the Hydraulic structures.

TEXT BOOKS:

1. Irrigation and water power engineering by Punmia& Lal, Laxmi publications pvt. Ltd., New Delhi 17th edition 2021
2. Engineering Hydrology by K. Subramanya, The Tata Mcgraw Hill Company, Delhi 5th edition 2020

Reference Books:

1. Irrigation Engineering and Hydraulic structures by S. K. Garg; Khanna Publishers, Delhi 36th edition
2. Engineering Hydrology by Jayarami Reddy, Laxmi publications pvt. Ltd., New Delhi 3rd edition 2016
3. Irrigation and Water Resources & Water Power by P.N.Modi, Standard Book House 6th edition 2020

E Resources:

https://nptel.ac.in/courses/105105110
https://nptel.ac.in/courses/105108130

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B.Tech. III Year I Semester

AIR POLLUTION & CONTROL

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0122T	3:0:0:0	3	CIE:30 SEE:70	3Hours	PE-I

Course Objectives:

- To identify the sources of air pollution
- To understand the working of air pollution control equipment's
- To know the pollutants dispersion models
- To know the composition and structure of atmosphere
- To know the Management of air quality

Syllabus		TotalHours:48
Unit-I	**Introduction to Air pollution**	**9 Hrs**

Sources, effects on –ecosystems, characterization of atmospheric pollutants, air pollution episodes of environmental importance. Indoor Air Pollution–sources, effects.

Unit-II	Meteorology	10Hrs

Composition and structure of the atmosphere, wind circulation, solar radiation, lapse rates, atmospheric stability conditions, wind velocity profile, Maximum Mixing Depth (MMD), Temperature Inversions, Wind rose diagram.

Unit-III	Plume behavior	9Hrs

General characteristics of stack emissions, plume behavior, heat island effect. Pollutants dispersion models –description and application of point, line and areal sources. Monitoring of particulate matter and gaseous pollutants –respirable, non-respirable and Nano -particulate matter. CO, CO2, Hydrocarbons (HC), SOX and NOX, photochemical oxidants.

Unit-IV	Control of Particulates and Gaseous Pollutants	10Hrs

Air Pollution Control equipment for particulate matter & gaseous pollutants–gravity settling chambers, centrifugal collectors, wet collectors, fabric filters, electrostatic precipitator (ESP). –Adsorption, Absorption, Scrubbers, Condensation and Combustion.

Unit-V	Air Quality Management	10Hrs

Monitoring of SPM, SO; NO and CO Emission Standards.

Course Outcomes (CO): Student will be able to

1. Identify the sources of air pollution and understand the Effects of Air pollutants.
2. Know about the Meteorology and plume Dispersion
3. Know about the general characteristics of stack emissions and their behavior
4. Know about the Applications in the removal of gases
5. Understand the General Methods of Control, Control of particulates.
6. Know about the Management of air quality

TEXT BOOKS:

1. Air Quality by Thod godish, Levis Publishers, Special India Edition,New Delhi
2. Air pollution By M.N. Rao and H.V.N.Rao – Tata Mc.Graw Hill Company.
3. Air pollution by Wark and Warner- Harper & Row, New York.
4. WarkK, Warner C.F., and Davis W.T., "Air Pollution -Its Origin and Control", Harper & Row Publishers, New York.
5. Lee C.C., and Lin S.D., "Handbook of Environmental Engineering Calculations", McGraw Hill, New York

REFERENCE BOOKS:

1. An introduction to Air pollution by R.K. Trivedy and P.K. Goel, B.S.Publications.
2. Air Pollution and Control by K.V.S.G.Murali Krishna, Kousal & Co. Publications, New Delhi.
3. Enivronmental meteorology by S.Padmanabham murthy, I.K. Internationals Pvt Ltd,New Delhi.

E Resources: **https://youtu.be/5dukz1UOtkA** **https://youtu.be/4AuwG2G_ERU** **https://youtu.be/F5mlfT3Sc7U** **https://youtu.be/XTzyZUBVf2M**

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B.Tech. III Year I Semester

Construction Technology & Project Management

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0123T	3: 0:0:0	3	CIE: 30 SEE:70	3Hours	PE-I

Course Objectives:

- To create construction project cost estimates.
- Analyze construction documents for planning and management of construction processes.
- Understand the legal implications of contract, common, and regulatory law to manage a construction project.
- Understand different methods of project delivery and the roles and responsibilities of all constituencies involved in the design and construction process.

Syllabus		Total Hours:48
UNIT - I	**Engineering Economy & Safety in Construction**	**10 Hrs**

Engineering Economy: Principle of Engineering Economy, Minimum cost point analysis, Breakeven point analysis, Depreciation and depletion.

Safety In Construction: Causes, classification, cost and measurement of an accident, safety programme for construction, protective equipment, accident report, safety measure: (a) For storage and handling of building materials. (b) Construction of elements of a building (c) In demolition of buildings

UNIT - II	**Construction Planning**	**10 Hrs**

Construction Planning: Need of construction planning, Constructional Resources, construction team, stages in construction, preparation of construction schedule, Job layout, inspection and quality control.

UNIT - III	**Construction Management**	**9 Hrs**

Resources Management and Inventor- Basic Concepts Equipment Management, Material Management Inventory Control.

UNIT - IV	**Accounts Management and Quality Control**	**10 Hrs**

Accounts Management – Basic Concepts, Accounting System and Book Keeping, Depreciation, Balance Sheet, Profit and Loss Account, Internal Auditing. Quality Control by Statistical Methods, Sampling Plan and Control Charts, Safety Requirements.

UNIT - V	**Cost and Financial Management, Laws**	**9 Hrs**

Cost and Financial Management – Cost Volume Relationship, Cost Control System, Budget Concept of Valuation, Cost of Equity Capital Management Cash. Labor and Industrial; Laws – Payment of Wages Act. Contract Labor, Workmen's Compensation, Insurance, Industrial Disputes Act.

Course Outcomes (CO):
Student will be able to

- Engineering Economy and safety of construction.
- Prepare construction documents for planning and management of construction.
- Adopting the most effect method for meeting the requirements.
- To produce a functionally and financially viable project.
- Implement different methods of project delivery.
- Follow the legal provisions implied

Text Books:

1. Construction Project Management by Jha ,Pearson Pubilications,New Delhi.
2. Construction Technology by Subir K.Sarkar and Subhajit Saraswati – Oxford Higher Education- Univ.Press, Delhi.

References:

1. Project Planning and Control with PERT and CPM by Dr.B.C.Punmia, K.K.Khandelwal, Lakshmi Publications New Delhi 2022 edition

E Resources:

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

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B.Tech. III Year I Semester

ADVANCED SURVEYING LABORATORY

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0124P	**0:0:3:0**	**1.5**	**CIE:30 SEE:70**	**3Hours**	**PCC LAB**

Course Objectives: This course will enable students to

- Understand the use of Total station in field
- Know about Q-GIS software and mapping the points

Syllabus	**Total Hours:48Hrs**

List of Experiments

1. Determination of land area using total station.
2. Traversing using total station.
3. Contouring using total station.
4. Determination of building height using total station.
5. Distance, gradient, Diff. height between two inaccessible points using total stations.
6. Creating a simple map using Q-GIS
7. Creating Park map in Q-GIS
8. Contour Mapping in QGIS
9. Finding an optimal location using GIS

Course Outcomes:

On completion of this course, the students are able to:

- Locate the point field through the Total station.
- Determine the area, contours and height of building through Total station
- Mapping the points in Q GIS
- Drawing Layouts points through Q GIS

Reference Books:

1. S K Duggal, "Surveying" (Vol – 1 & 2), Tata McGraw Hill Publishing Co. Ltd. New Delhi, 2004.
2. . B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain,"Surveying" (Vol – 1, 2 & 3), - Laxmi Publications (P) ltd., New Delhi.

E Resources:

https://nptel.ac.in/courses/105104100
https://www.youtube.com/watch?v=xaQz-VBaHKU
https://www.youtube.com/watch?v=quUVfeXOg7I

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B.Tech. III Year I Semester

SOIL MECHANICS LAB

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0125P	0:0:3:0	1.5	CIE:30 SEE:70	3Hours	PCC LAB

Course Objectives: This course will enable students to

- The object of the course is to enable the students to know the various characteristics of soils
- To carry out laboratory tests and to identify soil as per IS code procedures
- To perform laboratory tests to determine index properties of soil
- To perform tests to determine shear strength
- To perform consolidation test to determine the characteristics of soils

Syllabus **Total Hours:48Hrs**

List of Experiments

1. Specific gravity
2. Differential free swell (DFS)
3. Grain size Distribution
4. Field density-Core cutter and Sand replacement methods
5. Atterberg's Limits.
6. Proctor Compaction test
7. CBR Test
8. Direct Shear test
9. Vane Shear test
10. Unconfined Compression test
11. Hydrometer Analysis Test (Demonstration)
12. Consolidation test (Demonstration)
13. Permeability of soil - Constant and Variable head tests

Course Outcomes:

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

- Identify various soils based on their characteristics.
- Evaluate permeability and seepage of soils.
- Determine plasticity characteristics of various soils.
- To perform tests to determine shear strength
- Understand the consolidation process and thereby predicting the settlement of soils.

Reference Books:

1. Soil Mechanics and Foundation by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi publications Pvt. Ltd., New Delhi 17th edition 2017.

2. Basic and Applied Soil Mechanics by Gopal Ranjan & A. S. R. Rao, New age International Pvt . Ltd, New Delhi

3 rd edition 2016. 3. Principles of Geotechnical Engineering by Braja M. Das Cengage Learning

E Resources:

https://nptel.ac.in/courses/105101160

https://www.youtube.com/results?search_query=videos+on+soil+mechanics+laboratory

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B.Tech. III Year I Semester

Building Information Modeling

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0126P	1:0:2:0	2	CIE:30 SEE:70	3H	SOC (Advanced)

Course Objectives:

This course will enable students:

- To retrieve information from a BIM model and how to use common modeling tools
- To efficiently implement the BIM process to coordinate and communicate design intents as well as to convey data necessary for further building analysis
- To learn the essential concepts of BIM, and the basic technical skills to create and manipulate a BIM model
- To interpret field of BIM applications by providing a general lexicon
- To summarize overview of the main BIM applications currently in use

Syllabus		TotalHours:48Hrs
Unit-I	**BIM in Design Coordination**	**10 Hrs**
Improve our understanding of how to retrieve, analyze and integrate information into aid decision making by using relevant BIM tools.		
Unit-II	**BIM in Construction Operations**	**10 Hrs**
It reviews various BIM approaches and applications that can be used for planning and managing construction, including the simulation of design stages and logistics, building ability forecasts and collision detection.		
Unit-III	**BIM in Business and Practice**	**9 Hrs**
The possibility of carrying out a case study with regard to company interests and the ways in which businesses apply BIM approaches and protocols. In order to align its business strategy with that of the company, you will assist in preparing and implementing a Business Integrated Management Strategy and Implementation Plan.		
Unit-IV	**BIM in Operation and Maintenance**	**9 Hrs**
Assess the role of Building Information Management in relation to building and facility operation and maintenance, as well as challenges associated with BIM (FM) integration		
Unit-V	**Low/Zero-Impact Buildings**	**10 Hrs**
Specifies how BIM plays a role in the design and operation of comfortable buildings, which significantly reduce or remove their energy consumption. You will examine the impact of Part L, BREEAM, LEED and EPC ratings on low or zero carbon and renewable energy technologies, as well as the use of BIM to assess the environmental performance of buildings.		

Course Outcomes (CO): Student will be able to

- To communicate and evaluate project activities, use BIM to simulate construction schedules and logistics.
- To Identify the BIM framework to forecast build ability scenarios such as interference management and collision detection.
- To assess low zero carbon and renewable energy technologies
- To evaluate the environmental performance of buildings, use Building Information Modeling and low zero carbon technology.
- To develop a proper view of such techniques, the course will provide an in depth overview of major BIM applications that are already being used.

Text Book(s):.

1. BIM Handbook: A Guide to Building Information Modeling - Chuck Eastman, et al.
2. Building Information Modeling: A Strategic Implementation Guide - Dana K. Smith and Michael Tardif

Reference Book(s):

1. Building Information Modeling: Planning and Managing Construction Projects with 4DCAD and Simulations - Willem Kymmell
2. BIM & Construction Management: Proven Tools, Methods, & Workflows -Brad Hardin

E-resources:

1. https://www.coursera.org/lecture/bim-fundamentals/203-necessity-of-bim-u4nue
2. https://www.4dvirtual-lab.com/bim/

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B.Tech. III Year I Semester

RESEARCH METHODOLOGY

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
22A0032T	3-0-0	0	-	-	MANC

Course Objectives:

1. To understand the basic concepts of research and research problem
2. To make the students learn about various types of data collection and sampling design
3. To enable them to know the method of statistical evaluation
4. To make the students understand various testing tools in research
5. To make the student learn how to write a research report
6. To create awareness on ethical issues n research

Syllabus		**Total Hours: 30Hrs**
Module-I	**Foundations of Research**	**6 Hrs**

Meaning of Research –Objectives of Research –Types of Research –Research Approaches –Guidelines for Selecting and Defining Research Problem –Research Design –Concepts related to Research Design –Basic Principles of Experimental Design.

Module-II	**Sampling Design**	**7 Hrs**

Sampling Design –steps in Sampling Design –Characteristics of a Good Sample Design –Random Sampling Design. Measurement and Scaling Techniques-Errors in Measurement –Tests of Sound Measurement – Scaling and Scale Construction Techniques –Time Series Analysis –Interpolation and Extrapolation. Data Collection Methods –Primary Data –Secondary data –Questionnaire Survey and Interviews.

Module-III	**Data Analysis**	**6 Hrs**

Correlation and Regression Analysis –Method of Least Squares –Regression vs Correlation –Correlation vs Determination –Types of Correlations and Their Applications

Module-IV	**. Interpretation of Data**	**6 Hrs**

Statistical Inference: Tests of Hypothesis –Parametric vs Non-parametric Tests –Hypothesis Testing Procedure –Sampling Theory –Sampling Distribution –Chi-square Test –Analysis of variance and Co-variance –Multivariate Analysis

Module-V	**Report Writing and Professional Ethics**	**5 Hrs**

Report Writing and Professional Ethics: Interpretation of Data –Report Writing –Layout of a Research Paper –Techniques of Interpretation-Making Scientific Presentations in Conferences and Seminars – Professional Ethics in Research.

Course Outcomes (CO):

On completion of this course, student will be able to

- Understand basic concepts and its methodologies
- Demonstrate the knowledge of research processes
- Read. comprehend and explain research articles in their academic discipline
- Analyze various types of testing tools used in research
- Design a research paper without any ethical issues

Textbooks:

1. C.R.Kothari,"Research Methodology: Methods and Techniques",2nd edition, New Age International PublishersMathis,JohnH. Jackson,
2. AStep by Step Guide for Beginners,"Research Methodology": Ranjit Kumar, Sage Publications.

Reference Books:

1. P.Narayana Reddy and G.V.R.K.Acharyulu, "Research Methodology and Statistical Tools", 1stEdition,Excel Books,New Delhi.
2. Donald R. "Business Research Methods", Cooper & Pamela S Schindler, 9thedition.
3. S C Gupta, "Fundamentals of Statistics",7thedition Himalaya Publications

E-resources:

https://nptel.ac.in/courses/127/106/127106227/

Open Elective-I

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B.Tech. III Year I Semester

DATABASE MANAGEMENT SYSTEMS

(Common to CE,EEE,ME and ECE)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0512T	3:0:0:0	3	CIE: 30 SEE:70	3 Hours	OEC

Course Objectives:

This course will enable students to:

- To teach the role of database management system in an organization.
- To design databases using data modeling and Logical database design techniques.
- To construct database queries using relational algebra and calculus and SQL.
- To explore implementation issues in database transaction.
- To familiarize database security mechanisms.

Course Outcomes (CO):

On completion of this course, student will be able to

- Understand the Basic Concepts of Database languages, Relational model, SQL.
- Choose the specific Data models for large enterprise database design.
- Analyze the data efficiently through SQL instructions.
- Apply Normal forms on database for eliminating the redundancy.
- Demonstrate the Basic Concepts of transaction management techniques.
- Apply concurrency control techniques for Database recovery.

Syllabus		Total Hours:48
Module-I	**Introduction to Database concepts and Modeling**	**10Hrs**

Conceptual Modeling Introduction: Introduction to Data bases, Purpose of Database Systems, View of Data, Data Models, Database Languages, Database Users, Database Systems architecture.

The Entity-Relationship Model: Overview of Database Design, Beyond ER Design, Entities, Attributes and Entity sets, Relationships and Relationship sets, Conceptual Design with the ER Model.

Module-II	Relational Model, Relational Algebra	9Hrs

Relational Model: Introduction to the Relational Model – Integrity Constraints over Relations, Enforcing Integrity constraints, querying relational data, Logical data base Design, Views.

Relational Algebra: Introduction to Relational algebra, selection and projection, set operations, renaming, joins, division.

Module-III	SQL	10Hrs

SQL: Basic form of SQL Query, DDL, DML queries, Views in SQL, Joins, Nested & Correlated queries, Operators, predefined functions, Aggregate Functions.

PL/SQL: Introduction, Functions & Procedures, Triggers, Cursors.

Module-IV	Normalization	9Hrs

Relational database design: Introduction, Functional Dependencies (FDs), Normalization for relational databases: 1NF, 2NF, 3NF and BCNF, Basic definitions of Multi Valued Dependencies, 4NF and 5NF.

Module-V	Transaction Management &Concurrency Control and Recovery	10Hrs

Transaction Management: Transaction processing, Transaction Concept, Transaction States, Implementation of Atomicity and Durability, Concurrent Executions.

Concurrency Control: Lock-Based Protocols, Timestamp- Based Protocols, Validation-Based Protocols, Multiple Granularity.

Recovery: Failure Classification, Recovery and Atomicity, Log-Based Recovery.

Text Books:

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, 6th Edition, Tata McGraw-Hill Publishing Company,2017.
2. Raghu Ramakrishnan, Database Management System, 3rd Edition, Tata McGraw-Hill Publishing Company, 2014.

Reference Books:

1. Peter Rob, A.Ananda Rao, Corlos Coronel, Database Management Systems (for JNTU), Cengage Learning, 2011.
2. Hector Garcia Molina, Jeffrey D. Ullman, Jennifer Widom, Database System Implementation, 1st Edition, Pearson Education, United States, 2000.
3. E. Ramez and Navathe, Fundamental of Database Systems, 7th Edition, Pearson Education
4. R.P. Mahapatra & Govind Verma, Database Management Systems, Khanna Publishing House, 2016.
5. Carlos Coronel and Steven Morris, Database Systems: Design, Implementation, and Management, 12th edition, Cengage Learning,2016.
6. John V. ,Absolute beginner's guide to databases, Petersen, QUE

Web Resources:

1. https://www.coursera.org/learn/database-management
2. https://www.coursera.org/learn/sql-data-science
3. https://www.w3schools.com/sql/
4. https://www.youtube.com/watch?v=fHAfc7Hjq28&list=PLWPirh4EWFpGrpcMfZ6UcdI786QdtSxV8
5. https://www.youtube.com/watch?v=HwmEcudlv44&list=PL4OCRJojkV1jN-Ed6RkQpWfBvqe0utRd6
6. http://www.w3schools.in/dbms/
7. https://www.geeksforgeeks.org/dbms/
8. https://www.javatpoint.com/dbms-tutorial
9. https://www.edureka.co/blog/dbms-tutorial/

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B.Tech. III Year I Semester

POWER ELECTRONICS
(Common to all Except EEE)

Course Code	L:T:P	Credits	Exam marks	Exam Duration	Course Type
22A0216T	**3:0:0**	**3**	**CIE:30 SEE:70**	**3 Hours**	**ESC**

Course Objectives:

The objectives of the course are to make the students learn about:

1. Get an overview of semi-conductor devices (such as PN junction diode & Transistor) and their switching characteristics.
2. Understand the characteristics of AC to DC converters.
3. Understand about the practical applications Electronics in industries

Syllabus		**Total Hours: 49 Hrs**
Unit-I	**POWER SEMI CONDUCTOR DEVICES -I**	**10 Hrs**

Classification of Switching Devices Based on Frequency and Power Handling Capacity , Thyristors – Silicon Controlled Rectifiers (SCR's) – TRIACs, GTOs - Characteristics and Principles of Operation and other Thyristors.

Unit-II	**POWER SEMI CONDUCTOR DEVICES-II**	**10 Hrs**

BJT – Power Transistor - Power MOSFET – Power IGBT – Static Characteristics – Turn On and Turn Off Methods SCR- Dynamic Characteristics of SCR - Two Transistor Analogy – Triggering Circuits- Series and Parallel Connections of SCR's – Specifications and Ratings of SCR's, BJT, IGBT

Unit -III	**PHASE CONTROLLED CONVERTERS**	**9 Hrs**

Phase Control Technique – Single Phase Line Commutated Converters – Mid Point and Bridge Connections – Half Controlled Converters, Fully Controlled Converters with Resistive, RL Loads and RLE Load– Derivation of Average Load Voltage and Current – Effect of Source Inductance – Numerical Problems.

Unit -IV	**INVERTERS**	**10 Hrs**

Inverters – Single Phase Inverter – Basic Series Inverter – Basic Parallel Capacitor Inverter Bridge Inverter – Waveforms – Simple Forced Commutation Circuits for Bridge Inverters – Single Phase Half and Full Bridge Inverters-Pulse Width Modulation Control-Harmonic Reduction Techniques-Voltage Control Techniques for Inverters – Numerical Problems,

Unit -V	**AC VOLTAGE CONTROLLERS & CYCLO CONVERTERS**	**10 Hrs**

AC Voltage Controllers – Single Phase Two SCR's in Anti Parallel – With R and RL Loads – Modes of Operation of TRIAC – TRIAC with R– Derivation of RMS Load Voltage, Current and Power Factor Wave Forms – Firing Circuits -Numerical Problems

Cyclo Converters – Single Phase Mid Point Cycloconverters with Resistive and Inductive Load (Principle of Operation only) – Bridge Configuration of Single Phase Cycloconverter (Principle of Operation only) – Waveforms

Course Outcomes(CO):

At the end of studying the course, the student should be able to:

- Basic concepts of diode and transistor and its operation
- Basic operating principles of power semiconductor switching devices.
- The operation of power electronic converters, inverters, AC voltage controllers, and cycloconverter
- How to apply the learnt principles and methods to practical applications.

Textbooks:

1. Power Electronics, M. D. Singh and K. B. Khanchandani, Mc Graw Hill Education (India) Pvt. Ltd., 2nd Edition, 2007, 23rd Reprint 2015.
2. Power Electronics: Circuits, Devices and Applications, Muhammad H. Rashid, Pearson, 3rdEdition, 2014, 2nd Impression 2015

Reference Books:

1. Power Electronics, K. R. Varmah, Chikku Abraham, CENGAGE Learning, 1st Edition, 2016.
2. Power Electronics, P. S. Bimbhra, Khanna Publishers, 2012.
3. Power Electronics: Devices, Circuits, and Industrial Applications, V. R. Moorthi, OXFORD University Press, 1st Edition, 2005, 12th Impression 2012.

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E-Mail: geethanjali@gist.edu.in, Website: www.gist.edu.in

B.Tech. III Year I Semester

PRINCIPLES OF COMMUNICATION SYSTEMS
Common to (EEE,CSE, AI&ML, IT, CS, DS)

Course Code	L:T:P	Credits	Exam. Marks	Exam Duration	Course Type
22A0430T	3:0:0	3	CIE:30 SEE:70	3 Hours	PCC

Course Objectives:

- To understand the concept of various modulation schemes and multiplexing.
- To apply the concept of various modulation schemes to solve engineering problems.
- To analyse various modulation schemes.
- To evaluate various modulation scheme in real time applications.

Syllabus

Unit –I

Amplitude Modulation: Introduction to Noise and Fourier Transform. An overview of Electronic Communication Systems. Need for Frequency Translation
Amplitude Modulation: DSB-FC, DSB-SC, SSB-SC and VSB, Radio Transmitter and Receiver.

Unit –II

Frequency Modulation: Introduction to Angle Modulation, Tone modulated FM Signal, Arbitrary Modulated FM Signal, FM Modulation and Demodulation. Stereophonic FM Broadcasting.

Unit –III

Pulse Modulation: Sampling Theorem- Low pass and Band pass Signals. Pulse Amplitude Modulation and Concept of Time Division Multiplexing and Frequency Division Multiplexing. Pulse Width Modulation. Digital Representation of Analog Signals.

Unit –IV

Digital Modulation: Binary Amplitude Shift Keying, Binary Phase Shift Keying and Quadrature Phase Shift Keying, Binary Frequency Shift Keying. Regenerative Repeater, M-ary and comparison

Unit –V

Communication Systems: Satellite, RADAR, Optical, Micro wave communication, Mobile and Computer Communication (Block diagram approach only).

Text Books:

- Herbert Taub, Donald L Schilling and Goutam Saha, “Principles of Communication Systems”, 3 rdEdition, Tata McGraw-Hill Publishing Company Ltd., 2008.

References:

- B. P. Lathi, Zhi Ding and Hari M. Gupta, “Modern Digital and Analog Communication Systems”, 4th Edition, Oxford University Press, 2017.
- 2. K. Sam Shanmugam “Digital and Analog Communication Systems”, Wiley India Edition, 2008.

Course Outcomes:

After the completion of the course students will able to:

- Understand the concept of various modulation schemes.

- Understand the concept of Different multiplexing techniques.
- Apply the concept of various modulation schemes to solve engineering problems.
- Analyse various modulation schemes.
- Evaluate various modulation schemes in real time applications.
- Understand the concept of various Communication systems.

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B.Tech. III Year I Semester

Automobile Engineering					
Course Code	**L:T:P:S**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
22A0323Ta	**3: 0:0:0**	**3**	**CIE: 30 SEE:70**	**3Hours**	**PEC**

Course Objectives:

Impart the knowledge of vehicle structure and its components.

- Demonstrate various components of petrol engines and diesel engines.
- Trains about the various electrical system, circuits, and testing of automobiles.
- Explain the concepts of steering, suspension and braking system in automobile.

Syllabus		**Total Hours:42**
UNIT - I	**Introduction to vehicle structure and engine components**	**12 Hrs**

Vehicle construction - Chassis and body - Specifications - Engine - Types - Construction - Location of engine - Cylinder arrangement - Construction details - Cylinder block - Cylinder head - Cylinder liners - Piston – piston rings - Piston pin - Connecting rod - Crankshaft - Valves. Lubrication system - Types - Oil pumps - Filters. Crankcase ventilation

UNIT - II	**Ignition and fuel supply systems**	**10 Hrs**

Ignition system - Coil and Magneto - Spark plug - Distributor – Electronic ignition system - Fuel system - Carburetor - Fuel pumps - Fuel injection systems - Mono point and Multi point – Unit Injector – Nozzle types - Electronic Fuel Injection system (EFI) – GDI, MPFI, DTSI.

UNIT - III	**Steering and suspension system**	**10 Hrs**

Principle of steering - Steering Geometry and wheel alignment - Steering linkages – Steering gearboxes - Power steering - front axle - Suspension system - Independent and Solid axle – coil, leaf spring and air suspensions - torsion bar - shock absorbers.

UNIT - IV	**Wheels, Tyres and Braking System**	**12 Hrs**

Wheels and Tyres - Construction - Type and specification - Tyre wear and causes - Brakes - Needs – Classification –Drum and Disc Mechanical - Hydraulic and pneumatic - Vacuum assist – Retarders – Anti-lock Braking System(ABS).

UNIT - V	**Automobile electrical systems and advances in automobile engineering**	**12 Hrs**

Battery-General electrical circuits- Active Suspension System (ASS) - Electronic Brake Distribution (EBD) – Electronic Stability Program(ESP), Traction Control System (TCS) - Global Positioning System (GPS), Hybrid vehicle, Fuel Cell.

Course Outcomes (CO):

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

- Identify different parts of automobile
- Explain the working of various parts like engine and brakes
- Describe the working of steering and the suspension systems.
- Summarize the wheels and tires
- Outline the future developments in the automobile industry

Textbooks:

1. Kirpal Singh, Automobile Engineering, Vol.1&2, Standard Publications, 13/e, 2020.
2. William.H.Crouse, Automotive Mechanics, 10/e , McGraw-Hill, 2006.
3. David A. Corolla, Automotive Engineering: Powertrain, Chassis System and Vehicle Body, Butterworth-Heinemann Publishing Ltd, 2009.
4. Richard Stone, Jeffrey K. Ball, Automotive Engineering Fundamentals" SAE International, 2004.

Reference Books:

1. Bosch, Automotive Hand Book, 6/e, SAE Publications, 2007.
2. K. Newton and W. Steeds, The motor vehicle, 13/e, Butterworth-Heinemann Publishing Ltd, 1989.
3. Joseph Heitner, Automotive Mechanics Principles and Practices, 2/e, CBS publishing 2004

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B.Tech. III Year I Semester

Fundamentals of drone technology					
Course Code	**L:T:P:S**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
22A0334Tc	**3: 0:0:0**	**3**	**CIE: 30 SEE:70**	**3Hours**	**PEC**

Course Objectives:

The course should enable the students to:

- To make the students to understand the basic concepts of UAV drone systems.
- To introduce the stability and control of an aircraft

Syllabus		**Total Hours:42**
UNIT - I	**Introduction to Drones**	**12 Hrs**

Introduction to Unmanned Aircraft Systems, History of UAV drones, classification of drones, System Composition, applications

UNIT - II	**Design of UAV Drone Systems**	**10 Hrs**

Introduction to Design and Selection of the System, Aerodynamics and Airframe Configurations, Characteristics of Aircraft Types, Design Standards and Regulatory Aspects-India Specific, Design for Stealth.

UNIT - III	**Avionics Hardware of Drones**	**10 Hrs**

Autopilot, AGL-pressure sensors servos-accelerometer –gyros-actuators- power supply-processor, integration, installation, configuration.

UNIT - IV	**Communication, Payloads and Controls**	**12 Hrs**

Communication, Payloads and Controls: Payloads, Telemetry, Tracking, controls-PID feedback, radio control frequency range, modems, memory system, simulation, ground test-analysis-trouble shooting

UNIT - V	**Navigation and Testing**	**12 Hrs**

Navigation and Testing: Waypoints navigation, ground control software, System Ground Testing, System In-flight Testing, Future Prospects and Challenges

Course Outcomes (CO):

The student should able to:

- Ability to design UAV drone system
- To understand working of different types of engines and its area of applications.
- To understand static and dynamic stability dynamic instability and control concepts
- To know the loads taken by aircraft and type of construction and also construction materials used in Drones

Textbooks:

1. Reg Austin "Unmanned Aircraft Systems UAV design, development and deployment", Wiley, 2010.
2. Robert C. Nelson, Flight Stability and Automatic Control, McGraw-Hill, Inc, 1998.
3. Kimon P. Valavanis, "Advances in Unmanned Aerial Vehicles: State of the Art and the Road to Autonomy", Springer, 2007

Reference Books:

1. Paul G Fahlstrom, Thomas J Gleason, "Introduction to UAV Systems", UAV Systems, Inc, 1998.
2. Dr. Armand J. Chaput, "Design of Unmanned Air Vehicle Systems", Lockheed Martin Aeronautics.

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B.Tech. III Year II Semester

Semester-6 (Theory-6, Lab-3, SOC-1)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
1	PCC	22A0127T	Quantity surveying and Estimation	3	0	0	3
2	PCC	22A0128T	Design of Steel Structures	3	0	0	3
3	PCC	22A0129T	Highway Engineering	3	0	0	3
4	PEC		**Professional elective course-II**	3	0	0	3
5	OEC/JOE		**Open Elective-II**	3	0	0	3
6	PCC Lab	22A0133P	Highway Materials Lab	0	0	3	1.5
7	PCC Lab	22A0134P	Quantity Surveying Lab	0	0	3	1.5
8	PCC Lab	22A0135P	Design Studio Lab with STAAD Pro.	0	0	3	1.5
9	**SOC (Advanced)**	**22A0136P**	**E-TABS**	**1**	**0**	**2**	**2**
10	MANC	**22A0031M**	Intellectual Property Rights & Patents	2	0	0	0
						Total credits	**21.5**
Industrial/Research Internship (Mandatory) 2 Months during summer vacation							

Member Secretary

Head of the Department
Dept. of Civil Engineering
GEETHANJALI INSTITUTE OF SCIENCE & TECHNOLOGY
GANGAVARAM (V), Kovur (M),
S.P.S.R. Nellore Dt. A.P Pin 524 137

Head of the department

Professional Elective II

SL. No	Course Code	Course Name
1	22A0130T	Foundation Engineering
2	22A0131T	Environmental Impact Assessment
3	22A0132T	Low cost housing techniques

Open Elective-II

SL. No	Course Code	Branch	Course Name
1	22A0431T	ECE	Microcontroller & Applications
2	22A0327Ta	MECH	Introduction to composites
3	22A0327Tb		Hydraulic machinery
4	22A0024T	Basic science	Entrepreneurship & Innovation
5	22A0528T	CSE	Machine learning
6	22A0213Ta	EEE	Control systems

Category	CREDITS
Professional core courses (PCC)	13.5
Professional Elective courses (PEC)	3
Open Elective Course/Job oriented elective (OEC/JOE)	3
Skill advanced course/ soft skill course*(SOC)	2
Mandatory course (AICTE)(MANC)	0
Industrial/Research Internship (Mandatory) 2 Months	-
TOTAL CREDITS	**21.5**

Member Secretary

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Head of the department

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B.Tech. III Year II Semester

QUANTITY SURVEYING AND ESTIMATION					
Course Code	**L:T:P:S**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
22A0127T	**3:0:0:0**	**3**	**CIE:30 SEE:70**	**3Hours**	**PCC**

Course Objectives:

- The objective of the course is to make the student to understand about estimation and valuations of different types of structures and their valuation as per standard schedule of rates

Syllabus		**TotalHours:48Hrs**
UNIT-I	**Introduction & Standards Specifications**	**10Hrs**

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

STANDARDS SPECIFICATIONS: Standard specifications for different items of building construction

UNIT-II	**Estimation of Buildings**	**9Hrs**

Detailed Estimates of Buildings: Centre Line Method – Long and Short Wall Method for 1BHK & 2BHK

UNIT-III	**Earthwork &Reinforcement Estimation**	**10Hrs**

EARTHWORK ESTIMATION: Earthwork for roads and canals.

REINFORCEMENT ESTIMATION: Reinforcement bar bending and bar requirement

UNIT-IV	**Contracts & Tenders**	**10Hrs**

CONTRACTS AND TENDERS: Contracts – Types of contracts – Contract Documents – Conditions of contract – Types of Tenders – Requirement of Tendering.

UNIT-V	**Rate Analysis &Valuation**	**9Hrs**

RATE ANALYSIS: Working out data for various items of work over head and contingent charges.

VALUATION: Valuation of buildings

Course Outcomes (CO):

Student will be able to

- Explain the basic concepts of Quantity Surveying.
- Explain the basic concepts of Units and Specifications.
- Explain different types of estimates.
- Prepare Lead statement, Data Sheet, Detailed and Abstract estimates for the given Civil Engineering Structure
- Contracts and tenders
- Rate analysis and valuation of buildings

Text Books:

1. Estimating and Costing by B.N. Dutta, UBS publishers, 2000.
2. Contracts and estimations by B.S.Patil, Universities.Press, Hyderabad.
3. Estimation, Costing and Specifications by M. Chakraborthi; Laxmi publications.

Reference Books::

1. Estimating and Costing by G.S. Birdie, Dhanpat Rai Publishing Company (P) Ltd
2. A Text book of Estimating and Costing by D.D.Kohli, S.ChandPubilishers.
3. Standard Schedule of rates and standard data book by public works department.
4. I. S. 1200 (Parts I to XXV – 1974/ method of measurement of building and Civil Engineering works – B.I.S.)
5. National Building Code

Note: Standards scheduled of rates is permitted in the examination hall.

E Resources:

https://onlinecourses.swayam2.ac.in/nou20_cs11/preview

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B.Tech. III Year II Semester

DESIGN OF STEEL STRUCTURES

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0128T	3:0:0:0	3	CIE:30 SEE:70	3Hours	PCC

Course Objectives:

- To introduce steel structures and its basic components
- To introduce structural steel fasteners like welding and bolting
- To teach design tension members, compression members, beams and beam-columns
- To teach design column splices and bases.
- To teach design of various steel structures.

Syllabus		TotalHours:48 Hrs
UNIT-I	**Steel Structures & its basic components**	**10 Hrs**

Concepts of Plasticity, Yield strength of steel. Loads and combinations, wind loads on roof trusses, Concept of limit State Design of steel structures – Different Limit States as per IS 800 -2007 – Design Strengths- Deflection limits – Serviceability - Bolted connections – Welded connections – Design Strength – Efficiency of joint – Prying action Types of Welded joints - Design of Tension members

UNIT-II	Compression Member	10 Hrs

Design of Steel Compression members – Buckling class – slenderness ratio / strength design – Laced – Battened columns – Design of Column bases – Slab base only.

UNIT-III	Beams	9Hrs

Design of Beams – Plastic moment – Bending and shear strength, design of laterally supported beams – Built up sections – Large plates Web buckling, Crippling and Deflection of beams

UNIT-IV	Eccentric Connections	10 Hrs

Design of eccentric connections with brackets, Beam end connections – Web angle – Un-stiffened and stiffened seated connections (bolted and Welded types) Design of truss joints

UNIT-V	Shallow and Deep Foundations	9Hrs

Foundation design: Site investigation, selection of foundation types and basis for design, allowable loads, and permissible settlements of shallow and deep foundations.

Course Outcomes(CO): Student will be able to

- Learn the basic elements of a steel structure
- Learn the fundamentals of structural steel fasteners
- Able to design basic elements of steel structure like tension members, compression members, beams and beam-columns
- Able to design column splices and bases.
- Able to design the various steel structures.

Text Books:

1. Limit state design of Steel Structures by Subramanyam. N, Oxford University press, New Delhi2nd edition 2018
2. Limit State Design of steel structures by S.K. Duggal, Tata Mcgraw Hill, New Delhi 3rd edition2019

Reference Books:

1. Structural Design and Drawing by N.Krishna Raju, University Press, Hyderabad 3rd edition 2009
2. Structural design in steel by Sarwar Alam Raz, New Age International Publishers, New Delhi
3. Design of Steel Structures by Edwin Gaylord,CharlesGaylord,JamesStallmeyer, Tata Mc.Graw-Hill, New Delhi.

Codes/Tables: IS Codes:

1) IS -800 – 2007
2) IS – 875 – Part III
3) Steel Tables.
4) Railway Design Standards Code and steel tables to be permitted into the examination hall.

E Resources:

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

FINAL EXAMINATION PATTERN:

The end examination paper should consist of Part A and Part B. Part A consists of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions on design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

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B.Tech. III Year II Semester

HIGHWAY ENGINEERING

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0129T	3:0:0:0	3	CIE:30 SEE:70	3Hours	PCC

Course Objectives: This course enables students to

- To make the student understand the importance of Highway Development in Social and Economic Development of a Nation
- To impart the concepts of Geometric Design of various Highway Infrastructure elements like Super elevation, Sight Distances, Radius of Curve, Extra wideningetc
- To make the student aware of Basic Traffic Parameters and Surveys needed for collecting data about them
- To make the student understand the need for Management of Traffic in Urban areas andthe measures available
- To familiarize the students with types of Road Intersections and their design elements

Syllabus		TotalHours:48 Hrs
UNIT-I	**Highway Development & Planning**	**9 Hrs**

Highway development in India – Necessity for Highway Planning- Different Road Development Plans- Classification of Roads- Road Network Patterns – Highway Alignment- Factors affecting Alignment- Engineering Surveys – Drawings and Reports

UNIT-II	**Highway Geometric Design**	**10 Hrs**

Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements Sight Distance Elements- Stopping sight Distance, Overtaking Sight Distance and intermediate Sight Distance- Design of Horizontal Alignment- Design of Super elevation and Extra widening- Design of Transition Curves-Design of Vertical Alignment-Gradients-Vertical curves.

UNIT-III	**Traffic Engineering Studies**	**10Hrs**

Basic Parameters of Traffic-Volume, Speed and Density – Definitions and their inter relation – Highway capacity and level of service concept – factors affecting capacity and level of service -Traffic Volume Studies- Data Collection and Presentation-Speed studies- Data Collection and Presentation-Parking Studies and Parking characteristics- Road Accidents-Causes and Preventive measures-Accident Data Recording – Condition Diagram and Collision Diagrams.

UNIT-IV	**Road Markings & Intersection Design**	**9Hrs**

Road Traffic Signs – Types and Specifications – Road Markings-Need for Road Markings- Types of Road Markings- Specifications - Design of Traffic Signals –Webster Method – Saturation flow – phasing and timing diagrams – Numerical problems. Conflicts at Intersections- Channelization: Objectives – Traffic Islands and Design criteria- Types of At- Grade Intersections – Types of Grade Separated Intersections- Rotary Intersection – Concept ofRotary and Design Criteria- Advantages and Disadvantages of Rotary Intersection.

UNIT-V	**Pavement Design**	**10Hrs**

Types of pavements – Difference between flexible and rigid pavements – Pavement Components – Sub grade, Sub base, base and wearing course – Functions of pavement components – Design Factors – Flexible pavement Design methods – G.I method, CBR Method, (as per IRC 37-2002) – Design of Rigid pavements – Critical load positions - Westergaard's stress equations – computing Radius of Relative stiffness and equivalent radius of resisting section – stresses in rigid pavements – Design of Expansion and contraction joints in CC pavements. Design of Dowel bars and Tie bars.

Course Outcomes (CO):

- Understand the importance of Highway Development in Social and Economic Development of a Nation
- Understand the concepts of Geometric Design of various Highway Infrastructure elements like Super elevation, Sight Distances, Radius of Curve, Extra widening etc
- Understanding Basic Traffic Parameters and Surveys needed for Collecting Data about them
- Understand the need for Management of Traffic in Urban areas and the measures available
- Familiar with types of Road Intersections and their design elements

Text Books

1. Highway Engineering – S.K.Khanna&C.E.G.Justo, Nemchand& Bros., 7th edition (2000).
2. Traffic Engineering and Transportation Planning by L.R.Kadiyali and Lal- Khanna Publications 9th edition

ReferenceBooks:

1. Highway Engineering – S.K.Khanna&C.E.G.Justo, Nemchand& Bros., 7th edition (2000).
2. Traffic Engineering and Transportation Planning by L.R.Kadiyali and Lal- Khanna Publications 9th edition

E Resources:

https://nptel.ac.in/courses/105/107/105107220/
https://nptel.ac.in/courses/105105107

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B.Tech. III Year II Semester

FOUNDATION ENGINEERING

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0130T	3: 0:0:0	3	CIE: 30 SEE:70	3Hours	PE-II

Course Objectives:

- To enable the student to determine different soil exploration techniques..
- To enable the student to estimate earth pressure using various theories.
- To enable the student to estimate the contact pressure distribution below shallow footing and allowable bearing pressure.
- To enable the student to estimate the contact pressure distribution below shallow footing and allowable bearing pressure.

Syllabus **Total Hours:48 Hrs**

UNIT - I	**Soil Exploration**	**10 Hrs**

Need – Methods of soil exploration – Boring and Sampling methods – Field tests –Penetration Tests – Plate load test – Pressure meter – Planning of Programme and preparation of soil investigation report.

UNIT - II	**Earth Slope Stability**	**9 Hrs**

Infinite and finite earth slopes – Types of failures – Factor of safety of infinite slopes – Stability analysis by Swedish arc method, standard method of slices, Bishop's Simplified method – Taylor's Stability Number- Stability of slopes of earth dams under different conditions

UNIT - III	**Earth Pressure Theories**	**10 Hrs**

Rankine's theory of earth pressure – Earth pressures in layered soils – Coulomb's earth pressure theory– Rebhann's and Cullman's graphical method.

RETAINING WALLS: Types of retaining walls – stability of retaining walls.

UNIT - IV	**Shallow Foundations**	**10Hrs**

Types – choice of foundation – Location of depth – Safe Bearing Capacity – Terzaghi`s, Meyerhoff's and Skempton`s Methods.

ALLOWABLE BEARING PRESSURE: Safe bearing pressure based on N- value – Allowable bearing pressure; safe bearing capacity and settlement from plate load test – Allowable settlements of structures– Settlement Analysis

UNIT - V	**Deep Foundations**	**9 Hrs**

Pile Foundation: Types of piles – Load carrying capacity of piles based on static pile formulae – Dynamic pile formulae– Pile load tests – Load carrying capacity of pile groups in sands and clays –Settlement of pile groups.

Well Foundations: Types – Different shapes of wells – Components of wells – functionsand Design Criteria – Sinking of wells – Tilts and shifts.

Course Outcomes (CO): Student will be able to

- Able to understand different soil exploration techniques.
- Able to analyze the earth slope stability.
- Able to estimate earth pressure using various theories.
- Able to estimate the contact pressure distribution below shallow footing and allowable bearing pressure.
- Able to analyze the load carrying capacity of pile foundation and well foundation.

Text Books:

1. Geotechnical Engineering by C.Venkataramaiah, New Age Pubilications(2002)
2. Soil Mechanics and Foundation Engineering by Arora, Standard Publishers and Distributors,Delhi 7th edition 2009.
3. Soil Mechanics and Foundations by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain,Laxmi publications Pvt. Ltd., New Delhi 17th edition 2017

Reference Books:

1. Soil Mechanics and Foundation Engineering by Purushtoma Raj, Pearson Pubilications 2nd edition 2013
2. Principles of Foundation Engineering by Das, B.M., - (1999)–6 th edition (Indian edition) Thomson Engineering
3. Foundation Engineering by Varghese,P.C., Prentice Hall of India., New Delhi.
4. Foundation Engineering by V.N.S.Murthy, CRC Press, New Delhi.
5. Foundation Analysis and Design by Bowles, J.E., (1988)– 4 th Edition, McGraw-Hill Publishing company, Newyork.
6. Geotechnical Engineering by Manoj Dutta & Gulati S.K – Tata Mc.Grawhill Publishers New Delhi.

E Resources: https://nptel.ac.in/courses/105105176

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B.Tech. III Year II Semester

ENVIRONMENTAL IMPACT ASSESSMENT

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0131T	3: 0:0:0	3	CIE: 30 SEE:70	3Hours	PE-II

Course Objectives:

- To impart knowledge on sustainable development and economics of energy
- To teach regarding environmental degradation and economic analysis of degradation
- To inculcate the knowledge of economics of pollution and their management
- To demonstrate the understanding of cost benefit analysis of environmental resources
- To make the students to understand principles of economics of biodiversity

Syllabus **Total Hours:48 Hrs**

Unit- I **11 Hrs**

Basic concept of EIA : Initial environmental Examination, Elements of EIA, - factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters.

E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad- hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods and cost/benefit Analysis

Unit - II **10 Hrs**

Introduction and Methodology for the assessment of soil and ground water, Delineation ofstudy area, Identification of actives- application of remote sensing and GIS for EIA. EIAwith reference to surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment.

Unit - III **7 Hrs**

Assessment of Impact of development Activities on Vegetation and wildlife, Environmental impact of deforestation and incorporation of mitigation measures.

Unit - IV **9 Hrs**

Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocell, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report.

Unit - V **11 Hrs**

The Environmental protection Act, The water prevention Act, The Air (Prevention &Control of pollution Act.), Wild life Act. Case studies and preparation of Environmental Impact assessment statement for various Industries.

Course Outcomes (CO):Student will be able to

- Prepare EMP, EIS, and EIA report.
- Identify the risks and impacts of a project.
- Choose an appropriate EIA methodology.
- Evaluation the EIA report.
- Estimate the cost benefit ratio of a project.
- Know the role of stakeholder and public hearing in the preparation of EIA.

Text Books:

1.. Environmental Impact Assessment Methodologies, by Y. Anjaneyulu, B.S. Publication, Sultan Bazar, Hyderabad.

2. Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke – Prentice Hall Publishers

References Books:

1. Environmental Science and Engineering, by Suresh K. Dhaneja – S.K.,Katari & Sons Publication. New Delhi.

2. Environmental science and Enginering by Aloka Debi, Universities Press.

3. Environmental Pollution and Control, by Dr H.S. Bhatia – Galgotia Publication (P) Ltd, Delhi

E-resources

https://onlinecourses.nptel.ac.in/noc22_ar07/preview

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B.Tech. III Year II Semester

LOW COST HOUSING TECHNIQUES

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0132T	3:0:0:0	3	CIE:30 SEE:70	3Hours	PE-II

Course Objectives:

- The objective of the course is to train the students to have a comprehensive knowledge of planning, design, evaluation, construction and financing of housing projects. The course focuses on cost effective construction materials and methods. Emphasis is given on the principles of sustainable housing policies and programs.

Syllabus **TotalHours:48Hrs**

Unit-I **10 Hrs**

a) Housing Scenario Introducing- Status of urban housing- Status of Rural Housing
b). Housing Finance: Introducing- Existing finance system in India- Government role as facilitator- Status at Rural Housing Finance- Impedimental in housing finance and related issues
c) Land use and physical planning for housing: Introduction- Planning of urban land-Urban land ceiling and regulation act- Efficiency of building bye lands- Residential Densities
d) Housing the urban poor: Introduction- Living conditions in slums- Approaches and strategies for housing urban poor

Unit-II **10 Hrs**

Adoption of innovative cost-effective construction techniques- Adoption of precast elements in partial prefabrication- Adopting of total prefabrication of mass housing in India- General remarks on pre-cast rooting/flooring systems- Economical wall system- Single. Brick thick loading bearing wall-19cm thick load bearing masonry walls- Half brick thick load bearing wall-Fly ash gypsum thick for masonry- Stone Block Masonry-Adoption of precast R.C. plank
and join system for roof/floor in the building

Unit-III **9Hrs**

Introduction- Substitute for scarce materials- Ferrocement- Gypsum boards- Timbersubstitutions-Industrial Wastes-Agricultural wastes.

Unit-IV **10 Hrs**

Introducing- Present status- Technological options- Low cost sanitation's- Domestic wall- Water supply- energy. Rural Housing: Introduction traditional practice of rural housing continuous-Mud Housing technology- Mud roofs Characteristics of mud- Fire resistant treatment for thatched roof-Soil stabilization- Rural Housing programs

Unit-V **9Hrs**

Introduction- Earthquake- Damages to houses-Traditional Houses in disaster prone areas Type of Damages and Railways of non-engineered buildings- Repair and restore action of earthquakeDamaged non-engineered buildings recommendations for future constructions- Requirements ofstructural safety of thin precast roofing units against - Earthquake forces- Status of R& D in
earthquake strengthening measures- Floods- cyclone- future safety

Course Outcomes (CO): Student will beable to

- The students will have a comprehensive knowledge of planning, design, evaluation, construction and financing of housing projects with cost effective housing techniques.
- The student can be in a position to adopt the suitable techniques in rural and disaster-prone areas by using locally available materials.

Text Books:

- Building materials for low –income houses – International council for building research studies and documentation's.
- Hand book of low cost housing by A.K.Lal – Newage international publishers.
- Properties of Concrete – Neville A.M. Pitman publishing Limited- London.

Reference Books:

1. Light weight concrete- Academic kiado- Rudhai .G – Publishing home of Hungarian Academy of Sciences 1963.
2. Low cost Housing – G.C. Mathur
3. Modern trends in housing in developing countries – A.G. Madhava Rao- D.S. Ramachandra Murthy& G.Annamalai

E-Resources

https://nptel.ac.in/courses/124107001

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B.Tech. III Year II Semester

Highway Materials LAB

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0133P	0:0:3:0	1.5	CIE:30 SEE:70	3Hours	PCC LAB

Course Objectives:

- To make the students familiar with principles and procedures of testing of highway materials.
- To provide hands-on experience for the students on different Tests needed to be conducted on Aggregates and Bitumen to find out their suitability for Road Works.
- To conduct standard tests for bitumen pavement design and paving materials in order to assess their engineering properties and behavior.
- To relate material characteristics to various application of construction.
- To Understand the test procedures for characterization of aggregates and bituminous mixes

Syllabus **Total Hours:48Hrs**

LIST OF EXPERIMENTS

TESTS ON ROAD AGGREGATES:

- Aggregate Crushing value Test.
- Aggregate Impact Test.
- Abrasion Test.
- Shape tests

TESTS ON BITUMINOUS MATERIALS:

- Penetration Test.
- Ductility Test.
- Softening Point Test.
- Flash and fire point tests.
- Demo on Marshall Stability Test on Bituminous Mixes

Course Outcomes:

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

- Categorize the test on materials used Civil Engineering Building & Pavement constructions
- Identify engineering properties of aggregate
- Identify the grade & properties of bitumen.
- Examine the tests performed for Bitumen mixes.
- The students will be able to select the most appropriate materials for highway construction based on material characteristics, engineering properties, design requirements, cost, availability, and expected service life.

Reference Books:

1. Highway Material Testing and Quality Control (English, Paperback, G. Venkatappa Rao, K. Ramachandra Rao, Kausik Pahari, D.V. Bhavanna Rao) Dreamtech Pres
E-Resources: https://nptel.ac.in/courses/105/107/105107219/

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B.Tech. III Year II Semester

QUANTITY SURVEYING LAB

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0134P	0:0:3:0	1.5	CIE:30 SEE:70	3Hours	PCC LAB

Course Objectives:

The objective of this course is to enable the students to:

- Understand the quantity calculations of different components of the buildings.
- Understand the rate analysis of different quantities of the buildings components.
- Learn various specifications and components of the buildings.

Syllabus **Total Hours:48Hrs**

List of Experiments

1. Introduction to Quantity Surveying
2. Estimation of Reinforcement for RCC members
3. Estimation of a Residential Building
4. Estimation of RCC Slab Culvert
5. Estimation of an Underground Water Reservoir
6. Estimation of a Retaining Wall
7. Estimation of a Septic Tank
8. Earthwork Excavation for Roadway
9. Estimation of a Roof Truss
10. Uses of Software in Construction Estimation

Course Outcomes:

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

- The student should be able to determine the quantities of different components of buildings.
- The student should be in a position to find the cost of various building components.
- The student should be capable of finalizing the value of structures.

Reference Books:

- 'Standard Schedule of rates and standard data book' by public works department.
- IS 1200 (Parts I to XXV-1974/ Method of Measurement of Building & Civil Engg Works – B.I.S.)
- 'Estimation, Costing and Specifications' by M. Chakraborthi; Laxmi publications.
- National Building Code Book
- 'Estimating and Costing' by B.N. Dutta, UBS publishers, 2000.
- 'Civil Engineering Contracts and Estimates' by B. S. Patil, Universities Press (India) Pvt. Ltd., Hyd.
- 'Construction Planning and Technology' by Rajiv Gupta, CBS Publishers & Distributors Pvt. Ltd. New Delhi.
- 'Estimating and Costing' by G.S. Birdie

E-Resources:

https://www.youtube.com/watch?v=f66GMSqkNio
https://www.youtube.com/watch?v=D04uxZpgp6M
https://nptel.ac.in/courses/105103093

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B.Tech. III Year II Semester

Design Studio Lab with STAAD Pro

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0135P	**0: 0:3:0**	**1.5**	**CIE:30 SEE:70**	**3Hours**	**PCC LAB**

Course Objectives:

- To teach the students to understand the details of STAAD. Pro software package.
- To enable the students to prepare input data for RCC & Steel structures.
- To enable the students to design different components of structures.
- Students will learn the details of STAAD.Pro software package and know the behaviour of RCC and Steel structures.
- Students will understand the bending moment diagram, drawn in tension face and shear force diagram.

Syllabus **Total Hours: 48Hrs**

List of Experiments

1. Analysis & Design of 2D Frame under pure Vertical loading using STAAD Pro Software.
2. Analysis & Design of 2D Frame under both Vertical & Horizontal loading using STAAD Pro Software.
3. Analysis & Design of 2D Truss using STAAD Pro Software.
4. Analysis & Design of 3D Frames using STAAD Pro Software.
5. Analysis & Design of Different types of Beams Using STAAD Pro Software.
6. Analysis & Design of Rectangular & Circular Columns Using STAAD Pro Software.
7. Analysis & Design of Isolated Footings Using STAAD Pro Software.
8. Analysis & Design of Retaining Walls Using STAAD Pro Software.
9. Analysis & Design of One Way and Two-Way Slabs Using STAAD Pro Software.
10. Analysis & Design of Simple Tower by Using STAAD Pro Software.

Course Outcomes:

On completion of this course, the students are able to:

- Understand the details of STAAD.Pro software package.
- To prepare input data of STAAD.Pro.
- Run STAAD.Pro for analysis and design of structures.
- Design different components of structures.
- Expertise in functionalities like model generation and editing; loading analysis; concrete designing etc.

Textbooks:

1. Staad Pro V8i for Beginners: With Indian Examples by T.S.Sarma, Notion Press Media Pvt Ltd

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B.Tech. III Year II Semester

E-TABS

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0136P	1:0:2:0	2	CIE:30 SEE:70	3H	SOC (Advanced)

Course Objectives: This course will enable students:

Learn the basics of building analysis and design using ETABS software

- Understand the principles of designing and detailing reinforced concrete and steel structures
- Learn to use advanced features such as load combinations, time history analysis, and optimization
- Become familiar with the output options and report generation in ETABS
- Understand the process of creating detailed drawings and construction documents using the software.

Syllabus		Total Hours:48Hrs
Unit-I	**Introduction of E-TABS**	**10 Hrs**

Introduction to structural analysis and design, overview of ETABS software, introduction to menus and icons Geometry creation process; modeling through grids and import (2D & 3D); property assignment- line and area elements; loadings- dead, live, wind, earthquake, temperature loads; releases, supports, diaphragms and all definition parameters; checking of model techniques, advanced modeling options

Unit-II	**Advanced modeling, editing and ImportingTools**	**10 Hrs**

Gravity Analysis: 2D & 3D analysis, checking for warnings and errors, post processing options, interpretation of results, Meshing Techniques: Dealing with irregular structures, Auto and Manual Meshing Techniques Design Aspects: Design of frame elements and interpretation of results.

Unit-III	**Analysis and design of structures**	**8 Hrs**

Analysis and design of shear wall system; An Example of analysis of Flat Slab Structure

Unit-IV	**Advanced Analysis Methods in ETABS**	**10 Hrs**

Response spectrum, Time History and Pushover Analysis. Result interpretation and Plotting. Introduction to construction sequence analysis and P-Delta analysis

Unit-V	**Introduction to use of steel sections**	**10 Hrs**

A Practical Example of Complete 3D analysis and design of a Multistoried building using ETABS software

Course Outcomes (CO): Student will be able to

- Obtain comprehensive knowledge on the ETABS software and its applications.
- To perceive story levels and have the capacity to information building information in a coherent and simple way
- Illustrate the models utilizing objects and can comprehend the ideas when altering and making complex models.
- To analyze and design the entire building due to the integrated system of ETABS.
- Arrange the structural model if changes in data at any stage of product development.

Text Book(s):.

1. E-TABS Handbook: A Guide to E-TABS - Azuko Technical Institute.
2. E-TABS Integrated building Design software, user guide Computer Structures.inc2016

Reference Book(s):

1. Books for beginners RCC design by E-TABS by yusuf dinar & Nurullah Siddique,YDA Soutlines.
2. E-TABS Structural Earthquake Engineering Software, guide Computer Structures.inc2000

E-resources:

1. https://wiki.csiamerica.com/display/doc/ETABS+Training+manuals

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B.Tech. III Year II Semester

Intellectual Property Rights & Patents

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0031M	2:0:0:0	-	-	-	MANC

Course Objectives: This course will enable students:

- This course introduces the student to the basics of Intellectual Property Rights, Copy Right Laws, Cyber Laws, Trade Marks and Issues related to Patents. The overall idea of the course isto help and encourage the student for startups and innovations

Syllabus		TotalHours:42
Unit-I	**Introduction to Intellectual Property Law**	**8 Hrs**

Introduction to Intellectual Property Law – Evolutionary past – Intellectual Property Law Basics – Types of Intellectual Property – Innovations and Inventions of Trade related Intellectual Property Rights – Agencies Responsible for Intellectual Property Registration – Infringement – Regulatory – Overuse or Misuse of Intellectual Property Rights – Compliance and Liability Issues

Unit-II	Introduction to Copyrights	8 Hrs

Introduction to Copyrights – Principles of Copyright – Subject Matters of Copyright – Rights Afforded by Copyright Law –Copyright Ownership – Transfer and Duration – Right to Prepare DerivativeWorks – Rights of Distribution – Rights of performers – Copyright Formalities and Registration –Limitations – Infringement of Copyright – International Copyright Law- Semiconductor Chip ProtectionAct.

Unit-III	Introduction to Patent Law	8 Hrs

Introduction to Patent Law – Rights and Limitations – Rights under Patent Law – Patent Requirements – Ownership and Transfer – Patent Application Process and Granting of Patent – Patent Infringement and Litigation – International Patent Law – Double Patenting – Patent Searching
– Patent Cooperation Treaty – New developments in Patent Law- Invention Developers and Promoters.

Unit-IV	Introduction to Trade Mark	8 Hrs

Introduction to Trade Mark – Trade Mark Registration Process – Post registration procedures – Trade Mark maintenance – Transfer of rights – Inter parties Proceedings – Infringement – Dilution of Ownership of TradeMark
– Likelihood of confusion – Trade Mark claims – Trade Marks Litigation – International Trade Mark Law.

Unit-V	Introduction to Trade Secrets	10 Hrs

Introduction to Trade Secrets – Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreement – Trade Secret Law – Unfair Competition – Trade Secret Litigation – Breach of Contract – Applying State Law. Introduction to Cyber Law – Information Technology Act – Cyber Crime and E-commerce – Data Security – Confidentiality – Privacy – International aspects of Computer and Online Crime.

Course Outcomes (CO): Student will be able to

- Obtain comprehensive knowledge on the ETABS software and its applications.
- To perceive story levels and have the capacity to information building information in a coherent and simple way
- Illustrate the models utilizing objects and can comprehend the ideas when altering and making

complex models.

- To analyze and design the entire building due to the integrated system of ETABS.
- Arrange the structural model if changes in data at any stage of product development.

Text Books:

1. Deborah E.Bouchoux: "Intellectual Property". Cengage learning, New Delhi
2. Kompal Bansal &Parishit Bansal "Fundamentals of IPR for Engineers", BS Publications (Press)
3. Cyber Law. Texts & Cases, South-Western's Special Topics Collections

References Books:

1. Prabhuddha Ganguli: ' Intellectual Property Rights" Tata Mc-Graw – Hill, New Delhi
2. Richard Stim: "Intellectual Property", Cengage Learning, New Delhi.
3. R. Radha Krishnan, S. Balasubramanian: "Intellectual Property Rights", Excel Books. New Delhi.
4. M. Ashok Kumar and Mohd. Iqbal Ali: "Intellectual Property Right" Serials Pub.

E Resources:

https://archive.nptel.ac.in/courses/110/105/110105139/

Open Elective-II

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B.Tech. III Year II Semester

MICROCONTROLLERS & APPLICATIONS
Common to (EEE,CSE, AI&ML, IT, CS, DS)

Course Code	L:T:P	Credits	Exam. Marks	Exam Duration	Course Type
22A0431T	3:0:0	3	CIE:30 SEE:70	3 Hours	OEC-II

Course Objectives:

This course will enable students to:

- Describe the Architecture of 8051 Microcontroller and Interfacing of 8051 to external memory.
- Write 8051 Assembly level programs using 8051 instruction set.
- Describe the Interrupt system, operation of Timers/Counters and Serial port of 8051.
- Interface simple switches, simple LEDs, ADC 0804, LCD and Stepper Motor to 8051.

Syllabus

Unit –I

8051 Microcontroller: Microprocessor Vs Microcontroller, Embedded Systems, Embedded Microcontrollers, 8051 Architecture- Registers, Pin diagram, I/O ports functions, Internal Memory organization. External Memory (ROM & RAM) interfacing.

Unit –II

Addressing Modes, Data Transfer instructions, Arithmetic instructions, Logical instructions, Branch instructions, Bit manipulation instructions. Simple Assembly language program examples to use these instructions.

Unit –III

8051 Stack, Stack and Subroutine instructions: Simple Assembly language program examples to use subroutine instructions.8051 Timers and Counters – Operation and Assembly language programming to generate a pulse using Mode-1 and a square wave using Mode- 2 on a port pin.

Unit –IV

8051 Serial Communication- Basics of Serial Data Communication, RS- 232 standard, 9 pin RS232 signals, Simple Serial Port programming in Assembly and C to transmit a message and to receive data serially.8051 Interrupts. 8051 Assembly language programming to generate an external interrupt using a switch.

Unit –V

8051 C programming to generate a square waveform on a port pin using a Timer interrupt. Interfacing 8051 to ADC-0804, DAC, LCD and Interfacing with relays and Opto isolators, Stepper Motor Interfacing, DC motor interfacing, PWM generation using 8051.

Text Books:

1. Muhammad Ali Mazidi and Janice Gillespie Mazidi and Rollin D. McKinlay; “The 8051 Microcontroller and Embedded Systems – using assembly and C”, PHI, 2006 / Pearson, 2006. 2. Kenneth J. Ayala, “The 8051 Microcontroller”, 3rd Edition, Thomson/Cengage Learning.

References:

1. Manish K Patel, “The 8051 Microcontroller Based Embedded Systems”, McGraw Hill, 2014, ISBN: 978-93-329-0125-4.
2. Raj Kamal, “Microcontrollers: Architecture, Programming, Interfacing and System Design”, Pearson Education, 2005. Wayne Wolf, FPGA based system design, Prentice hall, 2004.

Course Outcomes:

After the completion of the course students will able to:

- Understand the importance of Microcontroller
- Acquire the knowledge of Architecture of 8051 Microcontroller.
- Apply and Interface simple switches, simple LEDs, ADC 0804, LCD and Stepper Motor to using 8051 I/O ports.
- Develop the 8051 Assembly level programs using 8051 instruction set.
- Design the Interrupt system
- Understand the operation of Timers/Counters and Serial port of 8051.

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B.Tech. III Year II Semester

Introduction to Composites					
Course Code	**L:T:P:S**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
22A0329Tb	**3: 0:0:0**	**3**	**CIE: 30 SEE:70**	**3Hours**	**OEC-II**

Course Objectives:

- To be familiar with classification and characteristics of composite material and their applications.
- To gain the knowledge about manufacturing methods of composites.
- To know the testing methods related to composite materials.

Syllabus		**Total Hours:42**
UNIT - I	**Introduction**	**12 Hrs**

Definitions, Composites, Reinforcements and matrices, Types of reinforcements, Types of matrices, Types of composites, Carbon Fibre composites, Properties of composites in comparison with standard materials, Applications of metal, ceramic and polymer matrix composites.

UNIT - II	**Manufacturing methods**	**10 Hrs**

Hand and spray lay - up, injection molding, resin injection, filament winding, pultrusion, centrifugal casting and prepregs. Fibre/Matrix Interface, mechanical. Measurement of interface strength.

UNIT - III	**Mechanical Properties**	**10 Hrs**

Stiffness and Strength: Geometrical aspects – volume and weight fraction. Unidirectional continuous fibre, discontinuous fibers, Short fiber systems, woven reinforcements – Mechanical Testing: Determination of stiffness and strengths of unidirectional composites; tension, compression, flexure and shear.

UNIT - IV	**Laminates**	**12 Hrs**

Plate Stiffness and Compliance, Assumptions, Strains, Stress Resultants, Plate Stiffness and Compliance, Computation of Stresses, Types of Laminates -, Symmetric Laminates, Anti- symmetric Laminate, Balanced Laminate, Quasi-isotropic Laminates, Crossply Laminate, Angle-ply Laminate. Orthotropic Laminate, Laminate Moduli, Hygrothermal Stresses.

UNIT - V	**Joining Methods and Failure Theories**	**12 Hrs**

Joining –Advantages and disadvantages of adhesive and mechanically fastened joints. Typical bond strengths and test procedures.

Course Outcomes(CO):

- To provide knowledge on characteristics of composites
- To get knowledge on manufacturing and testing methods and mechanical behaviour of composites.
- To get the exposure of different materials .

Textbooks:

1. K.K. Chawla, (1998), Composite Materials, Springer-Verlag, New York 2. B.TAstrom, (1997),
2. Manufacturing of Polymer Composites, Chapman & Hall
3. Composite materials by J.N.Reddy

Reference Books:

1. Stuart M Lee, J. Ian Gray, Miltz, (1989), Reference Book for Composites Technology, CRC press
2. Frank L Matthews and R D Rawlings, (2006), Composite Materials: Engineering and Science, Taylor and Francis.
4. D. Hull and T.W. Clyne, (1996), Introduction to Composite Materials, Cambridge University Press
5. Analysis and Performance of Fiber Composites by Bhagwan D. Agarwal
6. Mechanics of Composite Materials by Autar K. Kaw

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B.Tech. III Year II Semester

Hydraulic Machinery					
Course Code	**L:T:P:S**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
22A0327Tb	**2: 1:0:0**	**3**	**CIE: 30 SEE:70**	**3Hours**	**OEC-II**

CourseObjectives:

The main objective of this course is to deal with the concepts of flow through open channels and their applications and the principles of hydraulic machines and hydraulic models

Syllabus	**Total Hours:50**
UNIT-I	**10 Hrs**

Impact of Jets - Introduction – force exerted by the jet – stationary vertical plate – stationary inclined plate – Derive equations for force exerted by the jet striking on stationary vertical plate and stationary inclined plate (normal to the plate - in the jet direction and normal to the flow)with problems - stationary curved plate at the centre- stationary curved plate at one end tangentially – simple problems – Inclined plate – simple problems – moving flat vertical plate – moving flat inclined plate – moving curved plate – Derive equations for force of jet striking on hinged plate- series of vanes – simple problems – force exerted by jet of water on unsymmetrical moving curved plate when the jet strikes tangentially at one of the tips – simple problems- Derive equations for force developed- work done and efficiency by the jet striking on a moving flat vertical plate- moving flat inclined plate and moving curved plates.

UNIT-II	**10Hrs**

Impulse turbines - Introduction-development of water Turbines-classification-impulse Turbine-Pelton wheel components- State the equations and solve the problems for number of jets of a Pelton wheel - Pitch circle dia- dia of jets-quantity of water supplied to the wheel- Problems for number of jets – problems for work done - efficiency on Pelton wheel-governing of Impulse turbines.

UNIT-III	**10Hrs**

Reaction turbines -introduction –components—difference between impulse& reaction—classification of reaction turbines –discharge—power produced-work done—efficiencies—francis turbine—kaplan turbine—(simple problems)- draft tubes-types- unit quantities—specific speed—selection of turbine—selection based on specific speed- head of water (simple problems).

UNIT-IV	**10Hrs**

Centrifugal pump - Introduction – classify pumps: based on head-positive displacement - roto dynamictypes of casing—piping system of CP—work done- manometric head—efficiencies – discharge—power required to drive –multistage pumps –simple problems -specific speed of CP—selection of pumps based on specific speed and head— concept of NPSH – (net positive suction head)-cavitation—priming.– performance curves of centrifugal pumps - static head & dynamic head required for a system of pumping system- characteristic curve of a pumping system- Selection of centrifugal pump for best efficiency condition by matching system curve- considering NPSH

UNIT-V	**10Hrs**

reciprocating pump types -comparison of CP & RP –discharge—slip—power required –air vessels (simple problems) - hydraulic ram—air lift pump—jet pump- the mono block- coupled- submersible (open well &deep well) - propeller pumps - turbine pumps.

CourseOutcomes (CO):

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

1. Distinguish different classes of turbines and further analyse their working principles.
2. Assess the performance of hydraulic turbines.
3. Distinguish between different classes of pumps, their construction features and further Analyse their performance.
4. Explain the working principles of various hydraulic systems, hydraulic control systems and fluidics and select a suitable hydraulic device for a particular application.

Textbooks:

(1) Fluid Mechanics, Hydraulic and Hydraulic Machines by Modi & Seth, Standard book house.

(2) A text of Fluid mechanics and hydraulic machines by Dr.R.K. Bansal – Laxmi Publications (P) Ltd., New Delhi.

ReferenceBooks:

(1) Fluid Mechanics & Fluid Machines by Narayana Pillai, universities press.

(2) Open channel flow by srinivasan, Oxford University Press

(3) Fluid Mechanics AndMachenary-Kothandaraman, New Age Pubilishers

(4) Open Channel flow by K.Subramanya.TataMc.Grawhill Publishers.

(5) Elements of Open channel flow by Ranga Raju, Tata McGraw Hill, Publications.

(6) Fluid mechanics and fluid machines by Rajput, S.Chand& Co.

(7) Open Channel flow by V.T.Chow, Mc.Graw Hill book company

(8) Hydraulic Machines by Banga& Sharma Khanna Publishers.

(9) Fluid Mechanics & Fluid Power Engineering by D.S. Kumar Kataria& Sons.

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B.Tech. III Year II Semester

Entrepreneurship & Innovation					
Course Code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
22A0024T	**3:0:0:0**	**3**	**CIE:30 SEE:70**	**3 Hours**	**OEC-II**

Course Objectives:

- To make the student understand about Entrepreneurship
- To enable the student in knowing various sources of generating new ideas in setting up ofNew enterprise
- To facilitate the student in knowing various sources of finance in starting up of a business
- To impart knowledge about various government sources which provide financial assistance toentrepreneurs/ women entrepreneurs
- To encourage the student in creating and designing business plans

Syllabus		**Total Hours: 48**
Module - I	**Introduction to Entrepreneurship**	**10 Hrs**

Entrepreneurship - Concept, knowledge and skills requirement - Characteristics of successful entrepreneurs - Entrepreneurship process - Factors impacting emergence of entrepreneurship - Differences between Entrepreneur and Intrapreneur - Understanding individual entrepreneurial mindset and personality - Recent trends in Entrepreneurship.

Module - II	**Starting Up New Venture**	**10 Hrs**

Starting the New Venture - Generating business idea – Sources of new ideas & methods of generating ideas - Opportunity recognition - Feasibility study - Market feasibility, technical/operational feasibility - Financial feasibility - Drawing business plan - Preparing project report - Presenting business plan to investors.

Module - III	**Sources Of Finanace**	**9 Hrs**

Sources of finance - Various sources of Finance available - Long term sources - Short term sources - Institutional Finance – Commercial Banks, SFC's in India - NBFC's in India - their way of financing in India for small and medium business - Entrepreneurship development programs in India - The entrepreneurial journey- Institutions in aid of entrepreneurship development

Module - IV	**Women Entrepreneurship**	**9 Hrs**

Women Entrepreneurship - Entrepreneurship Development and Government - Role of Central Government and State Government in promoting women Entrepreneurship - Introduction to various incentives, subsidies and grants – Export- oriented Units - Fiscal and Tax concessions available - Women entrepreneurship - Role and importance - Growth of women entrepreneurship in India - Issues & Challenges - Entrepreneurial motivations.

Module - V	**Introduction to Incubation & Innovation**	**10 Hrs**

Fundamentals of Business Incubation - Principles and good practices of business incubation- Process of business incubation – Types, Advantages and Disadvantages of incubation. Innovation Meaning & Definition - Forms of innovation - Innovation, features and characteristics - Factors initiating innovations - Innovation process and its stages.

Course Outcomes (CO):

On completion of this course, student will be able to

- Understand the concept of Entrepreneurship and challenges in the world of competition. (L2)
- Apply the Knowledge in generating ideas for New Ventures.(L3)
- Analyze various sources of finance and subsidies to entrepreneur/women Entrepreneurs.(L4)
- Evaluate the role of central government and state government in promoting entrepreneurship.(L3)
- Create and design business plan structure through incubations.(L3)

Textbooks:

1. D F Kuratko and T V Rao, "Entrepreneurship**"** - A South-Asian Perspective – CengageLearning, 2012. (For PPT, Case Solutions Faculty may visit : login.cengage.com)
2. Nandan H, " Fundamentals of Entrepreneurship", PHI, 2013

Reference Books:

1. Vasant Desai, "Small Scale Industries and Entrepreneurship", Himalaya Publishing 2012.
2. Rajeev Roy "Entrepreneurship", 2nd Edition, Oxford, 2012.
3. B.JanakiramandM.Rizwana‖ "Entrepreneurship Development: Text & Cases", Excel Books,2011.
4. Stuart Read, Effectual "Entrepreneurship", Routledge, 2013.

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B.Tech. III Year II Semester

MACHINE LEARNING

(Common to CE,EEE,ME and ECE)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0528T	3:0:0:0	3	CIE: 30 SEE:70	3 Hours	OEC-II

Course Objectives:

This course will enable students to:

- Understand basic concepts of Machine Learning
- Study different learning algorithms
- Illustrate evaluation of learning algorithms

Course Outcomes(CO):

On completion of this course, student will be able to

- Identify machine learning techniques suitable for a given problem
- Solve the problems using various machine learning techniques
- Design application using machine learning techniques

Syllabus		Total Hours:48
Module-I	**Introduction – Human Learning & Machine Learning**	**10Hrs**

Human Learning, Types of Human Learning, Machine Learning, Types of Machine Learning, Applications of Machine Learning, Issues in Machine Learning.

Basic types of Data in Machine Learning, Data Preprocessing : Data Cleaning, Data transformation and Data Reduction

Module-II	Modeling and Evaluation	9Hrs

Introduction, selecting a Model, training a Model, Model Representation and Interpretability, Evaluating Performance of a Model, Improving Performance of a Model

Module-III	Supervised Learning :Classification	10Hrs

Classification – Methods of Classification : Classification model, Classification Learning Steps, Classification by Decision tree Induction, Classification by Back propagation, K-Nearest Neighbor Classification, Random Forest Algorithm, Naïve Baye's Classification

Module-IV	Supervised Learning : Regression	10Hrs

Regression – Assumptions in Regression Analysis, Types of Regression: Simple Linear Regression, Multiple Linear Regression, Polynomial Regression, Logistic Regression, Curve Fitting- Method of Least Squares.

Module-V	Unsupervised Learning : Clustering	9Hrs

Clustering- Different types of clustering techniques, Partitioning Methods: K-Means Algorithm, K-Medoid's algorithm, Hierarchical Clustering Methods, Density based Clustering Methods- DBSCAN, DENCLUE, OPTICS

Text Books:

1. Machine Learning, SaikatDutt, Subramanian Chandramouli, Amit Kumar Das, Pearson, 2019..

Reference Books:

1. EthernAlpaydin, “Introduction to Machine Learning”, MIT Press, 2004.
2. Stephen Marsland, “Machine Learning -An Algorithmic Perspective”, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series,2014.
3. Andreas C. Müller and Sarah Guido “Introduction to Machine Learning with Python: A Guide for Data Scientists”, Oreilly.

Web Resources:

1. Andrew Ng, “Machine Learning Yearning”
2. https://www.deeplearning.ai/machine-learning-
3. https://www.cse.huji.ac.il/~shais/UnderstandingMachineLearning/index.html

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B.Tech. III Year II Semester

Control Systems

(Common to all Except EEE & ECE)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0213Ta	3: 0:0:0	3	CIE: 30 SEE:70	3Hours	OEC-II

Course Objectives:

The objectives of the course are to make the students learn about:

- Merits and demerits of open loop and closed loop systems; the effects of feedback
- The use of block diagram algebra and Mason's gain formula
- Transient and steady state responses , time domain specifications
- Frequency domain specifications, Bode diagrams and Nyquist plots
- The fundamental aspects of modern control

Syllabus		**Total Hours:49**
Unit-I	**INTRODUCTION**	**10 Hrs**

Open Loop and closed loop control systems and their differences- Examples of control systems- Classification of control systems, Feedback Characteristics, Effects of positive and negative feedback. Mathematical models – Differential equations of Translational and Rotational mechanical systems, and Electrical Systems, Block diagram reduction methods – Signal flow graph - Reduction using Mason's gain formula. Transfer Function of DC Servo motor - AC Servo motor - Synchro transmitter and Receiver.

Unit-II	**TIME RESPONSE ANALYSIS**	**10 Hrs**

Step Response - Impulse Response - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants

Unit -III	**STABILITY**	**9 Hrs**

The concept of stability – Routh's stability criterion – Stability and conditional stability – limitations of Routh's stability. The root locus concept - construction of root loci effects of adding poles and zeros to G(s)H(s) on the root loci.

Unit -IV	**FREQUENCY RESPONSE ANALYSIS**	**10 Hrs**

Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram Stability Analysis from Bode Plots. Polar Plots- Phase margin and Gain margin-Stability Analysis.

Unit -V	**STATE SPACE ANALYSIS**	**10 Hrs**

Concepts of state, state variables and state model, derivation of state models from differential equations. Transfer function models. Block diagrams. Diagonalization. Solving the Time invariant state Equations- State Transition Matrix and it's Properties. System response through State Space models. The concepts of controllability and observability

Course Outcomes(CO):

At the end of studying the course, the student should be able to:

- Evaluate the effective transfer function of a system from
- block diagram reduction techniques (ii) Mason's gain formula
- Compute the steady state errors and transient response characteristics
- Determine the absolute stability and relative stability of a system
- Design a compensator to accomplish desired performance
- Derive state space model of a given physical system and solve the state equation

Textbooks:

1. Modern Control Engineering, Katsuhiko Ogata, PEARSON, 1st Impression 2015.
2. Control Systems Engineering, I. J. Nagrath and M. Gopal, New Age International Publishers, 5th edition, 2007, Reprint 2012.

Reference Books:

1. Automatic Control Systems, Farid Golnaraghi and Benjamin. C. Kuo, WILEY, 9th Edition, 2010.
2. Control Systems, Dhanesh N. Manik, CENGAGE Learning, 2012.
3. John J D'Azzo and C. H. Houpis , "Linear Control System Analysis and Design: Conventional and Modern", McGraw - Hill Book Company, 1988.

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B.Tech. IV Year I Semester

S.no	Category	Code	Course Title	Hours			Credits
1	PE		**Professional elective course-III**	3	0	0	3
2	PE		**Professional Elective Course– IV**	3	0	0	3
3	PE		**Professional Elective Course– V**	3	0	0	3
4	OE/JE		**Open Elective-III**	3	0	3	3
5	OE/JE		**Open Elective-IV**	3	0	3	3
6.	MC	22A0023T	Management Science	3	0	0	3
7	**SEC (Advanced)**	22A0146P	Design and Drawing of Irrigation Structures	1	0	2	2
Industrial/Research Internship 2 Months (Mandatory) after third year (to be evaluated during VII semester (22A0147P)				0	0	0	3
				Total credits			**23**

Category	**CREDITS**
Professional Elective courses (PE)	9
Open Elective Course/Job oriented elective (OE/JE)	6
Humanities and Social Science Elective (MC)	3
Skill advanced course/ soft skill course*(SEC)	2
Industrial/Research Internship (PR)	3
TOTAL CREDITS	**23**

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S.P.S.R. Nellore Dt. A.P Pin 524 137

Head of the department

Professional Elective III

SL. No	Course Code	Course Name
1	22A0137T	Railways, Airport and Harbour Engineering
2	22A0138T	Ground Improvement Techniques
3	22A0139T	Advanced Structural Engineering

Professional Elective IV

SL. No	Course Code	Course Name
1	22A0140T	Industrial Waste and Wastewater Management
2	22A0141T	Repair and Rehabilitation of structures
3	22A0142T	Building Science and Technology

Professional Elective V

SL. No	Course Code	Course Name
1	22A0143T	Prestressed Concrete
2	22A0144T	Remote Sensing and GIS
3	22A0145T	Bridge Engineering

Open Elective-III

SL. No	Course Code	Branch	Course Name
1	22A0433T	ECE	Industrial Electronics
2	22A0329Tc	ME CH	Measurement and Mechatronics
3	22A0332Tc		Unconventional Machining Processes
4	22A0529T	CSE	Cloud Computing
5	22A0241Ta	EEE	Smart Grid
6	22A0026T	BS	Human Resources& Management

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Member Secretary **Head of the department**

Open Elective- IV

SL. No	Course Code	Branch	Course Name
1	22A0432T	ECE	Basic VLSI Design
2	22A0334Tb	MECH	Nondestructive Evaluation
3	22A0329Ta		Renewable Energy sources
4	22A0534Ta	CSE	Cyber security
5	22A0232Ta	EEE	Electric vehicles
6	22A0025T	BS	Business Environment

Member Secretary

Head of the Department
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B.Tech. IV Year I Semester

RAILWAYS, AIRPORT AND HARBOUR ENGINEERING

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0137T	3:0:0:0	3	CIE:30 SEE:70	3Hours	PE-III

Course Objectives:

- Ability to explain the components of permanent way and its components and their functions and requirements.
- Ability to explain the geometric design elements of Railway track like can't, radius of curve and degree of curve etc... And their design components.
- Ability to the Aircraft characteristics and their influence on various design elements of an airport.
- Ability to explain the concepts of runway orientation, Airport lighting, Airport components and their planning and geometric design of runways and taxiways.
- Ability to explain the difference between ports and Harbour, types of Ports and Harbours, various facilities needed in Ports and Harbours and Navigational Aids for ships.

Syllabus **TotalHours:48Hrs**

UNIT-I	Railway Engineering	10Hrs

Introduction – Permanent way components – Cross section of permanent way – Functions and requirements of rails, sleepers and ballast – Types of gauges – Creep of rails – Theories related to creep – Coning of wheels – adzing of sleepers – Rail fastenings.

UNIT-II	Geometric design of railway track	9Hrs

Gradients – Grade compensation – Cant and negative super elevation – Cant deficiency – Degree of curves – Safe speed on railway track – Points and crossings – Layout and functioning of left hand turn out and right hand turn outs – Station yards – Signaling and interlocking.

UNIT–III	Airport Engineering	9Hrs

Airport site selection – Factors affecting site selection and surveys- Runway orientation – Wind rose diagram – basic runway length – Correction for runway length – Terminal area – Layout and functions – Concepts of terminal building – Simple building , Linear concept, pier concept and satellite concept – Typical layouts .

UNIT-IV	Geometric design of runways and taxiways	10Hrs

Aircraft characteristics – Influence of characteristics on airport planning and design – Geometric design elements of runway – Standards and specifications - Functions of taxiways – Taxiway geometric design – Geometric elements and standard specifications – Runway and taxiway lighting.

UNIT–V	Ports and Harbors	10Hrs

Harbours - Requirements of ports and harbours – Types of ports – Classification of harbours – Docks and types of docks – Dry docks, wharves and jetties – Breakwaters: layouts of different types of harbors and docks – Dredging operations – navigation aids.

Course Outcomes (CO): Student will be able to

- Understand the components of permanent way and its components and their functions and requirements.
- Understand the geometric design elements of Railway track like can't, radius of curve and degree of curve etc. And their design components.
- Understand the Aircraft characteristics and their influence on various design elements of an airport.
- Understand the concepts of runway orientation, Airport lighting, Airport components and their planning and geometric design of runways and taxiways.
- Understand the difference between ports and Harbours, types of Ports and Harbours, various facilities needed in Ports and Harbours and Navigational Aids for ships.

Text Books:

1. Transportation Engineering: Railways, Airports, Docks and Harbours, R Srinivasa Kumar, Universities Press, 2014
2. Airport Planning and Design- S.K. Khanna and M.G Arora, Nemchand Bros 6th edition
3. Dock and Harbour Engineering – Hasmukh P Oza, Gutam H Oza, Chartor Publishers pvt ltd.

Reference Books:

1. A Text Book of Railway Engineering-S.C.Saxena and S.Arora, Dhanpatrai and Sons, New Delhi 2010
2. Highway, railway, Airport and Harbour Engineering – K.P. Subramanian, Scitechpubilishers.
3. Harbour, Dock and Tunnel Engineering – R. Srinivasan, Charotar Publishing House Pvt. Limited, 2009

E Resources:

https://nptel.ac.in/courses/105107123

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B.Tech. IV Year I Semester

GROUND IMPROVEMENT TECHNIQUES					
Course Code	**L:T:P:S**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
22A0138T	**3: 0:0:0**	**3**	**CIE: 30 SEE:70**	**3Hours**	**PE-III**

Course Objectives:

- The knowledge on the problems posed by the problematic soils and the remedies to build the various structures in problematic soils will be imparted to the students.
- Understand the fundamental concept of ground improvement techniques.
- Apply knowledge of densification methods.
- Understand the concepts of stabilization mechanical & chemical methods.
- Impart knowledge of components of reinforced earth & design of reinforced earthwalls.
- Understanding the identification &foundation techniques.

Syllabus	**Total Hours:48Hrs**
Unit - I	**10 Hrs**

Methods of De-Watering- Sumps And Interceptor Ditches- Single, Multi Stage Well Points - VacuumWell Points- Horizontal Wells-Foundation Drains-Blanket Drains- Criteria For Selection Of Fill Material Around Drains –Electro-Osmosis.

Objectives Of Grouting- Grouts And Their Properties- Grouting Methods- Ascending, Descending And Stage Grouting- Hydraulic Fracturing In Soils And Rocks- Post Grout Test.

Unit - II	**10 Hrs**

In – situ densification methods in granular Soils: – Vibration at the ground surface, Impact at the Ground Surface, Vibration at depth, Impact at depth. In – situ densification methods in Cohesive soils: – Preloading or dewatering, Vertical drains – Sand Drains, Sand wick geo drains – Stone and lime columns – thermal methods.

Unit - III	**10 Hrs**

Methods of stabilization-mechanical-cement- Lime-bituminous-Chemical stabilization with calcium chloride, sodium silicate and gypsum.

Unit - IV	**9 Hrs**

Principles – Components of reinforced earth – Factors governing design of reinforced earth walls – Design principles of reinforced earth walls.

Geotextiles- Types, Functions and applications – Geogrids and geomembranes – Functions and applications.

Unit - V	**9 Hrs**

Problems of expansive soils – Tests for identification – Methods of determination of swell pressure. Improvement of expansive soils – Foundation techniques in expansive soils – Under reamed piles.

Course Outcomes (CO):

On completion of this course, student will be able to

- Use effectively the various methods of ground improvement techniques.
- Identify the problems in Expansive soils
- The locally available technique for ground improvement so that the design of foundation.
- Identify different types of function & application &geo member.
- Be able to anticipate & subject the soils test for identification method of determination of swell pressure.

Textbooks:

1. Engineering Principles of Ground Modification, Haussmann M.R. (1990), McGraw-Hill International Edition.
2. Ground Improvement Techniques by Dr.P.Purushotham Raj, Laxmi Publications, New Delhi / University Science Press, New Delhi.
3. Ground Improvement Techniques by Nihar Ranajan Patra. Vikas Publications, New Delhi

Reference Books:

1. Ground Improvement, Blackie Academic and Professional by Moseley M.P. (1993), Boca Taton, Florida, USA.
2. Ground Control and Improvement by Xanthakos P.P, Abramson, L.W and Brucwe, D.A (1994), John Wiley and Sons, New York, USA.
3. Designing with Geosynthetics by Robert M. Koerner, Prentice Hall New Jercy, USA

E-Resources

https://archive.nptel.ac.in/courses/105/105/105105210/

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B.Tech. IV Year I Semester

ADVANCED STRUCTURAL DESIGN					
Course Code	**L:T:P:S**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
22A0139T	**3:0:0:0**	**3**	**CIE:30 SEE:70**	**3Hours**	**PE-III**

Course Objectives:

- To make the student more conversant with the design principles of multistoried buildings, roof system, foundation and other important structures.

Syllabus		**TotalHours:48Hrs**
UNIT-I	**DESIGN OF COMBINED FOOTINGS**	**10 Hrs**
Design of Rectangular, triangular Combined Footing with or without Beam, Design of TrapezoidalCombined Footing with or without Beam, Design of Strap Footing		
UNIT-II	**WATER TANK**	**10 Hrs**
Design of circular and rectangular water tank resting on the ground		
UNIT-III	**RETAINING WALL**	**10 Hrs**
Design of cantilever and counter forte retaining wall with horizontal back fill		
UNIT-IV	**FLAT SLAB**	**9Hrs**
Introduction to slabs, Design of a flat slab (Interior panel only)		
UNIT-V	**PLATE GIRDERS AND GANTRY GIRDERS**	**9Hrs**
Design of Plate girders Design of welded plate girder – Curtailment of flange plates- stiffeners. and gantry girders- welded compound sections		

Course Outcomes (CO): Student will be able to

On completion of this course the student will be able to

1. Design of combined footing to Indian standards
2. Design of water storage structures
3. Understand about retaining wall
4. Design of flat slab
5. Design of plate girder
6. Design of gantry girder

Text Books:

1. Structural Design And Drawing (RCC And Steel) By Krishnam Raju, Universites .Press , New Delhi
2. R.C.C Structures By Dr. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Laxmi Publications, New Delhi

Reference Books:

1. Design Of RCC Structures By M.L.Gambhir P.H.I. Publications, New Delhi.
2. Advanced RCC By P.C. Varghese , PHI Publications, New Delhi.
3. R.C.C Designs By Sushil Kumar , Standard Publishing House.
4. Fundamentals Of RCC By N.C.Sinha And S.K.Roy, S.Chand Publications, New Delhi.

E Resources:

1. https://www.youtube.com/watch?v=PH0SSG7io3Q
2. https://www.youtube.com/watch?v=qKTPLCDltg4
3. https://www.youtube.com/watch?v=pKuvrds7XHk
4. https://www.youtube.com/watch?v=6diybn1fd9A
5. https://www.youtube.com/watch?v=6LZiPNApaB8

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B.Tech. IV Year I Semester

INDUSTRIAL WASTE AND WASTE WATER MANAGEMENT

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0140T	3: 0:0:0	3	CIE: 30 SEE:70	3Hours	PE-IV

Course Objectives:

- To distinguish between the quality of domestic and industrial water requirements and Wastewater quantity generation.
- To Know the industrial process, water utilization and wastewater generation.
- To Impart knowledge on selection of treatment methods for industrial wastewater.
- To acquire the knowledge on operational problems of common effluent treatment plants.
- To gain knowledge on different techniques and approaches for minimizing the generation and application of Physio-chemical and biological treatment methods for recovery, reuse and disposal of industrial wastewater.

Syllabus		**Total Hours:48Hrs**
Unit- I	**Sources of Pollution**	**10 Hrs**
Sources of Pollution - Physical, Chemical, Organic & Biological properties of Industrial Wastes - Difference between industrial & municipal waste waters - Effects of industrial effluents on sewers and Natural water Bodies.		
Unit - II	**Primary Treatment**	**10 Hrs**
Pre & Primary Treatment - Equalization, Proportioning, Neutralization, Oil separation by Floating-Waste Reduction-Volume Reduction-Strength Reduction.		
Unit - III	**Waste Treatment Methods**	**9 Hrs**
Waste Treatment Methods - Nitrification and De-Nitrification-Phosphorous removal -Heavy metal removal - Membrane Separation Process - Air Stripping and Absorption Processes - Special Treatment Methods - Disposal of Treated Waste Water.		
Unit - IV	**Characteristics and Composition of waste water**	**9 Hrs**
Characteristics and Composition of waste water and Manufacturing Processes of Industries like Sugar, Characteristics and Composition of Industries like Food processing Industries, Steel, and Petroleum Refineries.		
Unit - V	**Characteristics and Composition of Industries**	**10 Hrs**
Characteristics and Composition of Industries like Textiles, Tanneries, Atomic Energy Plants and other Mineral Processing Industries – Joint Treatment of Raw Industries waste water and Domestic Sewage – Common Effluent Treatment Plants (CETP) – Location, Design, Operation and Maintenance Problems – Economical aspects.		

Course Outcomes (CO):
Student will be able to

- To understand the fundamental concepts of wastewater treatment.
- To conduct experiments and the ability to analyze the data, interpret results and draw conclusions.
- To design a component, system or process to meet desired needs and imposed constraints.
- To Identify, formulate and solve civil engineering problems
- To understand the modern techniques skills and necessary for engineering practice.
- To understand the modern techniques tools including computer applications for engineering practice.

Text Books:

1. Wastewater engineering Treatment disposal reuse by Metcalf & Eddy, Tata McGraw Hill.
2. Industrial Water Pollution Control by Eckenfelder, W.W., McGraw-Hill

Reference Books:

1. Industrial Waste by M.N. Rao and Dutta CBS Publishers and Distributors Pvt Ltd; 3rd edition (January 30, 2018)
2. Water & Wastewater Technology by Mark J. Hammer, Mark J. Hammer, Jr., Prentice Hall of India

E Resources:

https://nptelvideos.com/video.php?id=1118

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B.Tech. IV Year I Semester

REPAIR AND REHABILITATION OF STRUCTURES

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0141T	3:0:0:0	3	CIE:30 SEE:70	3Hours	PE-IV

Course Objectives:

- To learn various distress and damages to concrete and masonry structures
- To understand the importance of maintenance of structures
- To assess the damage to structures using various tests
- To study the various types and properties of repair materials
- To learn various repair techniques of damaged structures, corroded structures

Syllabus		**TotalHours:48Hrs**
Unit-I	**Introduction**	**10 Hrs**
Introduction, significance of corrosion, and corrosion mechanisms - Embedded metal corrosion		
Unit-II	**Deterioration of cementations systems**	**10 Hrs**
Deterioration of cementations systems – Sulphate and Acid attack - Alkali Silica Reaction (ASR), Shrinkage, and others		
Unit-III	**Non-Destructive Tests (NDT)**	**9Hrs**
Concrete Assessment Using Non-Destructive Tests (NDT) - Concrete Assessment and LoadEffects.		
Unit-IV	**Assessment and repair of materials**	**10 Hrs**
Surface repair – Condition assessment – Analysis, strategy, and design – Material requirement, surface preparation, placement of repair material		
Unit-V	**Strengthening and stabilization**	**9Hrs**
Strengthening and stabilization -Strengthening of Structural elements, Repair of structures distressed due to corrosion, fire, leakage, earthquake-Transportation of Structures from one place to other Structural Health Monitoring- demolition techniques-Engineered demolition methods-Case studies, Study of structural conditions of heritage buildings.		

Course Outcomes (CO): Student will be able to

• Understand corrosion effects
• Understand the deterioration in structures
• Understand nondestructive tests
• Understand the surface repair of structures
• Understand the concepts of Strengthening and stabilization of structural elements
• Understand the concepts of demolition techniques

Text Books:

1. Concrete Repair and Maintenance by Peter H. Emmons, R.S. Means Company, Kingston, MA, USA.
2. Maintenance Repair & Rehabilitation & Minor Works of Buildings by P.C. Varghese, PHI Learning Pvt. Ltd., New Delhi.

Reference Books:

1. Concrete Repair to EN1504 – Diagnosis, Design, Principles and Practice by Michael Raupach and Till Buttner, CRC Press.,
2. Concrete Structures – Protection, Repair and Rehabilitation by R. Dodge Woodson, Butterworth-Heinemann – Elsevier, UK

E Resources: **https://youtu.be/G7S_XocB9G8**
https://youtu.be/T-853btlzCA
https://youtu.be/RwjJLvF5hzo

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B.Tech. IV Year I Semester

Building Science and Technology

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0142T	3:0:0:0	3	CIE:30 SEE:70	3Hours	PE-IV

Course Objectives:

- To interpret the challenges and efforts in sustainable development
- To develop basic knowledge Green building initiation in sustainability.
- To recite the standards of ventilation in heat and air conditioning design.
- To enhance the knowledge on the building services on water and drainage systems.
- To implement sustainable materials in construction
- To explain environmental effects of construction materials over sustainability.

Syllabus **TotalHours:48Hrs**

Unit-I — 10 Hrs

Challenges and efforts, sustaining life support systems, land degradation water management, urbanization and industrialization, Challenges in implementing environment law Systems analysis approaches – life cycle analysis, simulation models, risk based models, Measures of sustainability, indicators and different types societal change, sustainable developments.

Unit-II — 10 Hrs

Green building initiatives, its origin, characteristics of a green building, green buildings in India, certification of green buildings rating criteria sustainability. Sustainable sites, impact of building on environment, life cycle assessment. Design on Bioclimatic and solar passive architecture, considerations of energy consumption, water use, and system reliability, indoor air quality, noise level, comfort, cost efficiency in building design.

Unit-III — 9 Hrs

Components of Air conditioning Human comfort- Comfort Standards-Organizational flowchart building planning and design team and building construction team Licensing- Basics of heat transfer-Overall heat transfer-Different types of heat loads-Summary of heat load calculation procedures. Zoning of air- conditioned area-VAV systems-Room units- Unitary air conditioner- Roof top units- Air handling units-Air cleaning devices-Air Energy conservation

Unit-IV — 9 Hrs

Importance and necessity, municipal requirement, various types of water demands materials of pipes, Layout of water supply pipes, Calculation of pressure losses in piping systems, Selection of pumps Design of drainage systems using IS standards and BS standards for all types of building residential commercial, malls, and five star hotels. Recycling of waster using waste water treatment plants.

Unit-V — 10 Hrs

Alternate Building, Materials for sustainability, new techniques such as masonry with dry mortar pre cost lightweight panels. Embodied energy of different construction materials, like brick concrete wall glass and other metallic building materials, High performance metallic building materials and plastics, Corrosion inhibitors and corrosion control design, different types of organic paints for application of different types of buildings and civil engineering infrastructure.

Course Outcomes (CO): Student will be able to

- Understand factors effect environment sustainability.
- Explore knowledge on green technology in building construction.
- Analyze the behavior of heating ventilation and air conditioning in environment sustainability.
- Arrange the building services for requirement of building.
- Identify sustainable building materials for construction.
- Illustrate materials which exhibits equal strength in construction origin materials

Text Books:

1. Tropical housing and buildings climate design (1973). By Koenig's Berger Ltd, ingeesle, T-G Alan mayhew, s zokoloy S.vUniversity press (India) pot-Ltd Hyderabad.
2. Sustainable energy by choosing options Jefferson W.T etal (2005), P H, learning pvt Ltd New Delhi-11000
3. Air-conditioning Principles and systems, PHI Learning Private Limited

Reference Books:

1. Public Health engineering, E.B Phelps &CJ Velj John Wiley and sons, New York.
2. Sustainable energy by choosing options Jefferson W.T etal (2005) P H, learning Pvt. Ltd NewDelhi-1100

E Resources:

https://nptel.ac.in/courses/105107156

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B.Tech. IV Year I Semester

Prestressed Concrete

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0143T	3:0:0:0	3	CIE:30 SEE:70	3Hours	PE-V

Course Objectives:

- Analyze PSC beams with straight, concentric, eccentric, bent and parabolic tendons and design beams of rectangular and I sections for flexure.
- Design shear reinforcements, structural elements for shear, torsion and anchorage asper the provisions of BIS.
- Interpret the transmission mechanism of pre-stressing force by bond and compute deflection of beams under loads

Syllabus **TotalHours:48Hrs**

Unit-I	10 Hrs

Principles of pre-stressing – pre stressing systems - pre-tensioning and post tensioning-Advantages and limitations of Pre stressed concrete- need for high strength materials. Methods of pre-stressing: Pre-tensioning (Hoyer system) and Post-tensioning methods (Freyssinet system and Gifford- Udall System).

Unit-II	8 Hrs

Loss of pre-stress in pre-tensioned and post-tensioned members due to elastic shortening, shrinkage and creep of concrete, relaxation of stress in steel, anchorage slip and frictional losses.

Unit-III	12 Hrs

Analysis of beams for flexure and shear - beams pre-stressed with straight, concentric, eccentric, bent and parabolic tendons- Kern line - Cable profile - design of PSC beams (rectangular and I sections) using IS 1343. Analysis and design of rectangular and I beams for shear. Introduction to Transmission length and End block (no Design and Analytical problems).

Unit-IV	8 Hrs

Control of deflections- Factors influencing deflections - short term deflections of un cracked beams-prediction of long time deflection

Unit-V	10 Hrs

Different Types- Propped and Un-propped- stress distribution- Differential Shrinkage-Analysis of composite beams.

Course Outcomes (CO): Student will be able to

- Understand the concepts of pre-stressing and methods of pre stressing.
- Compute losses of pre-stress in pre-stressed concrete members.
- Design PSC beams under flexure and shear.
- Estimate the short and long term deflections of PSC beams.
- Apply pre stressing concepts for composite beams.
- Analyze PSC composite beams.

Text Books:

1. N. Krishna Raju, "Prestressed Concrete", Tata Mc.Graw Hill Publications.
2. Praveen Nagrajan, "Prestressed Concrete Design", Pearson publications, 2013.
3. Rajagopalan, "Prestressed concrete", Narosa Publishing House.

Reference Books:

1. Concrete T.Y. Lin & Ned H. Burns, "Design of Prestressed Concrete Structures", John Wiley &Sons.
2. Ramamrutham, "Prestressed", Dhanpatrai Publications.
3. BIS code on "prestressed concrete", IS: 1343 to be permitted into the examination Hall.

E Resources:

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

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B.Tech. IV Year I Semester

Remote sensing & GIS					
Course Code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
22A0144T	**3:0:0:0**	**3**	**CIE:30 SEE:70**	**3 Hours**	**PE-V**

Course Objectives:

- To understand the Photogrammetric techniques, concepts, components of Photogrammetry.
- To introduce the students to the basic concepts and principles of various components of remote sensing
- To provide an exposure to GIS and its practical applications in Civil Engineering
- Analyze the energy interactions in the atmosphere and earth surface features

Syllabus	**Total Hours:48Hrs**
Unit-I	**9 Hrs**

Principles& types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducially points, parallax measurement using fiducially line.

Unit -II	**9 Hrs**

Basic concepts and foundation of remote sensing – elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units. Energy resources, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies, introduction to digital data analysis.

Unit -III	**10 Hrs**

Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS. Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS – File management, Spatial data – Layer based GIS, Feature based GIS mapping

Unit -IV	**10 Hrs**

Computational Analysis Methods (CAM), Visual Analysis Methods (VAM), Data storage vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

Unit -V	**10 Hrs**

Land use/Land cover in water resources, Surface water mapping and inventory, Rainfall – Runoff relations and runoff potential indices of watersheds, Flood and Drought impact assessment and monitoring, Watershed management for sustainable development and Watershed characteristics.

Course Outcomes (CO):

On completion of this course, student will be able to

1. Principles of Remote Sensing and GIS
2. Analysis of RS and GIS data and interpreting the data for modeling applications

Textbooks:

1. Remote Sensing and GIS by B.Bhatta, Oxford University Press,New Delhi.
2. Fundamentals of remote sensing by Gorge Joseph , Universities press, Hyderabad

Reference Books:

1. Advanced Surveying : Total Station GIS and Remote Sensing – Satheesh Gopi – Pearson Publication.
2. Remote Sensing and its applications by LRA Narayana University Press 1999.
3. Basics of Remote sensing & GIS by S.Kumar, Laxmi Publications.
4. Remote sensing and GIS by M.Anji Reddy ,B.S.Pubiliications,New Delhi.
5. GIS by Kang – Tsung Chang, TMH Publications & Co.

E Resources:

https://nptel.ac.in/courses/105/103/105103193/

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B.Tech. IV Year I Semester

Bridge Engineering					
Course Code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
22A0145T	**3:0:0:0**	**3**	**CIE:30 SEE:70**	**3 Hours**	**PE-V**

Course Objectives:

- To introduce the students to choose the appropriate bridge type for a given project, and to analyses and design the main components of the chosen bridge
- To teach the students the method of designing a deck slab bridge for class AA loading
- To teach the students about the general features of a beam and slab bridge and various methods for design of an interior panel for class AA loading
- To make the students familiarize with components of plate girder bridges and composite bridges and their design procedure
- To introduce students the importance and stability analysis procedure of piers and abutments subjected to various forces

Syllabus	**Total Hours:48Hrs**
Unit-I	**9 Hrs**

INTRODUCTION: Importance of Site Investigation in Bridge Design. Highway Bridge Loading Standards. Impact Factor. Railway Bridge Loading Standards (B.G. ML Bridge) Various Loads in Bridge.

BOX CULVERT : General Aspects. Design Loads, Design of Box Culvert Subjected to RC Class AA Tracked Vehicle Only.

BRIDGE BEARINGS : General Features – Types of Bearings – Design Principles of Steel Rocker & Roller Bearings – Design of A Steel Rocker Bearing – Design of Elastometric Pad Bearing.

Unit -II	**9 Hrs**

Introduction – Effective Width Method of Analysis Design of Deck Slab Bridge (Simply Supported) Subjected to Class AA Tracked Vehicle Only.

Unit -III	**10 Hrs**

General Features – Design of Interior Panel of Slab – Pigeauds Method – Design of A T-Beam Bridge Subjected to Class AA Tracked Vehicle Only

Unit -IV	**10 Hrs**

Introduction – Elements of A Plate Girder and Their Design. Design of A Deck Type Welded Plate Girder – Bridge of Single Line B.G.

COMPOSITE BRIDGES: Introduction – Advantages – Design of Composite Bridges Consisting of RCC Slabs Over Steel Girders' Including Shear Connectors

Unit -V	**10 Hrs**

General Features – Bed Block – Materials Piers & Abutments Types of Piers – Forces Acting On Piers – Stability Analysis Of Piers – General Features of Abutments – Forces Acting On Abutments – Stability Analysis Of Abutments – Types Of Wing Walls – Approaches – Types Of Bridge Foundations (Excluding Design).

Course Outcomes (CO):

On completion of this course, student will be able to

1. Design the basic components of bridge structures like bridge deck slabs, longitudinal girders, transverse girders, piers and well foundations.
2. Understand the IRC classes of loading and railway bridge rules for detailed calculation of loadings and design of various components.
3. Know the methods of design of structural components of different types of Bridges

Textbooks:

1. Bridge Engineering By Ponnu Swamy, TATA Mcgraw Hill Company, New Delhi.
2. Design Of Bridges By N.Krishnam Raju, Oxford & IBH, Publishing Company Pvt.Ltd., Delhi.
3. Relevant – IRC & Railway Bridge Codes.

Reference Books:

1. Design Of Steel Structures, By B.C. Punmia, Ashok Kumar Jain And Arun Kumar Jain, LaxmiPublications, New Delhi.
2. Essentials Of Bridge Engineering By D.J.Victor, Oxford IBH Publishers Ltd

E Resources:

https://archive.nptel.ac.in/courses/105/105/105105216/

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B.Tech. IV Year I Semester

MANAGEMENT SCIENCE

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
22A0023T	3:0:0:0	3	CIE:30 SEE:70	3 Hours	MC

Course Objectives:

- To provide fundamental knowledge on Management, Administration, Organization & its concepts.
- To make the students understand the role of management in Production
- To impart the concept of HRM in order to have an idea on Recruitment, Selection, Training & Development, job evaluation and Merit rating concepts.
- To create awareness on identify Strategic Management areas & the PERT/CPM for better Project Management.
- To make the students aware of the contemporary issues in management.

Syllabus		**Total Hours:48**
Unit - I	**Introduction To Management**	**10 Hrs**

Management - Concept and meaning - Nature-Functions - Management as a Science and Art and both. Schools of Management Thought - Taylor's Scientific Theory-Henry Fayol's principles - Eltan Mayo's Human relations - Systems Theory - Organizational Designs - Line organization - Line & Staff Organization - Functional Organization - Matrix Organization - Project Organization - Committee form of Organization - Social responsibilities of Management.

Unit - II	**Operations Management**	**10 Hrs**

Principles and Types of Plant Layout - Methods of Production (Job, batch and Mass Production), Work Study - Statistical Quality Control - Deming's contribution to Quality. Material Management - Objectives - Inventory-Functions - Types, Inventory Techniques - EOQ-ABC Analysis - Purchase Procedure and Stores Management - Marketing Management - Concept - Meaning - Nature- Functions of Marketing - Marketing Mix - Channels of Distribution - Advertisement and Sales Promotion - Marketing Strategies based on Product Life Cycle.

Unit - III	**Human Resources Management**	**10 Hrs**

HRM - Definition and Meaning – Nature - Managerial and Operative functions - Evolution of HRM - Job Analysis - Human Resource Planning (HRP) - Employee Recruitment-Sources of Recruitment - EmployeeSelection - Process and Tests in Employee Selection - Employee Training and Development - On-the- job& Off-the-job training methods - Performance Appraisal Concept - Methods of Performance Appraisal
– Placement - Employee Induction - Wage and Salary Administration.

Unit - IV	**Strategic & Project Management**	**10 Hrs**

Definition& Meaning - Setting of Vision - Mission - Goals - Corporate Planning Process - Environmental Scanning - Steps in Strategy Formulation and Implementation - SWOT Analysis - Project Management - Network Analysis - Programme Evaluation and Review Technique (PERT) - Critical Path Method (CPM) Identifying Critical Path - Probability of Completing the project within given time - Project Cost- Analysis - Project Crashing (Simple problems).

Unit - V	**Contemporary Issues In Management**	**8 Hrs**

The concept of Management Information System(MIS) - Materials Requirement Planning (MRP)- Customer Relations Management(CRM) - Total Quality Management (TQM) - Six Sigma Concept - Supply Chain Management(SCM) - Enterprise Resource Planning (ERP) - Performance Management - Business Process Outsourcing (BPO) - Business Process Re- engineering and Bench Marking - Balanced Score Card - Knowledge Management.

Course Outcomes (CO):

On completion of this course, student will be able to

- Understand the concepts & principles of management and designs of organizationin a practical world (L2)
- Apply the knowledge of Work-study principles & Quality Control techniques inindustry(L3)
- Analyze the concepts of HRM in Recruitment, Selection and Training & Development.(L4)
- Evaluate PERT/CPM Techniques for projects of an enterprise and estimate time & cost of project & to analyze the business through SWOT.(L3)
- Create Modern technology in management science.(L3)

Textbooks:

1. A.R Aryasri, "Management Science", TMH, 2013
2. Stoner, Freeman, Gilbert, Management, Pearson Education, New Delhi, 2012.

Reference Books:

1. Koontz & Weihrich, "Essentials of Management", 6th edition, TMH, 2005.
2. Thomas N.Duening & John M.Ivancevich, "Management Principles and Guidelines",Biztantra.
3. Kanishka Bedi, "Production and Operations Management", Oxford University Press, 2004.
4. Samuel C.Certo, "Modern Management", 9th edition, PHI, 2005.

E Resources:

https://nptel.ac.in/courses/122/102/122102007/

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B.Tech. IV Year I Semester

DESIGN AND DRAWING OF IRRIGATION STRUCTURES					
Course Code	**L:T:P:S**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
22A0146P	**1: 0:2:0**	**2**	**CIE: 30 SEE:70**	**3Hours**	**SEC (Advanced)**

Course Objectives:

To know the design and drawing aspects of Surplus weir. To know the design and drawing aspects Trapezoidal notch fall. To know the design and drawing aspects Canal regulator. To know the design and drawing aspects Tank sluice with tower head. To know the design and drawing aspects Sloping glacis weir.

Syllabus		**Total Hours:48**
Unit - I	Surplus weir.	10 Hrs
Unit - II	Trapezoidal notch fall.	10 Hrs
Unit - III	Canal regulator	9 Hrs
Unit - IV	Tank sluice with tower head	9 Hrs
Unit - V	Sloping glacis weir.	10 Hrs

Course Outcomes (CO):

Oncompletion of this course, student will be able to

- Design and draw the plan and cross section of Surplus weir.
- Design and draw the plan and cross section of Trapezoidal notch fall
- Design and draw the plan and cross section of Canal regulator
- Design and draw the plan and cross section of Tank sluice with tower head
- Design and draw the plan and cross section of Sloping glacis weir.

Final Examination pattern: Any two questions of the above five designs may be asked out of which the candidate has to answer one question. The duration of examination will be three hours.

Textbooks:

1. Design of minor irrigation and canal structures by C. Satyanarayana Murthy, Wiley eastern Ltd.
2. Irrigation engineering and Hydraulic structures Standard by S.K. Garg, Khanna Publishers.

Reference Books:

1. Irrigation and water power engineering by B.C. Punmia, Dr. Pande B.B. Lal, Er. Asjok kumar jain, Dr. Arun Kumar Jain.

E Resources:

https://nptel.ac.in/courses/126/105/126105010/

https://rgmcet.edu.in/NAAC/2023/1.2.1/New_Subjects/CE-R15_Syllabus-4-2.pdf

Open Elective -III

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B.Tech. IV Year I Semester

Industrial Electronics

Open Elective Course -III

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0433T	3: 0:0:0	3	CIE: 30 SEE:70	3Hours	OE-III

Course Objectives:

The course should enable the students to:

- Describe semi-conductor devices (such as PN junction diode & Transistor) and their switching characteristics.
- Understand the characteristics ofAC to DC converters.
- Understand about the practical applications Electronics in industries.
- Describe the ultrasonic and its application.

Syllabus	**Total Hours: 48**

Unit-I	**Industrial Electronics**	**10 Hrs**

Scope of industrial Electronics, Semiconductors, Merits of semiconductors, crystalline structure, Intrinsic semiconductors, Extrinsic semiconductors, current flow in semi conductor, Open circuited p-n junction, Diode resistance, Zener diode, Photo conductors and junction photo diodes, Photo voltaic effect, Light emitting diodes(LED).

Unit-II	**Transistor**	**8 Hrs**

Introduction, The junction transistor, Conventions for polarities of voltages and currents, Open circuited transistor, Transistor biased in the active region, Current components in transistors, Currents in a transistor, Emitter efficiency, Transport factor and transistor-α, Dynamic emitter resistance, Transistor as an amplifier, Transistor construction, Letter symbols for semiconductor Devices, Characteristic curves of junction transistor in common configuration, static characteristic curves of PNP junction transistor in common emitter configuration, The transistor in common collector Configuration.

Unit –III	**AC to DC converters**	**10 Hrs**

AC to DC converters- Introduction, Classification of Rectifiers, Half wave Rectifiers, Full wave Rectifiers, Comparison of Half wave and full wave rectifiers, Bridge Rectifiers, Bridge Rectifier meter, Voltage multiplying Rectifier circuits, Capacitor filter, LC Filter, Metal Rectifiers, Regulated Power Supplies, Classification of Voltage Regulators, Short period Accuracy of Regulators, Long period .Accuracy of Voltage Regulator, Principle of automatic voltage Regulator, Simple D.C. Voltage stabilizer using Zener diode, D.C. Voltage Regulators, Series Voltage Regulators, Complete series voltage regulator circuit, Simple series voltage regulator.

Unit -IV	**Resistance welding controls**	**10 Hrs**

Resistance welding controls: Introduction, Resistance welding process, Basic Circuit for A.C. resistance welding, Types of Resistance welding, Electronic welding control used in Resistance welding, Energy storage welding. Induction heating: Principle of induction heating, Theory of Induction heating merits of induction heating, Application of induction heating, High frequency power source of induction heating. Dielectric heating: Principle of dielectric heating, theory of dielectric heating, dielectric properties of typical materials, electrodes used in dielectric heating, method of coupling of electrodes to the R.F. generator, Thermal losses in Dielectric heating, Applications.

Unit –V	**Ultrasonics**	**10 Hrs**

Ultrasonics: Introduction, Generation of Ultrasonic waves, Application of Ultrasonic waves, Ultrasonic stroboscope, ultrasonic as means of communication, ultrasonic flaw detection, Optical image on non-homogeneities, ultrasonic study of structure of matter, Dispersive study of structure of matter, Dispersive and colloidal effect of Ultrasonic, Coagulating action of Ultrasonic, separation of mixtures by ultrasonic waves, cutting and machining of hard materials by ultrasonic vibrations, Degassing of liquids by ultrasonic waves, Physio-chemical effects of ultrasonics, chemical effects of ultrasonics, Thermal effects of ultrasonics, soldering and welding by ultrasonics, Ultrasonic Drying.

Course Outcomes (CO):

On completion of this course, student will be able to

- Understand the semi-conductor devices and their switching characteristics.
- Apply the Ultrasonic waves with different applications.
- Understand the working of Transistor and its different configurations.
- Analyze the thermal effects of ultrasonic, soldering and welding by ultrasonic, ultrasonic Drying in the industry; interpret the characteristics ofAC to DC converters.
- Develop the practical applications Electronics in industries.
- Apply the process of Resistance welding, Induction heating and Dielectric heating in the industry.

Textbooks:

1. Fundamentals of Industrial Electronics, Bogdan M Wilamowski, J David irwin, 2nd Edition, 2011.
2. Industrial and Power Electronics – G. K. Mithal and Maneesha Gupta, Khanna Publishers, 19th Ed., 2003.
3. Integrated Electronics – J. Millman and C.C Halkias, McGraw Hill, 1972.

Reference Books:

1. Electronic Devices and circuits – Theodore. H. Bogart, Pearson Education, 6th Edn., 2003.
2. Integrated Circuits and Semiconductor Devices – Deboo and Burroughs, ISE

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B.Tech. IV Year I Semester

Measurements and Mechatronics
Open Elective Course -III

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0329Tc	3: 0:0:0	3	CIE: 30 SEE:70	3Hours	OE-III

Course Objectives:

- To instruct the principles of interchangeable manufacture.
- To introduce basic principles of mechanical measurements.
- To impart knowledge on mechatronics systems.

Syllabus		**Total Hours:42**
UNIT - I	**Limits & Fits**	**12 Hrs**

Introduction, terminology pertaining to limits and fits – unilateral and bilateral tolerance system, hole and shaft basis systems – Interchangeability, deterministic & statistical tolerance, selective assembly. International Standard system of limits and fits

Limit Gauges: Taylor's principle – Classification and design of limit gauges.

UNIT - II	**Linear and Angular Measurements**	**10 Hrs**

Line and end standards, slip gauges and length bars. bevel protractor – angle slip gauges – spirit levels and auto collimator.

Interferometry Applied to Measurement: NPL flatness interferometer and NPL gauge interferometer.

Surface Roughness Measurement: Differences between surface roughness and surface waviness-Numerical assessment of surface finish – CLA, R.M.S, Rz values, Methods of measurement of surface finish – Profilograph, Talysurf

UNIT - III	**Mechanical Measurements**	**10 Hrs**

Introduction to measurement: Elements of generalized measurement system

Displacement Measurement- Linear Variable Differential Transformer (LVDT), encoders, potentiometers.

Temperature Measurement - Pyrometers, Resistance Temperature Detector (RTD)

Strain Measurement-Electrical strain gauge – gauge factor – method of usage of resistance strain gauge

UNIT - IV	**Mechatronics Systems**	**12 Hrs**

Mechatronics systems- Elements of mechatronics system, mechatronics design process, system - measurement systems, control systems, programmable logic controllers, case studies of mechatronic systems

UNIT - V	**Actuating Systems**	**12 Hrs**

Hydraulic and pneumatic actuating systems - fluid systems, hydraulic systems, and pneumatic systems, components, control valves. mechanical actuating systems and electrical actuating systems – basic principles and elements.

Course Outcomes (CO):

Upon successful completion of the course, the students will be able to

- design the limit gauges for interchangeable manufacture.
- apply the basic principles of mechanical measurements for engineering practice.
- illustrate the role of mechatronics systems in manufacturing.
- explain principles of mechanical, hydraulic, pneumatic and electrical actuating systems.

Textbooks:

1. R.K. Jain, "Engineering Metrology", Khanna Publishers.
2. BeckWith, Marangoni, Linehard, " Mechanical Measurements", 6th edition,PHI / PE.
3. W. Bolton , "Mechatronics – Electronic Control Systems in Mechanical and Electrical Engg.", 4th Edition, Pearson, 2012.

Reference Books:

1. IC Guptha,"Engineering Metrology ",Danpath Rai Publications.
2. Doeblin Earnest. O. Adaptation by Manik and Dhanesh,"Measurement Systems: Application and Design", Tata Mc Graw Hill Publications.

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B.Tech. IV Year I Semester

Unconventional Machining Processes
Open Elective Course -III

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0332Tc	3: 0:0:0	3	CIE: 30 SEE:70	3Hours	OE-III

Course Objectives:

- Define various Modern Machining Processes.
- Acquire knowledge in the elementary mechanism and machinability of materials with different Modern Machining Processes.
- Determine basic principles of operation for each process and their applications.
- State various parameters influencing MRR in Non – Traditional Machining Process.
- Classify and understand the working of Additive Manufacturing Processes.

Syllabus		**Total Hours:42**
UNIT - I	**Non – Traditional Machining Processes**	**12 Hrs**

Introduction, Need, Classification and Brief Overview, Considerations in Process selection, Materials, Applications.

Mechanical Energy Based Processes: Abrasive Jet Machining, Water Jet Machining, Abrasive Water Jet Machining, Ultra Sonic Machining – Working Principle, Description of Equipment, Process Parameters, Metal Removal Rate, Applications, Advantages and Limitations.

UNIT - II	**Electrical Energy Based Processes**	**10 Hrs**

Electric Discharge Machining – Working Principles, Description of Equipment, Process Parameters, Surface Finish and MRR, Electrode / Tool, Power and Control Circuits, Tool Wear, Dielectric Fluid, Flushing, Advantages, Limitations and Applications. Wire cut EDM – Working Principle and Applications.

UNIT - III	**Chemical and Electro Chemical Energy Based Processes**	**10 Hrs**

Chemical Machining and Electro Chemical Machining – Working Principle, Description of Equipment, Etchants, Maskants, Techniques of Applying Maskants, Process Parameters, Surface Finish and MRR, Electro Chemical Grinding, Electro Chemical Honing, Applications, Advantages and Limitations

UNIT - IV	**Thermal Energy Based Processes:**	**12 Hrs**

Laser Beam Machining and Drilling, Plasma Arc Machining, Electron Beam Machining – Working Principle, Description of Equipment, Process Parameters, Applications, Advantages and Limitations.

UNIT - V	**Additive Manufacturing**	**12 Hrs**

Introduction to Additive Manufacturing, Classification of Additive Manufacturing Processes, Working Principle, Advantages, Limitations and Applications of Sterolithography (SLA), Fused Deposition Modeling, Selective Laser Sintering, Laminated Object Manufacturing

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B.Tech. IV Year I Semester

Cloud Computing
Open Elective Course -III

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0529T	3: 0:0:0	3	CIE: 30 SEE:70	3Hours	OE-III

Course Objectives:

The course should enable the students to:

- To introduce the broad perceptive of cloud architecture and model
- To understand the concept of Virtualization and familiar with the lead players in cloud.
- To understand the features of cloud simulator and apply different cloud programming model
- To design of cloud Services and explore the trusted cloud Computing system

Syllabus		**Total Hours:48**
Unit-I	**Basics of Cloud Computing**	**10Hrs**

Introduction to Cloud: Introduction to Cloud, Cloud Computing Reference Model, Characteristics and Benefits, Challenges Ahead, Elasticity in Cloud, On-demand Provisioning.

Virtualization: Introduction, Characteristics of Virtualized Environment, Taxonomy of Virtualization Techniques, Virtualization, and Cloud computing.

Unit-II	**Cloud Architecture, Models and Security**	**9Hrs**

Cloud Computing Architecture: Introduction, Cloud Reference Model, Architecture, Infrastructure / Hardware as a Service, Platform as a Service, Software as a Service, Types of Clouds.

Cloud Deployment Model: Public Clouds, Private Clouds, Hybrid Clouds, Community Clouds, Economics of the Cloud.

Unit-III	**Cloud Technologies and Advancements**	**10Hrs**

Apache Hadoop, MapReduce, Hadoop Cluster setup, Virtual Box, Google App Engine, Programming Environment for Google App Engine – Open Stack

Unit-IV	**VMware Simulator**	**9Hrs**

VMWare: Basics of VMWare, Advantages of VMware virtualization, create a new virtual machine on local host, cloning virtual machines, virtualize a physical machine, starting and stopping a virtual machine.

Unit-V	Cloud Applications	10Hrs

Cloud Applications: Scientific Applications – Health Care, Geoscience.

Business And Consumer Applications - CRM and ERP, Social Networking, Media Applications, and Multiplayer Online Gaming.

Course Outcomes (CO):

On completion of this course, student will be able to

- To Understand the basic concepts about cloud computing vision and its developments and gain the Knowledge of virtualization technology.
- Analyze the concepts of cloud services and the deployment models.
- Choose among various cloud technologies for implementing applications (GAE, Open stack ,etc)
- Construct the virtual machines by using VMware simulator.
- Build scientific applications by using Cloud environment.
- Develop Business and Consumer Applications.

Textbooks:

1. Mastering Cloud Computing by RajkumarBuyya, Christian Vecchiola, S.Thamarai Selvi from TMH 2013.
2. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" O'Reilly.
3. Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter, TATA McGraw- Hill , New Delhi – 2010.

Reference Books:

1. Cloud computing for dummies- Judith Hurwitz , Robin Bloor , Marcia Kaufman ,Fern Halper, Wiley Publishing, Inc, 2010
2. Cloud Computing (Principles and Paradigms), Edited by Rajkumar Buyya, James Broberg, Andrzej Goscinski, John Wiley & Sons, Inc. 2011
3. Enterprise Cloud Computing, Gautam Shroff, Cambridge University Press, 2010.
4. Cloud Application Architectures: Building Applications and Infrastructure in the Cloud, George Reese, O 'Reilly, SPD, rp2011.
5. Essentials of Cloud Computing by K. Chandrasekaran. CRC Press. Cloud computing A Hands-On Approach by ArshdeepBahga and Vijay Madisetti.

Web Resources:

1. https://nptel.ac.in/courses
2. https://freevideolectures.com/university/iitm

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B.Tech. IV Year I Semester

Smart Grid

Open Elective Course -III

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0241Ta	3: 0:0:0	3	CIE: 30 SEE:70	3Hours	OE-III

Course Objectives:

The course should enable the students to:

- Overview of the technologies required for the smart grid
- Switching techniques and different means for data communication
- Standards for information exchange and smart metering
- Methods used for information security on smart grid
- Smart metering and protocols for smart metering.
- Power quality management with upgraded technologies.

Syllabus		**Total Hours: 48**
Unit-I	**Introduction to Smart Grid**	**10 Hrs**
Evolution of Electric Grid, Concept, Definitions and Need for Smart Grid, Smart grid drivers, functions, opportunities, challenges and benefits, Difference between conventional & Smart Grid, Concept of Resilient &Self-Healing Grid, Present development & International policies in Smart Grid, Diverse perspectives from experts and global Smart Grid initiatives**.**		
Unit-II	**Smart Grid Technologies**	**8 Hrs**
Technology Drivers, Smart energy resources, Smart substations, Substation Automation, Feeder Automation ,Transmission systems: EMS, FACTS and HVDC, Wide area monitoring, Protection and control, Distribution systems: DMS, Volt/VAR control, Fault Detection, Isolation and service restoration, Outage management, High Efficiency Distribution Transformers, Phase Shifting Transformers, Plug in Hybrid Electric Vehicles (PHEV).		
Unit –III	**Smart Meters**	**10 Hrs**
Introduction to Smart Meters, Advanced Metering infrastructure (AMI) drivers and benefits, AMI protocols, standards and initiatives, AMI needs in the smart grid, Phasor Measurement Unit(PMU), Intelligent Electronic Devices(IED) & their application for monitoring & protection.		
Unit -IV	**Power Quality Management in Smart Grid**	**10 Hrs**
Power Quality & EMC in Smart Grid, Power Quality issues of Grid connected Renewable Energy Sources, Power Quality Conditioners for Smart Grid, Web based Power Quality monitoring, Power Quality Audit.		
Unit –V	**High Performance Computing**	**10 Hrs**
Local Area Network (LAN), House Area Network (HAN), Wide Area Network (WAN),Broadband over Power line (BPL), IP based Protocols, Basics of Web Service and		

CLOUD Computing to make Smart Grids smarter, Cyber Security for Smart Grid.

Course Outcomes (CO):

On completion of this course, student will be able to

- Understand the concepts and design of Smart grid.
- Understand the various communication technologies in smart grid.
- Understand the various measurement technologies in smart grid.
- Understand the analysis and stability of smart grid.
- Learn the renewable energy resources and storages integrated with smart grid.
- familiarize the high performance computing for Smart Grid applications

Textbooks:

1. Smart Grid, Janaka Ekanayake, Liyanage, Wu, Akihiko Yokoyama, Jenkins, Wiley Publications, 2012, Reprint 2015.
2. Smart Grid: Fundamentals of Design and Analysis, James Momoh, Wiley, IEEE Press., 2012, Reprint 2016.

Reference Books:

1. The Smart Grid – Enabling Energy efficiency and demand response, Clark W. Gellings, P.E., CRC Press, Taylor & Francis group, First Indian Reprint. 2015.
2. Smart Grid – Applications, Communications, and Security Edited by Lars Torsten Berger, Krzysztof Iniewski, WILEY, 2012, Reprint 2015.
3. Practical Electrical Network Automation and Communication Systems, Cobus Strauss, ELSVIER, 2003

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B.Tech. IV Year I Semester

HUMAN RESOURCE & MANAGEMENT
Open Elective Course -III

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
22A0026T	3:0:0:0	3	CIE:30 SEE:70	3 Hours	OE-III

Course Objectives:

1. To make the student understand about human resource management.
2. To enable the students about job analysis, job specification and job enrichment.
3. To enable the students knowing about HR planning and retention.
4. To impact knowledge about recruitment, selection and performance appraisal.
5. To create knowledge on training and development, compensation management.

Syllabus		Total Hours:48
Module - I	**HUMAN RESOURCE MANAGEMENT-INTRODUCTION**	**9 Hrs**

Introduction- Objectives – Scope & Features of HRM – Importance & - Functions of HRM- Challenges of HRM. Personnel Management Vs HRM – Role of HR manager - Strategic Human Resource Management.

Module - II	**JOB ANALYSIS AND JOB DESIGN**	**9 Hrs**

Job Analysis Process –Techniques of Data Collection - Contents of Job Description & Job Specification - Job design - Factors affecting Job design - Job enrichment Vs Job enlargement.

Module - III	**HUMAN RESOURCE PLANNING AND EMPLOYEE RETENTION**	**10 Hrs**

Objectives and Need of HR planning, Process of HR Planning and factors affect the HR Planning -HR Information System - Employee retention - Importance of retention - strategies of retention.

Module - IV	**HR ACQUISITION AND MANAGING EMPLOYEE PERFORMANCE**	**10 Hrs**

Recruitment - Objectives and Sources of recruitment - Selection - Objectives - Selection Procedure - Placement - Performance Appraisal –Objectives & Importance, performance Appraisal Methods – Constraints.

Module - V	**HR DEVELOPMENT AND COMPENSATION MANAGEMENT**	**9 Hrs**

Training and Development– Objectives, Need and Methods of Training –career planning and career development - Compensation Management - Job evaluation – welfare provisions and fringe benefits - Quality Circles and Total Quality Management.

Course Outcomes (CO):

On completion of this course, student will be able to

- Understand the basic concept of Human Resource Management.(L2)
- Explain the job analysis and job design methods.(L2)
- Understand the demand and supply of HR & concept of employee retention.(L2)
- Understand the sources of Recruitment, Selection process and Performance appraisal methods.(L2)
- Examine the Training and Development methods and compensation management process.(L2)

Textbooks:

1. Gary Dessler, Biju Varkkey, Human Resource Management, 4e, Pearson 2017.
2. Robert L. Mathis, John H. Jackson, Manas Ranjan Tripathy, Human Resource Management, Cengage Learning 2016.

Reference Books:

1. Aswathappa, Human Resource Management, 4th Edition, TMH 2006.
2. Subbarao, Personnel and Human Resource Management –Text and cases, Himalaya, 2009
3. R.Wayne Mondy, Robert M.Noe, Human Resource Management, Pearson
4. Noea.Raymond, John Hollenbeck, Barry Gerhart and Patrick Wright, Human Resource Management, Tata McGraw Hill.
5. Muller, Human Resource Management a case study approach, Jaico Publishers, 2008
6. VSP Rao, Human Resource Management, Text and Cases, Excel Books 2006.

Open Elective -IV

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B.Tech. IV Year I Semester

BASIC VLSI DESIGN
Open Elective Course -IV

Course Code	L:T:P	Credits	Exam. Marks	Exam Duration	Course Type
22A0432T	3:0:0	4.5	CIE:30 SEE:70	3 Hours	OE-IV

Course Objectives:

- To give exposure to different steps involved in fabrication Process of PMOS & NMOS transistors, CMOS & BICOM Inverters.
- To provide knowledge on electrical properties of MOS & BICMOS devices to analyze the behaviour of inverters designed with various loads.
- To provide knowledge on Basic Circuit Concepts of VLSI Design
- To apply the design Rules and draw layout of a given logic circuit and basic circuit concepts to MOS circuits.
- To Apply the design for testability methods for combinational & sequential CMOS circuits

Syllabus

Unit –I: Introduction to Fabrication Process

Introduction: Brief Introduction to IC technology, Moore's Law, Different modes MOSFET operation, Fabrication Process of PMOS, NMOS, CMOS & Bi-CMOS devices, Comparison between CMOS and Bi-polar Technologies.

Fabrication Steps: Wafer Preparation, Oxidation, Photolithography, Etching, Ion Implantations, Metallization, Testing.

Unit –II::Basic Electrical Properties of MOS/BiCMOS devices

Basic Electrical Properties: Ids Vs Vds relationships, MOS transistor Threshold Voltage-VT, figure of merit-ω0, Transconductance - gm, Output conductance-gds, Pass transistor logic, NMOS Inverter, Pull-up to Pull-down Ratio for NMOS inverter driven by another NMOS inverter, and through one or more pass transistors Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

Unit –III:: Basic Circuit Concepts

Basic Circuit Concepts: Sheet Resistance Rs and its concepts to MOS, Area Capacitances calculations, Inverter Delays, Driving large Capacitive Loads, Wiring Capacitances, Fan-in and fan-out

Unit –IV:: VLSI Circuit Design Processes

VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, Lambda(λ)-based design rules for wires, contacts and Transistors, Layout Diagrams for NMOS and CMOS Inverters Logic Gates and Various MOS Circuits. Scaling of MOS circuits, Limitations of Scaling.

Unit –V::CMOS Testing

CAD Tools for Design and Simulation, Aspects of Design Tools, Design for Testability, Testing Combinational Logic, Testing Sequential Logic, Practical Design for Test (OFT) Guidelines, Scan Design Techniques, Built-In-Self-Test (BIST), Future Trends.

Text Books:

1. Kamran Eshraghian, “Essentials of VLSI Circuits and Systems”, Douglas and A. Pucknell and SholehEshraghian, Prentice-Hall of India Private Limited, 2005 Edition.
2. Behzad Razavi , “Design of Analog CMOS Integrated Circuits”, McGraw Hill, 2003
3. Modern VLSI Design – Wayne Wolf, 3 Ed., 1997, Pearson Education.

References:

1. Jan M. Rabaey, “Digital Integrated Circuits”, AnanthaChandrakasan and Borivoje Nikolic, Prentice-Hall of India Pvt.Ltd, 2nd edition, 2009.
2. John P. Uyemura, “Introduction to VLSI Circuits and Systems”, John Wiley & Sons, reprint 2009
3. CMOS VLSI Design-A Circuits and Systems Perspective, Neil H.E Weste, David Harris, Ayan Banerjee, 3rd Edn, Pearson, 2009.

Course Outcomes:

After the completion of the course students will able to:

- Acquire qualitative knowledge about the fabrication process of integrated circuit using MOS transistors.
- Understand the concept of Basic Electrical Properties of MOS/Bi-CMOS Devices
- Apply the basic circuit concepts to MOS circuits.
- Understand the concept of Scaling of MOS circuits and Limitations of Scaling
- Apply the design Rules to draw the Stick diagram &layout of a given logic circuit.
- Interpret the need for testability and testing methods in VLSI.

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B.Tech. IV Year I Semester

Non-Destructive Evaluation
Open Elective Course -IV

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0334Tb	3: 0:0:0	3	CIE: 30 SEE:70	3Hours	OE-IV

Course Objectives:

- To familiarize with the concepts of various NDT techniques to identify the defect in a mechanical component

Syllabus		**Total Hours:42**
UNIT - I	**Introduction to NDT and Radiography Test**	**12 Hrs**

Introduction: Overview of non-destructive testing, types of materials testing, Preliminary NDT methods, NDT methods

Radiography test: Sources of X rays and Gamma Rays, their properties and interaction with matter, radiographic test, film characteristics, radiographic equipment, Radiographic techniques, safety aspects, advantages, limitations, industrial applications of radiography test.

UNIT - II	**Ultrasonic Test**	**10 Hrs**

Principle of wave propagation, piezo-electric effect, ultrasonic transducers - characteristics, ultrasonic equipment, testing procedure, interpretation, evaluation, advantages, limitations, industrial applications of ultrasonic testing

UNIT - III	**Liquid Penetrant Test**	**10 Hrs**

Basic concepts, liquid penetrant system, surface preparation, test procedure, examination, interpretation, evaluation, advantages, limitations, industrial applications of liquid penetrant testing.

UNIT - IV	**Magnetic Particle Test**	**12 Hrs**

Magnetic materials, principle of magnetic particle test, magnetic particle test equipment, test procedure, interpretation and evaluation, advantages, limitations, Industrial applications of the magnetic particle test.

UNIT - V	**Eddy Current Test**	**12 Hrs**

Principle of eddy current, factors affecting eddy currents, impedance diagram, eddy current test system, test coils, advantages, limitations and industrial applications of eddy current test.

Course Outcomes (CO):

Upon successful completion of the course, the students will be able to

- Describe choose a suitable non-destructive method to find the defect in the given mechanical components using radiography test, ultrasonic test, liquid penetrant test, magnetic particle test and eddy current test

Textbooks:

1. J Prasad and GCK Nair, "Non-Destructive Test and Evaluation of Materials", Tata McGraw-Hill Education, 2nd edition, 2011.
2. B Raj, T Jayakumar and M Thavasimuthu, "Practical Non Destructive Testing",
3. Alpha Science International Limited, 3rd edition, 2017.

Reference Books:

1. V Jayakumar and K Elangovan, "Non-Destructive Testing of Materials", Lakshmi Publications, 2nd edition, 2018.
2. George V. Crowe, "An Introduction to Nondestructive Testing", American Society for Nondestructive Testing, 3rd edition, 2009.
3. Ravi Prakash, "Non-Destructive Testing Techniques", New age international publishers, 1st edition, 2021.

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B.Tech. IV Year I Semester

Renewable Energy Sources
Open Elective Course -IV

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0329Ta	3: 0:0:0	3	CIE: 30 SEE:70	3Hours	OE-IV

Course Objectives:

- To be familiar with classification and characteristics of composite material and their applications.
- To gain the knowledge about manufacturing methods of composites.
- To know the testing methods related to composite materials.

Syllabus		**Total Hours:42**
UNIT - I		**12 Hrs**

Energy Sources and Their Availability: Conventional and non-conventional energy sources. Need of Renewable Energy Sources (RES), classification of RES, role and potential of RES in India.

Solar Radiation: Structure of the sun, solar constant, environmental impact of solar radiation, radiation at the earth surfaces, solar radiation measuring instruments, solar radiation Geometry, extraterrestrial and terrestrial solar radiation, spectral distribution of extraterrestrial radiation, solar radiation on tilted surfaces and empirical equations for estimating solar radiation.

UNIT - II		**10 Hrs**

Solar Collectors: Principles of the conversion of solar radiation into heat, classifications of solar collectors- flat plate collectors and concentrating collectors, collector materials, performance analysis of a flat plate collector.

Solar Energy Storage and applications: Different storage methods-sensible and latent heat, solar ponds, solar water heating, space heating /cooling, solar electric conversion, solar distillation, solar pumping, solar furnace, solar cooking and solar green house

UNIT - III		**10 Hrs**

Wind Energy: Principles of wind energy conversion, site selection consideration, basic components, types of wind machines – horizontal axis and vertical axis, applications, Betz coefficient.

Biomass Energy Conversion Systems: Biomass conversion technologies, photosynthesis, biogas generation, factors affecting bio-digestion, classification of biogas plants, advantages and disadvantages, bio mass gasification

Geothermal Thermal Energy: Resources, types of wells, methods of harnessing the energy.

UNIT - IV		12 Hrs

Ocean Thermal Energy: Methods of Ocean thermal electric power generation open cycle systems, closed cycle systems

Tidal Power System: Working principle, components of tidal power plant, single basin and double basin tidal energy system advantages and limitations.

Wave Energy: Wave energy conversion Devices-wave energy conversion by floats, high level reservoir wave machine and dolphin type wave power machine. Advantages and disadvantages.

UNIT - V		12 Hrs

Direct Energy Conversion: Need for DEC, limitations, principles of DEC. thermoelectric Power – See-beck, Peltier, Joule -Thomson effects, Thermo-electric Power generators

MHD Power Generation: Principles, dissociation and ionization, Hall effect, magnetic flux, MHD accelerator, MHD engine, power generation systems, electron gas dynamic conversion.

Fuel Cell: Working principle, classification – efficiency – VI characteristics

Course Outcomes (CO):

Upon successful completion of the course, the students will be able to

- Classify various types of renewable sources of energy and illustrate the principles of solar radiation.
- Evaluate solar flat plate collector efficiency and illustrate various solar energy storage methods and applications.
- Describe the techniques of exploiting wind, biomass and geothermal energies in power generation.
- Illustrate the methods of tapping ocean thermal, tidal and wave energies in power generation.
- Describe the working of various direct energy conversion systems and their applications.

Textbooks:

1. SP Sukhatme, “Solar Energy: Principles of thermal collection and storage” Tata McGraw Hill
2. Tiwari and Ghosal, “Renewable Energy Resources: Basic Principles and Applications”, narosa
3. 3. G.D. Rai, “Non-Conventional Energy Sources”, Dhanpat Rai and Sons

Reference Books:

1. B.H.Khan, “Non – conventional Energy Resources”, Tata McGraw Hill education Pvt. Ltd.
2. Twidell & Weir, “Renewable Energy Sources “. Routledge (Taylor &Francis Group)

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B.Tech. IV Year I Semester

Cyber Security

Open Elective Course -IV

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0534Ta	3: 0:0:0	3	CIE: 30 SEE:70	3Hours	OE-IV

Course Objectives:

The course should enable the students to:

- The Cyber security Course will provide the students with foundational Cyber Security principles, Security architecture, risk management, attacks, incidents, and emerging IT and IS technologies.
- Students will gain insight into the importance of Cyber Security and the integral role of Cyber Security professionals.
- Evaluate the trends and patterns that will determine the future state of cyber security.

Syllabus		**Total Hours:48**
Module-I	**Introduction to Cybercrime**	**8 Hrs**

Introduction to Cybercrime: Definition and Origins ofthe Word, Cybercrime and Information Security, Who are Cybercriminals, Classifications of Cybercrimes, Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens

Module-II	**Cyber Offenses**	**10 Hrs**

How Criminals Plan Them –Introduction, How Criminals Plan the Attacks, Social Engineering, Cyber stalking, Cyber Cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector Backdoors-Steganography-SQL Injection.

Module-III	**Cybercrime Mobile and Wireless Devices**	**10 Hrs**

Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile.

Module-IV	**Tools and Methods Used in Cybercrime**	**10 Hrs**

Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, DoS and DDoS Attacks, Buffer Overflow, Attacks on Wireless Networks, Phishing and Identity Theft: Introduction, Phishing, Identity Theft (ID Theft).

Module-V	Cyber Crimes and security	10Hrs

Cyber Security –Organizational implications-cost of cybercrimes and IPR issues Web threats for organizations: the evils and Perils-Social media marketing Security and privacy Implications-Protecting people privacy in the organizations Forensic best practices for organizations. Cases.

Course Outcomes (CO):

On completion of this course, student will be able to

- Cyber Security architecture principles
- Identifying System and application security threats and vulnerabilities
- Identifying different classes of attacks
- Cyber Security incidents to apply appropriate response
- Describing risk management processes and practices

Textbooks:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole, SunitBelapure, Wiley.
2. Principles of Information Security, MichealE.Whitman and Herbert J.Mattord, Cengage Learning

Reference Books:

1. Information Security, Mark Rhodes, Ousley, MGH.

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B.Tech. IV Year I Semester

Electric Vehicles
Open Elective Course -IV

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0232Ta	3: 0:0:0	3	CIE: 30 SEE:70	3Hours	OE-IV

Course Objectives:

The course should enable the students to:

- Understand to Provide good foundation on hybrid and electrical vehicles.
- Understand To address the underlying concepts and methods behind power transmission in hybrid and electrical vehicles
- Familiarize energy storage systems for electrical and hybrid transportation
- Design and develop basic schemes of electric vehicles and hybrid electric vehicles.

Syllabus		**Total Hours: 50**
Module-I	**Electric Vehicle Propulsion and Energy Sources**	**10Hrs**

Introduction to electric vehicles, vehicle mechanics - kinetics and dynamics, roadway fundamentals propulsion system design - force velocity characteristics, calculation of tractive power and energy required, electric vehicle power source - battery capacity, state of charge and discharge, specific energy, specific power, Ragone plot. battery modeling - run time battery model, first principle model, battery management system- soc measurement, battery cell balancing. Traction batteries - nickel metal hydride battery, Li-Ion, Lipolymer battery.

Module-II	**Electric Vehicle Power Plant And Drives**	**10 Hrs**

Introduction electric vehicle power plants. Induction machines, permanent magnet machines, switch reluctance machines. Power electronic converters-DC/DC converters - buck boost converter, isolated DC/DC converter. Two quadrant chopper and switching modes. AC drives PWM, current control method. Switch reluctance machine drives - voltage control, current control.

Unit -III	**Hybrid And Electric Drive Trains**	**8 Hrs**

Introduction hybrid electric vehicles, history and social importance, impact of modern drive trains in energy supplies. Hybrid traction and electric traction. Hybrid and electric drive train topologies. Power flow control and energy efficiency analysis, configuration and control of DC motor drives and induction motor drives, permanent magnet motor drives, switch reluctance motor drives, drive system efficiency.

Unit -IV	**Electric and Hybrid Vehicles - Case Studies**	**10 Hrs**

Parallel hybrid, series hybrid -charge sustaining, charge depleting. Hybrid vehicle case study – Toyota Prius, Honda Insight, Chevrolet Volt. 42 V system for traction applications. Lightly hybridized vehicles and low voltage systems. Electric vehicle case study - GM EV1, Nissan Leaf, Mitsubishi Miev. Hybrid electric heavy duty vehicles, fuel cell heavy duty vehicles.

Unit -V	Electric And Hybrid Vehicle Design	10 Hrs

Introduction to hybrid vehicle design. Matching the electric machine and the internal combustion engine. Sizing of propulsion motor, power electronics, drive system. Selection of energy storage technology, communications, supporting subsystem. Energy management strategies in hybrid and electric vehicles - energy management strategies- classification, comparison, implementation.

Course Outcomes (CO):

On completion of this course, student will be able to

- Understand the working of hybrid and electric vehicles
- Apply a suitable drive scheme for developing an hybrid and electric vehicles depending on resources
- eDevelop the electric propulsion unit and its control for application of electric vehicles.
- Understand the proper energy storage systems for vehicle applications
- Design and develop basic schemes of electric vehicles and hybrid electric vehicles

Textbooks:

1. Iqbal Hussein, "Electric and Hybrid Vehicles: Design Fundamentals", 2nd edition, CRC Press, 2003.
2. Amir Khajepour, M. Saber Fallah, Avesta Goodarzi, "Electric and Hybrid Vehicles: Technologies, Modeling and Control - A Mechatronic Approach", illustrated edition, John Wiley & Sons, 2014.
3. Mehrdad Ehsani, YimiGao, Sebastian E. Gay, Ali Emadi, "Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design", CRC Press,2004.

Reference Books:

1. James Larminie, John Lowry, "Electric Vehicle Technology", Explained, Wiley, 2003.
2. John G. Hayes, G. Abas Goodarzi, "Electric Powertrain: Energy Systems, Power Electronics and Drives for Hybrid, Electric and Fuel Cell Vehicles", 1st edition, WileyBlackwell, 2018.

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B.Tech. IV Year I Semester

BUSINESS ENVIRONMENT

Open Elective Course -IV

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
22A0025T	3:1:0:0	3	CIE:30 SEE:70	3 Hours	OE-IV

Course Objectives:

1. To make the student understand about the business environment.
2. To enable them in knowing the importance of fiscal and monitory policy.
3. To facilitate them in understanding the export policy of the country.
4. Impart knowledge about the functioning and role of WTO.
5. Encourage the student in knowing the structure of stock market.

Syllabus		**Total Hours:48**
Module - I	**AN OVERVIEW OF BUSINESS ENVIRONMENT**	**10 Hrs**

Overview of Business Environment – Types of Environments - Internal & External - Micro and Macro environment - Competitive structure of industries - Environmental analysis - Scope of business - Characteristics of business - Process & limitations of environmental analysis.

Module - II	**FISCAL POLICY & MONETARY POLICY**	**10 Hrs**

FISCAL POLICY - Public Revenues - Public Expenditure - Public debt Development activities financed by public expenditure - Evaluation of recent fiscal policy of Government of India - Highlights of Budget - MONETARY POLICY - Demand and Supply of Money – RBI - Objectives of monetary and credit policy - Recent trends - Role of Finance Commission.

Module - III	**INDIA'S TRADE POLICY & BALANCE OF PAYMENTS**	**10 Hrs**

INDIA'S TRADE POLICY - Magnitude and direction of Indian International Trade - Bilateral and Multilateral Trade Agreements - EXIM policy and role of EXIM bank - BALANCE OF PAYMENTS – Structure & Major components - Causes for Disequilibrium in Balance of Payments - Correction measures – WTO - Nature and Scope - Organization and Structure - Role and functions of WTO in promoting world trade

Module - IV	**MONEY MARKETS AND CAPITAL MARKETS**	**10 Hrs**

Features and components of Indian financial systems - Objectives, features and structure of money markets and capital markets - Reforms and recent development – SEBI - Stock Exchanges - Investor protection and role of SEBI.

Module - V	**INTRODUCTION TO INFLATION**	**8 Hrs**

Inflation – Meaning & Definition – Causes – Effects – Types – Advantages & Disadvantages Deflation – Meaning & Definition - Causes & Effects.

Course Outcomes (CO):

On completion of this course, student will be able to

- Understand various types of business environment. (L2)
- Evaluate fiscal and monitory policy (L3)
- Analyze India's Trade Policy(L4)
- Understand the role of WTO(L2)
- Apply the knowledge of Money markets in future investment(L3)

Textbooks:

1. Francis Cherunilam (2009), "International Business": Text and Cases, Prentice Hall ofIndia.
2. K. Aswathappa, "Essentials of Business Environment": Texts and Cases & Exercises13th Revised Edition.HPH2016.

Reference Books:

1. K. V. Sivayya, V. B. M Das (2009), Indian Industrial Economy, Sultan ChandPublishers, New Delhi, India.
2. Sundaram, Black (2009), International Business Environment Text and Cases, PrenticeHall of India, New Delhi, India.
3. Chari. S. N (2009), International Business, Wiley India.
4. E. Bhattacharya (2009), International Business, Excel Publications, New Delhi.

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B.Tech. IV Year II Semester

Sl.No	Category	Course Code	Course Name	Hours per week			Total Credits
				L	T	P	
1	Major Project	22A0148P	Project work	0	0	24	12
Total credits							**12**

Member Secretary

Head of the Department
Dept. of Civil Engineering
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GANGAVARAM (V), Kovur (M),
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Head of the department

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Open Elective courses offered by CE Dep

Year-Sem	Course code	Open Elective
III-I	22A0149T	Building Materials
III-II	22A0150T	Environmental Economics
IV-I	22A0151T	Disaster Management
IV-I	22A0152T	Construction Management

Member Secretary

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B.Tech. III Year I Semester

Building Materials (ME, CSE,AI&ML, CS, DS, ECE,EEE)					
Course Code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
22A0149T	**3:0:0:0**	**3**	**CIE:30 SEE:70**	**3 Hours**	**OE-I**

Course Objectives:

- To identify the traditional materials that are used for building constructions.
- To explain basic concepts of building components such as stair case and masonry
- To know the causes of dampness in structures and its preventive measures
- To understand the building rules, building bye laws and acoustics of building

Syllabus		**Total Hours:48**
Unit-I	**Building Materials**	**9 Hrs**
Traditional materials: Stones- Types of stone masonry -Brick-types of brick masonry- lime Cement – Timber – Seasoning of timber - their uses in building works		
Unit-II	**Building Components**	**9 Hrs**
Lintels, Arches and Vaults – Staircases, Lifts – Types. Different types of flooring-Concrete, Mosaic, Terrazo floors; Different types of roofs- Pitched, Flat and Curved Roofs. Lean-to-Roof, Coupled Roofs, Trussed roofs - King and Queen Post Trusses. Doors & Windows- Types and Specifications		
Unit -III	**Materials used for Dampness**	**10 Hrs**
Dampness and its prevention: Causes of dampness- ill effects of dampness-requirements of an ideal material for damp proofing-materials for damp proofing –methods of damp proofing.		
Unit -IV	**Building Planning**	**10 Hrs**
Elements of building planning- basic requirements-orientation-planning for energy efficiency-planning based on utility-other requirements		
Unit -V	**Building Rules And Bye-Laws**	**10 Hrs**
Zoning regulations; Regulations regarding layouts or subdivisions; Building regulations; Rules for special type of buildings; Calculation of plinth, floor and carpet area; Floor space index. Building Information System		

Course Outcomes(CO):

On completion of this course, student will be able to

- To understand the characteristics of different building materials
- Differentiate brick masonry, stone masonry construction and bonds used in construction of walls of buildings
- To know about the causes of dampness in buildings and its ill effects
- To understand the principles of planning in buildings
- Describe capable of understanding building rules and knowledge about, bye-laws and building elements..

Textbooks:

1. Building Drawing by M.G. Shah, C.M. Kale and S.Y. Patki, Tata McGraw-Hill, New
2. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, ‚Building Construction' - Laxmi Publications (P) Ltd., New Delhi

Reference Books:

1. Building Materials, S. K. Duggal, New Age International Publications.
2. N. Kumaraswamy, A. Kameswara Rao, building planning and drawing, 7th Ed, Charotar

E-resources:

https://nptel.ac.in/courses/124/105/124105013/
https://nptel.ac.in/courses/105/102/105102088/
https://nptel.ac.in/courses/105/106/105106206/

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B.Tech. III Year II Semester

Environmental Economics

(ME, CSE, AI&ML, CS, DS, ECE, EEE)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
22A0150T	3:0:0:0	3	CIE:30 SEE:70	3 Hours	OE-II

Course Objectives:

- To impart knowledge on sustainable development and economics of energy
- To teach regarding environmental degradation and economic analysis of degradation
- To inculcate the knowledge of economics of pollution and their management
- To demonstrate the understanding of cost benefit analysis of environmental resources
- To make the students to understand principles of economics of biodiversity

Syllabus **Total Hours:48**

Unit-I	Sustainable Development	9 Hrs

Introduction to sustainable development - Economy-Environment interlinkages - Meaning of sustainable development - Limits to growth and the environmental Kuznets curve – The sustainability debate - Issues of energy and the economics of energy

Unit-II	Environmental Degradation	9 Hrs

Economic significance and causes of environmental degradation - The concepts of policy failure, externality and market failure - Economic analysis of environmental degradation – Equi –marginal principle.

Unit -III	Economics Of Pollution	10 Hrs

Economics of optimal pollution, regulation, monitoring and enforcement - Managing pollution using existing markets: Bargaining solutions – Managing pollution through market intervention: Taxes, subsidies and permits.

Unit -IV	Cost – Benefit Analysis	10 Hrs

Cost – Benefit Analysis: Economic value of environmental resources and environmental damage - Concept of Total Economic Value - Alternative approaches to valuation – Cost-benefit analysis and discounting.

Unit -V	Economics Of Biodiversity	10 Hrs

Economics of biodiversity: Economics of biodiversity conservation - Valuing individual species and diversity of species -Policy responses at national and international levels. Economics of Climate Change – stern Report

Course Outcomes(CO):

On completion of this course, student will be able to

- The information on sustainable development and economics of energy
- The information regarding environmental degradation and economic analysis of degradation
- The identification of economics of pollution and their management
- The cost benefit analysis of environmental resources
- The principles of economics of biodiversity

Textbooks:

1. An Introduction to Environmental Economics by N. Hanley, J. Shogren and B. White Oxford University Press.(2001)

2. Blueprint for a Green Economy by D.W. Pearce, A. Markandya and E.B. Barbier Earthscan, London.(1989)

Reference Books:

1. Environmental Economics: An Elementary Introduction by R.K. Turner, D.W. Pearce and I. Bateman Harvester Wheats heaft, London. (1994),
2. Economics of Natural Resources and the Environment by D.W. Pearce and R.K. Turner Harvester Wheat sheaf, London. (1990),

E-resources:

https://nptel.ac.in/courses/109107171

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B.Tech. IV Year I Semester

DISASTER MANGEMENT (ME, CSE,AI&ML, CS, DS, ECE,EEE)					
Course Code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
22A0151T	**3:0:0:0**	**3**	**CIE:30 SEE:70**	**3 Hours**	**OE-III**

Course Objectives:

- Develop an understanding of why and how the modern disaster manager is involved with pre-disaster and post-disaster activities.
- Develop an awareness of the chronological phases of natural disaster response and refugee relief operations
- Describe the three planning strategies useful in mitigation
- Describe public awareness and economic incentive possibilities
- Understand the tools of post-disaster management

Syllabus		**Total Hours:48**
Unit-I	**Natural Hazards And Disaster Management**	**9 Hrs**
Introduction of DM – Inter disciplinary -nature of the subject– Disaster Management cycle – Five priorities for action. Case study methods of the following: floods, draughts – Earthquakes – global warming, cyclones & Tsunamis – Post Tsunami hazards along the Indian coast – landslides		
Unit-II	**Man Made Disaster**	**9 Hrs**
Fire hazards – transport hazard dynamics – solid waste management – post disaster – bio terrotirism -threat in mega cities, rail and air craft's accidents, and Emerging infectious diseases & Aids and their management.		
Unit -III	**Risk And Vulnerability**	**10 Hrs**
Building codes and land use planning – social vulnerability – environmental vulnerability – Macroeconomic management and sustainable development, climate change risk rendition – financial management of disaster – related losses.		
Unit -IV	**Role Of Technology In Disaster Managements**	**10 Hrs**
Disaster management for infra structures, taxonomy of infra structure – treatment plants and process facilities-electrical substations roads and bridges- mitigation programme for earth quakes –flowchart, geospatial information in agriculture drought assessment-multimedia technology in disaster risk management and training- transformable indigenous knowledge in disaster reduction.		
Unit -V	**Education And Community Preparedness**	**10 Hrs**
Education in disaster risk reduction-Essentials of school disaster education-Community capacity and disaster resilience-Community based disaster recovery -Community based disaster management and social capital-Designing resilience- building community capacity for action.		

Course Outcomes (CO):

On completion of this course, student will be able to

- To know about the natural hazards and its management
- To know about the fire hazards and solid waste management
- To understand about the emerging infectious diseases and aids their management
- To know about the regulations of building codes and land use planning related to risk and vulnerability.
- To impart the education related to risk reduction in schools and communities

Textbooks:

1. Rajib shah & R R Krishnamurthy "Disaster Management" – Global Challenges and Local Solutions' Universities press. (2009),
2. Tushar Bhattacharya, "Disaster Science & Management" Tata McGraw Hill Education Pvt. Ltd., New Delhi

Reference Books:

1.Harsh. K . Gupta "Disaster Management edited", Universities press, 2003.

E-resources:

https://www.youtube.com/watch?v=DExlZTfKZAM&list=PLC4PaTsQiLcbejXqJR7S59Ohk2OK1rgE G
https://nptel.ac.in/courses/124/107/124107010/
https://nptel.ac.in/courses/105/104/105104183/

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B.Tech. IV Year I Semester

CONSTRUCTION MANAGEMENT
(ME, CSE, AI&ML, CS, DS, ECE, EEE)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
22A0152T	3:0:0:0	3	CIE:30 SEE:70	3 Hours	OE-IV

Course Objectives:

- To make the student familiar with various construction activities, preparing construction schedule and maintaining documents and records of those activities
- To teach the students about various terms and technologies involved in earthwork of construction activities
- To make the students familiar with concepts involved in project management like bar charts and milestone charts
- To teach the students the concepts of time estimates involved in CPM and PERT , float and slack, critical path calculations

Syllabus		Total Hours:48
Unit-I	**Fundamentals Of ConstructionTechnology**	**9 Hrs**

Definitions and Discussion – Construction Activities –Construction Processes -Construction Works – Construction Estimating – Construction Schedule – Productivity and Mechanized Construction – Construction Documents – Construction Records – Quality – Safety – Codes and Regulations.

Unit-II	**Earthwork**	**9 Hrs**

Classification of Soils – Project Site – Development – Setting Out - Mechanized Excavation – Groundwater Control – Trenchless (No-dig) Technology – Grading – Dredging. Rock Excavation – Basic Mechanics of Breakage – Blasting Theory – Drillability of Rocks – Kinds of Drilling – Selection of the Drilling Method and Equipment – Explosives – Blasting Patterns and Firing Sequence – Smooth Blasting – Environmental Effect of Blasting

Unit -III	**Project Management And Bar Charts AndMilestone Charts**	**10 Hrs**

Project planning – Scheduling – Controlling – Role of decision in project management – Techniques for analyzing alternatives Operation research – Methods of planning and programming problems – Development of bar chart – Illustrative examples – Shortcomings of bar charts and remedial measures – Milestone charts

Unit -IV	**Elements Of Network And Development OfNetwork**	**10 Hrs**

Introduction – Event – Activity – Dummy – Network rules – Graphical guidelines for network – Common partial situations in network – Numbering the events – Cycles Problems.

Unit -V	**Pert And Cpm**	**10 Hrs**

Time estimates – Frequency distribution – Mean, variance and standard deviation-Expected time Problems -Earliest expected time – Formulation for TE - Latest allowable occurrence time – Formulation for TL - Combined tabular computations for TE and TL problems. Introduction - Slack – Critical Path-Illustrative examples Problems.

Course Outcomes (CO):

On completion of this course, student will be able to

- Identify the various construction activities like preparing construction schedule and maintaining documents and records of those activities
- Understand the concepts and techniques involved in earthwork activities• To understand about the emerging infectious diseases and aids their management
- Understand the steps involved in developing a project scheduling and management and the application of bar charts and milestone charts.
- Understand the various elements of a network diagram like event, activity and dummy.
- Understand the concepts of calculation of time estimates of CPM and PERT

Textbooks:

1. Construction project management by Jha ,Pearson publications, New Delhi 2nd Edition 2015
2. Construction Technology by SubirK.Sarkar and Subhajit Saraswati – Oxford Higher EducationUniv.Press, Delhi 2008 edition
3. Project Planning and Control with PERT and CPM by Dr.B.C.Punmia, K.K.Khandelwal, LakshmiPublications New Delhi 2022 editionDelhi

Reference Books:

1. Optimal design of water distribution networks P.R.Bhave, Narosa Publishing house 2003.
2. Total Project management, the Indian context- by : P.K.JOY- Mac Millan Publishers India Limited.

E-resources:

1. https://nptel.ac.in/courses/105104161

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LIST OF HONOR SUBJECTS

S.NO	Course Code	Course Name	L-T-P	Credits
POOL-1				
1	22A0153T	Mechanics of Materials	3-1-0	4
2	22A0154T	Admixtures and special concretes	3-1-0	4
3	22A0155T	Open channel flow	3-1-0	4
POOL-2				
1	22A0156T	Global Navigation Satellite System and applications	3-1-0	4
2	22A0157T	Cost Effective Housing Techniques	3-1-0	4
3	22A0158T	Remote sensing and digital image processing of satellite data	3-1-0	4
POOL-3				
1	22A0159T	Expansive Soil	3-1-0	4
2	22A0160T	Principles of construction management	3-1-0	4
3	22A0161T	Analysis and design of bituminous pavement	3-1-0	4
POOL-4				
1	22A0162T	Sustainable Transportation Systems	3-1-0	4
2	22A0163T	Finite Element Method	3-1-0	4
3	22A0164T	Pavement Materials	3-1-0	4
POOL-5				
1	22A0165T	Environmental chemistry	3-1-0	4
2	22A0166T	Rural water resources management	3-1-0	4
3	22A0167T	Geosynthetics And Its Applications	3-1-0	4

Member Secretary

Head of the Department
Dept. of Civil Engineering
GEETHANJALI INSTITUTE OF SCIENCE & TECHNOLOGY
GANGAVARAM (V), Kovur (M).
S.P.S.R. Nellore Dt. A.P Pin 524 137

Head of the department

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MECHANICS OF MATERIALS					
Course Code	**L:T:P:S**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
22A0153T	**3: 1:0:0**	**4**	**CIE: 30 SEE:70**	**3Hours**	**Honor(Pool-I)**

Course Objectives:

To understand the stresses and strains developed in bars, compounds bars, beams, shafts, cylinders and spheres and design basic components of machines.

Syllabus		**Total Hours:48**
Unit - I	**Introduction to Stresses & Strains**	**10 Hrs**

Introduction, Stress, strain, mechanical properties of materials, Linear elasticity, Hooke's Law and Poisson's ratio, Stress-Strain relation - behavior in tension for Mild steel, cast iron and nonferrous metals. Extension / Shortening ofa bar, bars with cross sections varying in steps, bars with continuously varying cross sections (circular and rectangular), Elongation due to self-weight, Principle of super position.

Unit - II	**Forces and Deflections In Beams**	**10 Hrs**

Introduction, Types of beams, loads and reactions, shear forces and bending moments, rate of loading, sign conventions, relationship between shear force and bending moments. Shear force and bending moment diagrams for different beams subjected to concentrated loads, uniformly distributed load, (UDL) uniformly varying load (UVL) and couple for different types of beams.

Unit - III	**Stresses in Beams**	**9 Hrs**

Introduction, Theory of simple bending, assumptions in simple bending, bending stress equation, relationship between bending stress, radius of curvature, relationship between bending moment and radius of curvature, Moment carrying capacity of a section. Shearing stresses in beams, shear stress across rectangular, circular, symmetrical I and T sections. (composite / notched beams not included).

Unit - IV	**Principal Stresses and Strains**	**10 Hrs**

Normal and tangential components of stress-Principal planes and principal stresses-Analytical and graphical method (Mohr's circle) for determining stresses on principal planes and oblique section-Mohr's strain circle-Strains on an oblique plane

Unit - V	**Thin Cylinders, Shells and Thick Cylinders**	**9 Hrs**

Stresses and strains in thin cylindrical and spherical shell due to internal pressure-Circumferential, radial and longitudinal stresses and strains in thin cylinder-Circumferential, radial and longitudinal stresses and strains in thick cylinder-Shrink fit and compound cylinder

Course Outcomes (CO):

On completion of this course, student will be able to

- Understand stress and strain terms and its behavior on different materials.
- Understand the Forces and deflections in beams.
- Identify the stresses in beams for symmetrical sections.
- Analysis on Principal planes and principal stresses on planes
- Understand the Stresses and strains in thin cylindrical and spherical shells.

Textbooks:

1. P, Beer and E. R. Johnson, Mechanics of materials, Tata McGraw Hill publishing company limited, 2005.
2. P, Popov, Engineering Mechanics of solids, Prentice hall Inc.
3. P. Boresi and O. P. Sidebottom, Advanced Mechanics of materials, Wiley

Reference Books:

1. K. Rajput, Strength of materials, S. Chand & Co. Ltd.
2. Kripal singh, Mechanics of Materials, Standard Publishers Distributors.
3. Ramammurtham, R. Narayanan, Strength of materials, Dhanapat Rai Publishing Company.

E-Resources:

https://archive.nptel.ac.in/courses/105/106/105106172/
https://nptel.ac.in/courses/112107146

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ADMIXTURES AND SPECIAL CONCRETES

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0154T	3:1:0:0	4	CIE:30 SEE:70	3Hours	Honor subject(Pool-1)

Course Objectives:

1. To explain the functional role of admixtures in concrete and apply this knowledge to mix designtheory.
2. To develop basic knowledge of mineral and chemical admixtures in concrete properties.
3. To interpret special concretes according to new advanced requirements in construction.
4. To enhance the knowledge on the Self compacting concrete and design a SCC mix which fulfilsthe required properties for fresh and hardened concrete.
5. To implement design a High-performance concrete mix by the required properties for fresh andhardened concrete.
6. To inculcate the knowledge on the applications of special concretes.

Syllabus		TotalHours:48
Unit-I	**Chemical Admixtures**	**10 Hrs**
Admixtures – classification of chemical admixtures – properties and limitations- super plasticizers-water reducing agents- air entraining agents- accelerating admixtures- retarders.		
Unit-II	**Mineral Admixtures**	**10 Hrs**
Classification of mineral admixtures- Fly ash- ground granulated blast furnace slag- Silica fume- rice husk ash- metakaolin- physical Characteristics of mineral admixtures - chemical composition of mineral admixtures –Source and availability of mineral admixtures – advantages of mineral admixtures		
Unit-III	**Special Concretes**	**9 Hrs**
Introduction – Mix Design – Applications of: Light Weight Concretes - Cellular Concrete – No Fines Concrete-High Density Concrete – Fiber Reinforced Concrete-Polymer Concrete		
Unit-IV	**Self-compacting concrete**	**9 Hrs**
Introduction – Composition of SCC- advantages and disadvantages of SCC- application of SCC- Chemical admixtures used- Mix design of SCC according to IS Specifications – Tests and properties of SCC- V-Funnel test - L-Box test U-Box test - Slump Flow test - J–Ring test.		
Unit-V	**High performance concrete**	**10 Hrs**

Introduction – Composition of HPC- advantages and disadvantages of HPC- application of HPC- Chemical and mineral admixtures used- Mix design of HPC according to IS Specifications –Fresh HPC tests & properties
- Hardened HPC tests & properties.

Course Outcomes (CO): Student will be able to

- Investigate the behavior of concrete with response to mineral and chemical admixtures used
- Identify special concretes for accomplishing performance levels.
- Investigate the durability properties for special concretes.
- Understand various composition of Self compacting concrete and their aspect.
- Explore knowledge on the fresh and hardened properties of High performance concrete.
- Design concrete mixes using discrete methods for SCC and HPC.

Text Books:

1. Mehta, P. K., and Monteiro, P. J. M., Concrete: Microstructure, Properties, and Materials, Fourth Edition (Indian Edition), McGraw Hill, 2014.
2. Neville, A. M., Properties of Concrete, Pitman Publishing, Inc., MA, 1981.
3. Thomas M.D.A., Supplementary Cementing Materials in Concrete, CRC Press, Francis & Taylor Group, Florida, USA, 2013.

Reference Books:

1. Bentur, A., Diamond, S., and Berke, N.S., Steel Corrosion in Concrete, E&FN Spon, UK, 1997.
2. Taylor, H. W. F., Cement Chemistry, Academic Press, Inc., San Diego, CA, 1990.
3. Lea, F. M., The Chemistry of Cement and Concrete, Chemical Publishing Company, Inc., New York, 1971.
4. Mindess, S., and Young, J. F., Concrete, Prentice Hall, Inc., NJ, 1981.

E Resources:

1. **https://archive.nptel.ac.in/courses/105/102/105102012/**
2. **https://onlinecourses.nptel.ac.in/noc23_ce61/preview**

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OPEN CHANNEL FLOW

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0155T	3: 1:0:0	4	CIE: 30 SEE:70	3Hours	Honor(Pool-I)

Course Objectives:

- To introduce the importance of study of open channel flow, to give brief description on different types of flows and channels and hydraulic design principles of channels.
- To learn the fundamentals of Uniform and Non-Uniform flow in open channels.
- To understand about the concepts of specific energy, critical flow and their applications.
- To give an idea about the gradually varied flow and rapidly varied flow and their equations and computations.
- Apply dimensional analysis to predict formulas which connect particular variables in given circumstances

Syllabus		Total Hours:48
Unit - I	**Uniform Flow**	**10 Hrs**
Uniform Flow in Open Channels & Compound Channels: Specific energy, Critical flow, Channel transitions, Uniform flow formulae, Best hydraulic sections.		
Unit - II	**Non- Uniform Flow**	**10 Hrs**
Steady Gradually Varied Flow: Non- uniform flow in open channels, Gradually varied flow equations, Type of GVF profiles, Computation of GVF profiles.		
Unit - III	**Rapidly Varied Flow**	**8 Hrs**
Steady Rapidly Varied Flow: Hydraulic jump in a horizontal rectangular channel, Specific force, Computation of energy loss		
Unit - IV	**Unsteady Flow**	**10 Hrs**
Unsteady Flow: Celerity of a gravity wave, Monoclonal rising wave, Positive and negative surges, St. Venant's equations, Method of characteristics, Hydraulic routing		
Unit - V	**Dimensional Analysis**	**10 Hrs**
Hydraulic Similitude: Review of dimensional analysis, Similarity laws, and Model studies		

Course Outcomes (CO):

On completion of this course, student will be able to

- Know the different types of flows and channels.
- Efficient in knowledge on the different hydraulics properties involved in open channel flow
- Understand the Gradually and Rapidly flow and its applications.
- Understand the flow in open channels, Depth energy relationship, Specific energy, Specific force, and Specific discharge
- Carry out the applications of dimensional and model analysis and basics of model studies and its applications

Textbooks:

1. Flow in Open Channels, Subramanya K., Tata McGraw Hill Pub., N Delhi2015
2. Flow through Open Channels, Rajesh Srivastava, Oxford Univ. Press. N Delhi, 2011
3. Open Channel Hydraulics, Chow,V.T.,McGrawHillInc.NYork,1979

Reference Books:

1 Open Channel Hydraulics, French, R.H., McGraw Hill PubCo.,NYork,1986

2 Open Channel Hydraulics, Terry Sturm, Tata McGraw Hill Pub. N Delhi,2011**.**

E-Resources

1.https://nptel.ac.in/courses/105/106/105106114

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GLOBAL NAVIGATION SATELLITE SYSTEM & APPLICATIONS

(CIVIL ENGINEERING)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0156T	3: 1:0:0	4	CIE: 30 SEE:70	3Hours	Honor(Pool-II)

Course Objectives:

- To determine the referential ITRF coordinates.
- To determined by GNSS positioning units.
- To receivers then use this data to determine location.
- To gain knowledge on different techniques and approaches about GNSS.
- To their source, generation techniques, derivatives, errors and limitations would be discussed extensively.

Syllabus		Total Hours:48
Unit- I	**Introduction To Global Navigation Satellite System**	**10 Hrs**

Introduction To Global Navigation Satellite System, how the position is determined by the GNSS PART-I, how the position is determined by the GNSS PART-II, how the position is determined by the GNSS PART-III, NAVSTAR -GPS

Unit - II	**Global Navigation Satellite System**	**10 Hrs**

Introduction to Global Navigation Satellite System (GLONASS), BeiDou Navigation Satellite System (BDS), Indian Regional Navigation Satellite System (IRNSS), GALIEO, Quasi-Zenith Satellite System (QZSS)

Unit - III	**Differential Global Navigation Satellite System**	**10 Hrs**

Introduction to Differential Global Navigation Satellite System (DGNSS), REAL-TIME KINEMATIC (RTK), Satellite Based Augmentation System (SBAS)

Unit - IV	**Gnss Errors & Correction Methods**	**8Hrs**

Introduction **to** GNSS Errors & GNSS Correction Methods,

Unit - V	**Gnss Applications**	**10 Hrs**

Why altitude estimated by GNSS receivers is not very accurate , Introduction to **G**NSS APPLICATIONS-I, GNSS APPLICATIONS-II, M GNSS CURRENT TRENDS AND Future, GNSS Opportunities in India

Course Outcomes (CO): Student will be able

- To understand the fundamental concepts of GNSS.
- To understand the concepts of GNSS Points.
- To understand the **GNSS** Errors & Correction Methods.
- To understand the Differential Global Navigation Satellite System
- To understand the modern techniques skills and necessary for engineering practice.
- To understand their source, generation techniques, derivatives, errors and limitations would be discussed extensively.

Text Books:

1. Awange, J. L., 2012. Environmental Monitoring using GNSS: Global Navigation Satellite Systems, Springer, London.
2. Bhatta, B., 2010. Global Navigation Satellite Systems: Insights Into GPS, Glonass, Galileo, Compass, and Others, BS Publications, New Delhi.
3. Grewal, M. S., Weill, L. R., Andrews, A. P., 2006. Global Positioning Systems, Inertial Navigation, and Integration, John Wiley & Sons, New York.

Reference Books:

1. Hofmann-Wellenhof, B., Lichtenegger, H., Wasle, E., 2008. GNSS – Global Navigation Satellite Systems, Springer, Verlag Wien.
2. Hofmann-Wellenhof, B., Lichtenegger, H., Collins, J., 2001. Global Positioning SystemTheory and Practice, Springer, Verlag Wien.
3. Tan, S., 2018. GNSS Systems and Engineering: The Chinese Beidou Navigation and PositionLocation Satellite, JohnWiley & Sons, Singapore

E Resources:
https://archive.nptel.ac.in/courses/105/107/105107194/

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Cost Effective Housing Techniques

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0157T	3:1:0:0	4	CIE:30 SEE:70	3Hours	Honor(Pool-II)

Course Objectives:

- To possess comprehensive knowledge of planning, design, evaluation, construction and financing of housing projects.
- To focuses on cost effective construction materials and methods.
- To understand on the principles of sustainable housing policies and programmes.
- To adopt the suitable techniques in rural and disaster-prone areas by using locally available materials.

Syllabus		TotalHours:48
UNIT-I	Introduction	10 Hrs

Housing Scenario
Introduction - Status of Urban Housing - Status of Rural Housing

Housing Finance:
Introducing - Existing Finance System in India - Government Role As Facilitator - Status At Rural Housing Finance - Impedimently in Housing Finance and Related Issues

Land Use and Physical Planning for Housing
Introduction - Planning of Urban Land - Urban Land Ceiling and Regulation Act - Efficiency of Building Bye Lass - Residential Densities

Housing The Urban Poor
Introduction - Living Conditions in Slums - Approaches and Strategies for Housing Urban Poor

UNIT-II	Development and Adoption of Low Cost Housing Technology	10Hrs

Introduction - Adoption of Innovative Cost-Effective Construction Techniques - Adoption of Precast Elements in Partial Prefatroices - Adopting of Total Prefabrication of Mass Housing in India- General Remarks on Pre Cast Rooting/Flooring Systems -Economical Wall System - Single Brick Thick Loading Bearing Wall - 19cm Thick Load Bearing Masonery Walls - Half Brick Thick Load Bearing Wall - Flyash Gypsum Thick for Masonry - Stone Block Masonery- Adoption of Precast R.C. Plank and Join System for Roof/Floor in The Building

UNIT-III	Alternative Building Materials	10Hrs

Alternative Building Materials for Low Cost Housing

Introduction - Substitute for Scarce Materials – Ferrocement - Gypsum Boards - Timber Substitutions - Industrial Wastes - Agricultural Wastes - Fitire Starateru; for, P,Topm of Alternative Building Maintenance

Low Cost Infrastructure Services:

Introduce - Present Status - Technological Options - Low Cost Sanitation - Domestic Wall -Water Supply, Energy

UNIT-IV	Rural Housing	9Hrs

Introduction Traditional Practice of Rural Housing Continuous - Mud Housing Technology Mud Roofs - Characteristics of Mud - Fire Treatment for Thatch Roof - Soil Stabilization - Rural Housing Programs

UNIT-V	Housing in Disaster Prone Areas	9Hrs

Introduction – Earthquake - Damages To Houses - Traditional Prone Areas - Type of Damages and Railways of Non-Engineered Buildings - Repair and Restore Action of Earthquake Damaged Non-Engineered Buildings Recommendations for Future Constructions. Requirements of Structural Safety of Thin Precast Roofing Units Against Earthquake Forces, Status of R&D in Earthquake Strengthening Measures - Floods, Cyclone, Future Safety

Course Outcomes(CO):Student will be able to

- Development of construction technology and innovative techniques as tools to address demand mass construction .
- Knowledge of eco friendly material with their application
- Learn the use of locally available material according to their availability and maintenance.
- Focuses on cost effective construction materials and methods.
- Understand on the principles of sustainable housing policies and programmes.
- Adopt the suitable techniques in rural and disaster prone areas by using locally available materials.

Text Books:

1. Building Materials for Low –Income Houses – International Council for Building Research Studies and Documentation.
2. Hand Book of Low Cost Housing by A.K.Lal – Newage International Publishers.
3. Modern Trends in Housing in Developing Countries – A.G. Madhava Rao, D.S. Ramachandra Murthy & G.Annamalai.

Reference Books:

1. Properties of Concrete – Neville A.M. Pitman Publishing Limited, London.
2. Light Weight Concrete, Academic Kiado, Rudhai.G – Publishing Home of Hungarian Academy of Sciences 1963.
3. Low Cost Housing – G.C. Mathur.

E-Resources:

https://nptel.ac.in/courses/124/107/124107001/

https://nptel.ac.in/courses/124107001

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REMOTE SENSING AND DIGITAL IMAGE PROCESSINGOF SATELLITE DATA

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0158T	3:1:0:0	4	CIE:30 SEE:70	3Hours	Honor(Pool-II)

Course Objectives:

- Basic understanding about satellite based Remote Sensing and Digital Image Processing technologies
- To know various domains including in civil engineering
- Knowledge of Digital Image Processing of satellite data

Syllabus **TotalHours:48**

Unit-I	**Remote Sensing**	**10 Hrs**

Development of remote sensing technology and advantages, Different platforms of remote sensing, EM spectrum, solar reflection and thermal emission remote sensing, Interaction of EM radiation with atmosphere including atmospheric scattering, absorption and emission, Interaction mechanisms of EM radiation with ground, spectral response curves, Principles of image interpretation

Unit -II	**Scanners and Imaging Devices**	**10Hrs**

Multi-spectral scanners and imaging devices, Salient characteristics of LANDSAT, IRS, Cartosat, Resource Sat etc. sensors , Image characteristics and different resolutions in Remote Sensing, Image interpretation of different geological landforms, rock types and structures,

Unit -III	**Remote Sensing Integration**	**10Hrs**

Remote Sensing integration with GIS and GPS, Georeferencing Technique, Basic image enhancement techniques, Spatial filtering techniques, Image classification techniques, In SAR Technique and its applications, Hyperspectral Remote Sensing, Integrated applications of RS and GIS in groundwater studies-Limitations of Remote Sensing Technique

Unit -IV	**Techniques of Image Acquisition**	**9Hrs**

Different techniques of Image acquisition, digital image processing importance, Image characteristics and different resolutions in Remote Sensing, EM spectrum, solar reflection and thermal emission remote sensing, Colour representations and transforms, Image Histograms and statistics

Unit -V	**Geometric Transformations**	**9Hrs**

Image enhancement techniques, Multispectral transforms: scatter plot, principal component analysis and decorrelation stretch, Spatial filtering techniques, Frequency domain - Fourier transformation, Basic Image Compression techniques and different image file formats, Image classification techniques

Course Outcomes (CO): Student will be able to

- Understanding about satellite based Remote Sensing and Digital Image Processing technologies
- Know Remote sensing datasets available from various earth orbiting satellites

- Remote Sensing integration with GIS and GPS
- Understanding Different techniques of Image acquisition
- Image enhancement techniques
- Image Compression technique

Textbooks:

1. 'Signals and Systems', by Simon Haykin and Barry Van Veen, Wiley.

Reference Books:

1. 'Theory and Application of Digital Signal Processing', Rabiner and Gold
2. 'Signals and Systems', Schaum's Outline series

3. 'Digital Signal Processing', Schaum's Outline series

E-Resources:

https://nptel.ac.in/courses/105/107/105107160/

https://nptel.ac.in/courses/105107160

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EXPANSIVE SOILS

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0159T	3: 1:0:0	4	CIE: 30 SEE:70	3Hours	Honor(Pool-III)

Course Objectives:

- Origin and occurrence of expansive soils
- Identification of expansive soils
- Determine the swelling potential and methods

Syllabus		Total Hours:48
Unit - I	**Introduction**	**10 Hrs**

Origin and occurrence of expansive soils-problems associated with expansive clays identification and classification based on mineralogical composition. X-Ray diffraction, differential thermal analysis and electron microscopy-identification by index properties

Unit - II	Clay interaction	10Hrs

Clay-water system – Ion distribution in clay –water systems-diffuse double layer-Gouy Chapman theory-cation exchange. Mechanisms of swelling-osmotic pressure concept Importance of mineralogical details in swelling-soil suction-measurement in laboratory and field.

Unit - III	Swelling	10 Hrs

Swell potential-swelling pressure-factors affecting-direct measurement from laboratory testing-stresses in an in-situ soil mass-factors affecting heave-methods of heave prediction

Unit - IV	Shear strength	9 Hrs

Shear strength of expansive clays-Katti's concept of bilinear stress- state variables-Fredlund's three-dimensional approach to shear strength and swelling behaviour of expansive clays

Unit - V	Stabilization	9 Hrs

Foundation practices in expansive clays-sand cushion-belled piers-under reamed piles-CNS layer technique. Expansive soil stabilization with lime-lime soil columns and lime slurry pressure injection-stabilization with admixtures

Course Outcomes (CO):

On completion of this course, student will be able to

- Understand about properties of expansive soil
- Determine Shear strength properties of the expansive soil

Textbooks:

1. Foundations on expansive soils – F.H. Chen, Elsevier Publishing Co.
2. 2. Search for solutions to problems in black cotton soils – R.K. Katti, Indian Goe.Tech.Journal, Volume 1, 1971

Reference Books:

1. Fundamentals of soil behaviour – J.K. Mitchell, John Wiley& SonsSrinath L.S., PERT and CPM – Principles and Applications, 3rd Edition, East West publishers, New Delhi, India, 1989.

E-Resources:

https://archive.nptel.ac.in/courses/105/103/105103214/
https://www.youtube.com/watch?v=lWoNPYoDB9w
https://lecturenotes.net/home/course/expansive-soil/3353

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PRINCIPLES OF CONSTRUCTION MANAGEMENT

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0160T	3: 1:0:0	4	CIE: 30 SEE:70	3Hours	Honor(Pool-III)

Course Objectives:

- Distinguish and explain construction management and review the responsibilities of CMs within the project scope.
- Identify the factors controlled by the specialized management technique and describe the use techniques to plan, coordinate, monitor, and control a construction project.
- Understand the overall process of safely managing a quality project from start to finish applicable to any industry, within budget, on schedule, and meeting scope expectations as applied specifically to the construction industry addressing all associated risks.

Syllabus		Total Hours:48
Unit - I	**Project organization and Estimation**	**10 Hrs**

Introduction to the course- Interdisciplinary nature of modern construction projects- Overview of stepsin execution of a project- Illustrative examples for evaluation of bids based on different schemes- Resource management in construction projects- Estimating quantities- Description of items- Estimation of project cost.

Unit - II	**Construction Economics**	**10 Hrs**

Discussion on the case study of boundary wall- Running account bills- Economic decision making in construction projects- Depreciation of construction equipment.

Unit - III	**Planning and Scheduling**	**9 Hrs**

Repayment of a loan- Introduction to planning and scheduling- Project scheduling- Uncertainties in duration of activities -Using PERT in scheduling- Project monitoring and control systems- Resource leveling and allocation- Crashing of networks.

Unit - IV	**Construction Safety and Quality Management**	**10 Hrs**

Introduction to construction safety- Accidents in construction industry – I & II - Personal protective equipment- Implications of construction accidents- Safety organization and safety officer- Quality control in construction- Quality in construction welding- Epoxy coated bars- Quality control of grouts in ducts of post-tensioned PC members- Quality control (QC) issues in concrete.

Unit - V	**Legal Aspects of Construction Projects**	**9 Hrs**

Legal issues in construction management-An introduction- Essentials of a good contract- Dispute resolution in construction projects- Types of construction contracts – Definitions- legal aspects- Quality control concrete sewer pipeline.

Course Outcomes (CO):

On completion of this course, student will be able to

- Apply fundamental principles, processes and tools in construction project management;
- Describe standard building design methods and materials for site preparation and construction;
- Identify and comply with building code regulations, bylaws and permit requirements;
- Understand legal concepts, basic negotiation tactics and risks involved with construction contract;
- Identify sustainable building practices, compliance standards and types of certification programs;
- Understand health, safety, and building code governance and assessments for construction projects and prepare a workplace safety plan;
- Understand the purpose and principles behind construction estimating, including cost controls and feasibility budgets; and prepare useful technical documentation and written communication.

Textbooks:

1. Jha K.N., Construction Project Management- Theory and practice, 2nd Edition, Pearson India Education Services Pvt. Ltd., UP, India 2015.

2. Kerzner H., Project Management- A systems approach to planning, scheduling and controlling, 10th edition, John Wiley & Sons, Inc., New Jersey, USA, 2009.

3. Chitkara K.K., Construction Project Management – Planning, Scheduling and Controlling, TMH Publishing Company Ltd., 9th Edition, New Delhi, India, 2005.

Reference Books:

1. Crundwell F.K., Finance for Engineers-Evaluation and Funding of Capital Projects, Springer, London, UK, 2008. (ISBN 978-1-84800-032-2).

2. Theusen G.J., Fabrycky W.J., Engineering Economy, 9th Edition, Prentice-Hall, Inc., New Delhi, India, 2001.
3. Srinath L.S., PERT and CPM – Principles and Applications, 3rd Edition, East West publishers, New Delhi, India, 1989.

E-Resources:

https://archive.nptel.ac.in/courses/105/104/105104161/
https://www.youtube.com/playlist?list=PLWnoy5z_3BObBvFtBlowxM05D-q0VAWEs

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ANALYSIS AND DESIGN OF BITUMINOUS PAVEMENT

(CIVIL ENGINEERING)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0161T	3: 1:0:0	4	CIE: 30 SEE:70	3Hours	Honor(Pool-III)

Course Objectives:

- To gain knowledge on Kenlayer & Traffic Analysis.
- To Gain Knowledge on Reliability in Pavement Design.
- To gain knowledge on Pavement Cross Sections and Pavement Design Process.
- To gain knowledge on different techniques and approaches about pavement design.
- To their source, generation techniques, derivatives, errors and limitations would be discussed extensively.

Syllabus		Total Hours:48
Unit- I	**Pavement Cross Sections and Pavement Design Process**	**10 Hrs**

Introduction To Pavement Cross Sections And Pavement Design process, Pavement Design Factors-I, Pavement Design Factors-II, Stresses and strains in Bituminous Pavements-I , Stresses and strains in Bituminous Pavements-II, Numerical problems in one layer theory, Numerical problems in two layer theory

Unit - II	**Introduction to Kenlayer &Traffic Analysis**	**10 Hrs**

Introduction To KENLAYER, KENLAYER-1, KENLAYER-2, KENLAYER-3 KENLAYER-4, Traffic Analysis-ESAL using VDF, Kenlayer – Non Linear Analysis & Damage Analysis, Traffic Analysis – ESAL using TF, Traffic Analysis with examples Traffic Analysis-load spectra factor

Unit - III	**Design for Pavements & Environmental Effect**	**10 Hrs**

Modulus for Design -CBR, Modulus for Design- Granular material, Modulus for Design- Bituminous material, Modulus for Design- Dynamic Modulus**,** Environmental Effect-Part-01, Environmental Effect-Part-02, Environmental Effect-Part-03, Environmental Effect-Part-04, Enhanced integrated climatic model - part-1&2

Unit - IV	**Reliability in Pavement Design**	**8 Hrs**

Introduction To Reliability In Pavement Design-1, Reliability In Pavement Design-2, Reliability In Pavement Design-3, Reliability In Pavement Design-4, Reliability In Pavement Design-5, Reliability In Pavement Design- 6, Distress Transfer function- fatigue cracking , Rutting and low temperature cracking

Unit - V	**IRC Design**	**10 Hrs**

Design input and IITPAVE SOFTWARE , Pavement design with granular base , pavement design with ctb, pavement design with rap base, Overview of Mechanistic-Empirical Pavement Design Methods - -Part 1, Overview of Mechanistic-Empirical Pavement Design Methods -Part 2, Overview of Mechanistic-Empirical Pavement Design Methods - Part -3,

Course Outcomes (CO): Student will be able to

- To understand the fundamental concepts of Pavements.
- To understand the concepts of IRC Design procedures.
- To understand the Reliability In Pavement Design.
- To understand the Environmental Effect
- To understand the modern techniques skills and necessary for engineering practice.
- To understand the To Kenlayer & Traffic Analysis

Text Books:

1. Yoder and Witzorack, "Principles of Pavement Design", John Willey and Sons.
2. Yang, H. Huang, "Pavement Analysis and Design", Prentice Hall Publication, Englewood Cliffs, NewJersy

Reference Books:

1. Sargious, M.A. Pavements and Surfacings for Highways and Airports – Applied science Publisherslimited
2. Ralps Hass and Hudson, W.R. " Pavement Management System" Mc-Graw Hill Book Company. 5. IRCcodes of practice

E Resources:

nptel.ac.in/courses/105/106/105162
21/

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Sustainable Transportation Systems
(Civil Engineering)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0162T	3:1:0:0	4	CIE:30 SEE:70	3Hours	Honor(Pool-IV)

Course Objectives:

- The objective of the course is to impart knowledge and skills of environmental issues related to transportation systems, concept of sustainability and related issues.
- To know the various environmental aspects of mass rapid transportation systems
- To know the air quality management through transportation planning in mega cities

Syllabus		TotalHours:48
Unit-I	**EIA And Transportation Systems**	**10 Hrs**
Introduction to Environmental Impact Assessment (EIA) and Transportation systems		
Unit -II	**Schemes And Planning**	**9Hrs**
Land-use plans, zoning schemes and provisions, Urban and regional transport planning,		
Unit -III	**Impacts And Baseline Conditions**	**10Hrs**
Impacts on humans, flora and fauna, soil, water, air, climate and landscape Establishment of baseline conditions with respect to soil, water and air quality		
Unit -IV	**Modelling And Modelling Of Impacts**	**10Hrs**
Noise, air and water pollution modelling, Modelling of impacts and scenario-based analysis, Assessment of potential project impacts including indirect, cumulative and synergistic impacts		
Unit -V	**Support Systems**	**9Hrs**
Decision support systems for EIA of transport infrastructures, Abatement measures, Sustainable transportation systems		

Course Outcomes (CO):Student will be able to

- Understanding about environmental issues related to transportation systems
- Know about Schemes And Planning
- Understanding about Impacts And Baseline Conditions
- Understanding about Modelling of impacts
- Know about potential project impacts
- Know about Support Systems

Text Books:

1. Assessment & Decision Making for Sustainable Transport, European Conference of Ministersof Transport, OECD Publishing 2004.
2. Wood, C. and Wood, C., "Environmental Impact Assessment: A Comparative Review",Prentice Hall. 2002.
3. Petts, J., "Handbook of Environmental Impact Assessment", Blackwell Publishing. 1999.

Reference Books:

1. Sucharov, L.J. and Baldasano, J.M., "Urban Transport and the Environment, Vol. II", Computational Mechanics Publications. 1996.
2. Zannetti P. (Ed.), "Environmental Modeling, Vol. I", Computational Mechanics Publication,Elsevier Applied Science. 1993.

E Resources:
https://onlinecourses.nptel.ac.in/noc21_ce74/preview

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Finite Element Methods

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0163T	3:1:0:0	4	CIE:30 SEE:70	3Hours	Honor(Pool-IV)

Course Objectives:

- To familiarize the student with the latest developments in analysis for Civil Engineering problemsusing Finite Element Methods.

Syllabus		TotalHours:48
UNIT-I	**Introduction of finite element methods**	**10 Hrs**

Introduction to finite element methods for solving field problems, Stress and equilibrium, Boundary conditions, Strain-Displacement relations, Stress- strain relations for 2D and 3D Elastic problems. Potential energy and equilibrium, The Rayleigh-Ritz method, Formulation of Finite Element Equations.

UNIT-II	**One dimensional problems:**	**10Hrs**

Finite element modeling coordinates and shape functions. Assembly of global stiffness matrix and load vector. Finite element equations, Treatment of boundary conditions, Quadratic shape functions.

UNIT-III	**Two Dimensional Elements**	**9Hrs**

Different types of elements for plane stress and plane strain analysis – Displacement models –generalized coordinates – shape functions – convergent and compatibility requirements – Geometric invariance – Natural coordinate system – area and volume coordinates.

UNIT-IV	**Analysis of trusses and Beams**	**10Hrs**

Analysis of trusses: Stiffness Matrix for plane truss element. Stress Calculations and Problems.

Analysis of beams: Element Stiffness Matrix for two noded, two degrees of freedom per node beam element and simple problems.

UNIT-V	**Solution Techniques**	**9Hrs**

Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads.

Course Outcomes (CO): Student will be able to

1. Demonstrate the differential equilibrium equations and their relationship
2. Apply numerical methods to FEM
3. Demonstrate the displacement models and load vectors
4. Formulate and analyze truss and beam problems.
5. Compute the stiffness matrix for isoperimetric elements
6. Analyze plane stress and plane strain problems.

Text Books:

1. 1. Chandraputla, Ashok &Belegundu, "Introduction to Finite Element in Engineering", Prentice Hall.
2. 2. S.S.Rao, "The Finite Element Methods in Engineering",2nd Edition,Elsevier Butterworth -Heinemann 2011.

Reference Books:

1. J N Reddy, "An introduction to the Finite Element Method", McGraw – Hill, New York,1993.
2. R D Cook, D S Malkus and M E Plesha, "Concepts and Applications of Finite Element Analysis", 3rd Edition, John Wiley, New York, 1989.
3. K J Bathe, "Finite Element Procedures in Engineering Analysis", Prentice-Hall, Englewood Cliffs,1982.
4. T J R Hughes, "the Finite Element Method, Prentice", Hall, Englewood Cliffs, NJ, 1986.
5. C Zienkiewicz and R L Taylor, "the Finite Element Method", 3rd Edition. McGraw-Hill,1989.

E Resources: https://archive.nptel.ac.in/courses/105/106/105106051/

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PAVEMENT MATERIALS

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0164T	3:1:0:0	4	CIE:30 SEE:70	3Hours	Honor(Pool-IV)

Course Objectives:

- Basic and fundamental understanding about the behavior of various materials used inthe construction of pavements
- Characterization, tests and engineering properties of these materials
- Current practices and future trends in the area of pavement materials
- material engineering related to pavement application.

Syllabus		TotalHours:48
Unit-I	**Soil**	**10 Hrs**

Introduction to soil as a highway material; Classification of soils; Consistency Limits; Soil compaction and role of moisture; Mechanical properties of soil (Shear strength, Unconfined compressive strength, Resilient modulus, California bearing ratio, Modulus of subgrade reaction etc.); Introduction to expansive soils, relevant tests, and soil stabilization techniques.

Unit -II	Aggregates	10Hrs

Aggregate origin, types, production, and quarrying operation; Classification of aggregates; Aggregate gradation and gradation parameters; Theories of aggregate blending; Minerology of aggregates and its importance; Aggregate shape and texture: quantification and importance, Aggregate strength properties, and relevant tests.

Unit -III	Bitumen	9Hrs

Bitumen, Modified bitumen, Bitumen emulsion and Cutback bitumen: Bitumen as a binding agent; Production of bitumen; Physical and rheological properties of bitumen; Introduction to viscoelasticity; Chemistry of bitumen; Ageing of bitumen; Grading of bitumen, and relevant tests: Penetration grade, Viscosity grade, Performance grade; Bitumen modification: Need, Types and Importance; Introduction of bitumen emulsion: Theory of emulsification, Uses, Grading of emulsions, and Relevant tests; Introduction to cutback bitumen: Types, Uses, and relevant tests.

Unit -IV	Cement	10Hrs

Production of cement; Theory of hydration and importance of different hydration products; Physical and chemical properties of cement; Types of cement; Pozzolanic and geopolymer materials as alternate cement.

Unit -V	Alternative Pavement Materials	9Hrs

Alternative Pavement Materials: State of the art on various alternative materials for construction of flexible and rigid pavements.

Course Outcomes (CO):Student will be able to

- Understand the different soils
- Identify the aggregate properties
- Know about bitumen
- Understand about the cement
- Know about Alternative Pavement Materials
- Understand about the materials used in construction of flexible and rigid pavements.

Textbooks:

1. Highway Engineering – S.K.Khanna&C.E.G.Justo, Nemchand& Bros., 7th edition (2000).

Reference Books:

1. Transportation Engineering, R Srinivas Kumar, Universities Press, 2020
2. Highway Engineering – Dr.S.K.Sharma, S.Chand Publishers 2014 edition
3. Transportation Engineering, Volume I, C Venkatramaiah, Universities Press, 2015
4. Pavement Design, R Srinivasa Kumar, Universities Press, 2013

E-Resources:

https://archive.nptel.ac.in/courses/105/107/105107219/

https://www.youtube.com/watch?v=sQ63_AvwGFY

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ENVIRONMENTAL CHEMISTRY

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0165T	3:1:0:0	4	CIE:30 SEE:70	3Hours	HONOR(Pool-V)

Course Objectives:

- The course deals with the fundamentals and critical analysis of chemical processes one encounters in the field of Environmental Engineering

Syllabus **TotalHours:48**

Unit-I	INTRODUCTION	10 Hrs

Introduction, Fundamentals of chemical processes, Equilibrium (definitions) Gibbs free energy, Phase Equilibrium, Equilibrium Models, Generalized Approach, Kinetics, Reactions, Reactors, Determination of rate equation, Requirements, Approaches, Regression

Unit -II	ACID/BASE REACTIONS	10Hrs

Acid/Base Reactions: Introduction (importance, terminology), Kinetics, Equilibrium, Single Reaction, Ionization Fractions, Models (multiple reactions), Recipe problems, Inverse Problems, Computer solutions, Log C-pH Graphs: Introduction, Preparation, Example, Carbonate System: Introduction, Closed system, Open system: Equivalence Point, Buffer

Unit -III	AQUEOUS COMPLEX FORMATION	10 Hrs

Aqueous Complex Formation: Introduction, Kinetics, Equilibrium, Equilibrium Coefficients, Strength of complexes, Models

Unit -IV	PRECIPITATION	9Hrs

Precipitation: Introduction, Kinetics, Steps Ostwald, More crystalline, less soluble, Controlling precipitation, Promoting precipitation, Inhibiting precipitation, Equilibrium, Coefficients, Important concepts, Models, Competitive Precipitation, Predominance Area Diagram, Calcium carbonate precipitation

Unit -V	OXIDATION/REDUCTION	9Hrs

Oxidation/Reduction: Introduction, Terminology, Applications, Balancing Redox Reactions, Kinetics, Importance, Models, Equilibrium: Introduction, Alternatives for reaction feasibility, Q/K approach, pe approach, Eh approach, Oxidation-Reduction Potential (ORP) Measurement, Predominance Area Diagrams, Corrosion

Course Outcomes (CO):Student will beable to

- Application of equilibrium equations and material balance equations to calculate conditions in environmental systems at equilibrium using the concept of components.
- Use of chemical equilibrium programs such as VMINTEQ to calculate conditions in environmental systems at equilibrium
- Application of kinetic equations, stoichiometric relationships and material balances to calculate conditions in environmental systems in which reactions occur that are not at equilibrium.
- Application of fundamental aspects of thermodynamics to describe equilibrium conditions in environmental systems.
- Defining equilibrium and kinetic limitations as relating to environmental systems and the relative importance of each for chemical processes in environmental systems.
- Knowledge of important terminology for chemical processes occurring in environmental systems

Textbooks:

1. Physical chemistry by Ira N. Levine
2. Essentials of Physical Chemistry, Bahl and Bahl and Tuli.

References Books:

1. Inorganic Chemistry, Silver and Atkins
2. Fuel Cell Hand Book 7th Edition, by US Department of Energy (EG&G technical services and corporation)
3. Hand book of solar energy and applications by Arvind Tiwari and Shyam.
4. Solar energy fundamental, technology and systems by Klaus Jagar et.al.
5. Hydrogen storage by Levine Klebonof

E-Resources:

https://nptel.ac.in/courses/105/107/105107176/

https://nptel.ac.in/courses/122/106/122106030/

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Rural Water Resources Management

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0166T	3:1:0:0	4	CIE:30 SEE:70	3Hours	HONOR(Pool-V)

Course Objectives:

- To impart knowledge on Importance of water resources management
- To explain the theory of ground water flows
- To disseminate knowledge on porosity and specific yield & Hydraulic conductivity.
- To explain basic concepts of surface water storage structures
- To describe the concepts of Revival of lakes/ tanks.
- To explain the maintenance and ownership issues Data issues.

Syllabus		Total Hours:48
UNIT-I	**Introduction**	**10 Hrs**

Introduction- Importance of water resources management - Rural Water Supply: Basic Objectives Development of Water Supply Schemes for Rural Areas - Health and Economic Aspects in Design of the Scheme, Disinfection of Wells, Specific Problems in Rural Water Supply and Treatment and Remedies Design
of Distribution Systems Rural Areas.

UNIT-II	**Ground Water Hydrology**	**10 Hrs**

Hydrological Cycle- Description of Hydrological Cycle- Measures of precipitation- key methods of precipitation- Theory of ground water flows- Ground water Hydrology- Components-Different types of aquifers- Ground water recharge- Geological maps of aquifer in India

UNIT-III	**Ground Water Components**	**10Hrs**

Porosity with water and air-relation between porosity and specific yield- Hydraulic conductivity

UNIT-IV	**Surface water storage structures**	**9Hrs**

Need of Surface water storage structures-constructional aspects of rural lake tank- Lift irrigation from check dam- Issues of urban to rural conversion of lakes/ tanks- Revival of lakes/ tanks- Desiltingof tanks and feeders

UNIT-V	Rural Water management issues	9Hrs

Specifies on how to improve water management- capacity building- infrastructure related issues- Maintenance and ownership issues Data issues

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

- To understand the Importance of water resources management & Hydrological Cycle.
- To evaluate the Components of Ground water Hydrology.
- To understand relation between porosity and specific yield.
- To understand the Need of Surface water storage structures.
- To understand the maintenance and ownership issues Data issues.

TextBooks:

1. Freeze P.A., Cherry J. 1979 Groundwater. Prentice-Hall
2. Ward, R.C and Robinson. M. 1967. Principles of Hydrology. Tata McGraw Hill .
3. Dingman, S.L. and Dingman, S.L. 2015. Physical hydrology (Vol. 575). Upper Saddle River,NJ: Prentice Hall.

ReferenceBooks:

1. Fetter, C.W. 2018. Applied hydrogeology. Waveland Press.
2. Brady, Nyle C., and Harry Oliver Buckman. The nature and properties of soils. No. 631.4 B7295n Ej. 6 008553. Macmillan, 2013. .
3. Raghunath H.M. 2006. Hydrology: principles, analysis and design

E Resources:

https://onlinecourses.nptel.ac.in/noc22_ce48/preview

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Geosynthetics and its applications

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0167T	3:1:0:0	4	CIE:30 SEE:70	3Hours	HONOR(Pool-V)

Course Objectives:

- To impart knowledge on various types of geosynthetics
- To explain the manufacturing process of geosynthetics
- To disseminate knowledge on various properties of geosynthetics.
- To explain basic concepts on various functions of geosynthetics
- To describe the applications of geosynthetics in civil engineering structures
- To explain the concepts of Ground Improvement by geo drains

Syllabus **Total Hours:48**

UNIT-I	**Introduction**	**10Hrs**

Historical development-Types of geosynthetics : geotextiles , geogrids, geonets , geomembranes , geo composites-Recent use in India

UNIT-II	**Manufacturing: Materials and Process**	**10 Hrs**

Raw materials: Polyamide, polyester , polyethylene , polypropylene , poly vinyl chloride-Different type of geosynthetics based on manufacturing woven , monofilament , multifilament , slit filament , non-woven-Different
bonding process: Mechanically bonded, Chemically bonded, Thermally bonded

UNIT-III	**Properties of Geosynthetics**	**10Hrs**

PHYSICAL Properties: Mass per unit area, Thickness, Specific gravity-Hydraulic properties: Apparent open size, Permittivity, Transmissivity-Mechanical Properties : Uniaxial Tensile Strength ,Burst and Puncture Strength, Soil Geosynthetic friction tests-Durability : Abrasion resistance ,Ultraviolet resistance

UNIT-IV	**Functions of Geosynthetics**	**9Hrs**

Reinforcement-Separation-Filtration-Drainage-Barrier Functions-Confinement

UNIT-V	**Applications of Geosynthetics**	**9Hrs**

Use of geo synthetics in roads-Use of reinforced soil in Retaining Walls-Improvement of bearing capacity-Geo synthetics in environmental control and landfills-Ground Improvement by geo drains-Use of Geo synthetics in lining of
canals

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

- To understand the types of geosynthetics
- To understand the Materials and Process
- To understand the Properties of Geosynthetics.
- To describe the Functions of Geosynthetics.
- To understand the process of Reverse Osmosis, Electro dialysis.

Text Books:

1. Engineering with Geosynthetics by G. Venkatappa Rao and G.V.S Suryanarayana Raju –Tata McGraw Hill, New Delhi, 1990
2. Construction and Geotechnical Methods in Foundation Engineering by Robert M. Koerner – McGraw Hill, New York, 1985
3. Designing with Geo synthetics by Robert M. Koerner, Prentice Hall, New Jersey, UAS,1989

Reference Books:

1 Fundamentals of Geosynthetic Engineering by Sanjay Kumar Shukla, Jian-Hua Yin, CRC Press
2. Handbook on Geosynthetics and their applications, Sanjay Kumar Shukla, Thomas Telford, 2002 .

E Resources: https://archive.nptel.ac.in/courses/105/106/105106052/

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LIST OF MINOR SUBJECTS

S.NO	Course Name	Course Name	L-T-P	Credits
1	22A0168T	Basics of Strength of Materials	3-1-0	4
2	22A0169T	Introduction to Fluid Mechanics	3-1-0	4
3	22A0170T	GPS Surveying	3-1-0	4
4	22A0171T	Traffic Engineering	3-1-0	4
5	22A0172T	Construction Practice	3-1-0	4
6	22A0173T	Introduction in Geotechnical Engineering	3-1-0	4
7	22A0174T	Geographic Information System	3-1-0	4
8	22A0175T	Project planning & control	3-1-0	4
9	22A0176T	Water supply Engineering	3-1-0	4
10	22A0177T	Railway Engineering	3-1-0	4

Member Secretary

Head of the Department
Dept. of Civil Engineering
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Head of the department

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BASICS OF STRENGTH OF MATERIALS

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0168T	3: 1:0:0	4	CIE: 30 SEE:70	3Hours	MINOR SUBJECT

Course Objectives:

This subject is useful for a detailed study of forces and their effects. To study the rigid and deformable solids. To give an ability to calculate stresses and deformations of objects under external forces. To give an ability to apply the knowledge of strength of materials on engineering applications and design problems

Syllabus		Total Hours:48
Unit - I	**Simple Stresses and Strains**	**10 Hrs**

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

Unit - II	**Bending moment and Shear Force Diagrams**	**10 Hrs**

Bending moment (BM) and shear force (SF) diagrams.BM and SF diagrams for cantilevers and simply supported under point, uvl and udl

Unit - III	**Flexural Stresses and shear stresses**	**9 Hrs**

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

Unit - IV	**Slope and deflection**	**10 Hrs**

Relationship between moment, slope and deflection for cantilever and simply supported Moment area method.

Unit - V	**Torsion**	**9 Hrs**

Derivation of torsion equation and its assumptions. Applications of the equation of the hollow and solid circular shafts, torsional rigidity.

Course Outcomes (CO):

On completion of this course, student will be able to

- Describe the concepts and principles, understand the theory of elasticity including strain/displacement and Hooke's law relationships; and perform calculations, relative to the strength and stability of structures and mechanical components.
- Define the characteristics and calculate the magnitude of combined stresses in individual members and complete structures; analyze solid mechanics problems using classical methods and energy methods.
- Analyze various situations involving structural members subjected to combined stresses by application of Mohr's circle of stress; locate the shear centre of thin wall beams.
- Calculate the deflection at any point on a beam subjected to a combination of loads; solve for stresses and deflections of beams under unsymmetrical loading; apply various failure criteria for general stress states at points; solve torsion problems in bars and thin-walled members;

Textbooks:

1. S S Rattan, ―Strength of Materials‖, McGraw Hill Education.
2. M L Gambhir, ―Fundamentals of Solid Mechanics‖, Prentice Hall India Learning Private Limited.
3. ames M. Gere, Barry J. Goodno, ―Mechanics of Materials‖, 8th edition, Cengage Learning.
4. Timoshenko, S. and Young, D. H., ―Elements of Strength of Materials‖, DVNC, New York,USA.
5. Kazmi, S. M. A., ―Solid Mechanics‖ TMH, Delhi, India.

Reference Books:

1. Crandall, S. H., N. C. Dahl, and T. J. Lardner. An Introduction to the Mechanics of solids. 2nd ed. New York, NY: McGraw Hill, 1979.
2. Mechanics of Materials - Ferdinand P. Beer, E. Russel Jhonston Jr., John T. DeWolf– TMH 2002.
3. Strength of Materials by R. Subramanian, Oxford University Press, New Delhi.

E-Resources:

https://www.youtube.com/watch?v=GkFgysZC4Vc
https://nptel.ac.in/courses/105/105/105105108/

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Introduction to Fluid Mechanics & Hydraulics

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0169T	3: 1:0:0	4	CIE: 30 SEE:70	3Hours	MINOR

Course Objectives:

- To impart ability to solve engineering problems in fluid mechanics
- To explain basics of statics, kinematics and dynamics of fluids and various measuring techniques of hydrostatic forces on objects.
- To enable the students measure quantities of fluid flowing in pipes, tanks and channels
- To Introduce concepts of uniform and non-uniform flows through open channel.
- To impart knowledge on design of turbines and pump

Syllabus **Total Hours:48**

Unit - I	**Introduction to Fluid Statics**	**10 Hrs**

Distinction between a fluid and a solid - characteristics of fluids - Fluid Pressure: Pressure at a point, Pascal's law, pressure variation with temperature, density and altitude. Piezometer, U-Tube Manometer, Single Column Manometer, U Tube Differential Manometer

Unit - II	**Fluid kinematics and Dynamics**	**10 Hrs**

Classification of fluid flow - Stream line, path line, streak line and stream tube; stream function, velocity potential function, Practical applications of Bernoulli's equation

Unit - III	**Analysis Of Pipe Flow**	**9 Hrs**

Major & Minor losses in pipelines; Hydraulic Grade Line and Total Energy Line; Concept of equivalent length – Pipes in Parallel and Series.

Unit - IV	**Flow in Open Channels**	**10 Hrs**

Open Channel Flow-Comparison between open channel flow and pipe flow, geometrical parameters of a channel, classification of open channels, Velocity Distribution of channel section, Definitions of Reynolds Number, Froude Number, Mach Number, Weber Number and Euler Number;

Unit - V	**Hydraulic Machines**	**9 Hrs**

Turbines: Classification of turbines, centrifugal pump, Multistage centrifugal pumps; troubles and remedies – Introduction to Reciprocating Pump.

Course Outcomes (CO):

Oncompletion of this course, student will be able to

- Familiarize basic terms used in fluid mechanics
- Understand the principles of fluid statics, kinematics and dynamics
- Understand flow characteristics and classify the flows and estimate various losses in flow through channels
- Analyze characteristics for uniform and non-uniform flows in open channels.
- Design different types of turbines, centrifugal and multistage pump

Textbooks:

1. M. Modi and S. M. Seth, "Hydraulics and Fluid Mechanics", Standard Book House
2. K. Subrahmanya, "Theory and Applications of Fluid Mechanics", Tata McGraw Hill

Reference Books:

1. R. K. Bansal, A text of "Fluid Mechanics and Hydraulic Machines", Laxmi Publications (P) Ltd., New Delhi.
2. K. Subramanya, Open channel Flow, Tata McGraw Hill.
3. N. Narayana Pillai, Principles of "Fluid Mechanics and Fluid Machines", Universities Press Pvt Ltd, Hyderabad. 3rd Edition 2009

E Resources:

1. https://www.coursera.org/courses?query=fluid%20mechanics
2. https://www.udemy.com/topic/fluid-mechanics/
3. https://onlinecourses.nptel.ac.in/noc21_ce31/preview

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GPS SURVEYING

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0170T	3: 1:0:0	4	CIE: 30 SEE:70	3Hours	Minor

Course Objectives:

- To determine the relative position of any objects or points of the earth.
- To determine the distance and angle between different objects.
- To prepare a map or plan to represent an area on a horizontal plan.
- To acquire the knowledge on GPS field Surveying & Processing.
- To gain knowledge on different techniques and approaches about GPS.

Syllabus		Total Hours:48
Unit- I	**Introduction for GPS Surveying**	**10 Hrs**
Introduction (GPS Surveying & Applications), GPS System, GPS Signal (Civilian Perspective) , GPS Receiver, GPS software		
Unit - II	**GPS Position**	**10 Hrs**
Introduction to GPS Position, GPS Positioning and its Principles & methods Field demonstration of GPS Positioning Method		
Unit - III	**GPS Data Processing**	**9Hrs**
Introduction to GPS Data Pre-Processing-I, GPS Data Pre-Processing-II, GPS Data Processing-I, GPS Data PreProcessing-II, Quality Assessment of GPS surveying		
Unit - IV	**Procedure of GPS SURVEYING**	**10 Hrs**
Introduction for Procedure of GPS Surveying-I, Procedure of GPS Surveying-II, Procedure of GPS Surveying-III,		
Unit - V	**GPS Field Surveying**	**9 Hrs**
Introduction for GPS Field surveying, GPS Data processing		

Course Outcomes (CO):
Student will be able to

- To understand the fundamental concepts of GPS Surveying.
- To understand the concepts of GPS Position.
- To understand the Gps Data Processing.
- To understand the Procedure Of GPS SURVEYING
- To understand the modern techniques skills and necessary for engineering practice.
- To understand the modern techniques tools including for gps software .

Text Books:

1.GPS SURVEYING Prof. Jayanta Kumar Ghosh

E Resources:

1. https://nptel.ac.in/courses/105/107/105107157/

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Traffic Engineering

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0171T	3:1:0:0	4	CIE:30 SEE:70	3Hours	Minor

Course Objectives:

1. To explain road and vehicle characteristics.
2. To interpret traffic surveys in application of traffic forecasting
3. To develop basic knowledge of rotary intersection.
4. To enhance the knowledge on traffic signs and road markings.
5. To inculcate the knowledge on measures on road accidents.
6. To implement traffic system management for road safety measures.

Syllabus **TotalHours:48**

Unit-I	Traffic Planning and Characteristics	10 Hrs

Road Characteristics-Road user characteristics, PIEV theory, Vehicle Performance characteristics, Fundamentals o Traffic Flow, Urban Traffic problems in India, Integrated planning of town, country, regional and all urban infrastructures, Sustainable approach- land use & transport and modal integration.

Unit-II	Traffic Surveys	10 Hrs

Traffic Surveys- Speed, journey time and delay surveys, Vehicles Volume Survey including non-motorized transports, Methods and interpretation, Origin Destination Survey, Methods and presentation, Parking Survey, Accident analyses-Methods, interpretation and presentation, Statistical applications in traffic studies and traffic forecasting, Level of service-Concept, applications and significance.

Unit-III	Traffic Design and Visual Aids	9 Hrs

Intersection Design- channelization, Rotary intersection design, Signal design, Coordination of signals, Grade separation, Traffic signs including VMS and road markings, Significant roles of traffic control personnel, Networking pedestrian facilities & cycle tracks.

Unit-IV	Traffic Safety and Environment	9 Hrs

Road accidents, Causes, effect, prevention, and cost, Street lighting, Traffic and environment hazards, Air and Noise Pollution, causes, abatement measures, Promotion and integration of public transportation, Promotion of non-motorized transport.

Unit-V	Traffic Management	10 Hrs

Area Traffic Management System, Traffic System Management (TSM) with IRC standards, Traffic Regulatory Measures, Travel Demand Management (TDM), Direct and indirect methods, Congestion and parking pricing, All segregation methods- Coordination among different agencies, Intelligent Transport System for traffic management, enforcement and education.

Course Outcomes (CO): Student will be able to

- Describe traffic planning characteristics in urban infrastructures
- Apply fundamentals of traffic surveys
- Explain intersection design and channelization
- Apply traffic regulatory measures in traffic system management
- Understand the basic knowledge of Intelligent Transportation System.
- Explore knowledge of traffic engineering in road safety measure

Text Books:

1. Roess, Roger P., Elena S. Prassas, and William R. McShane. Traffic engineering. Pearson/Prentice Hall, 2019.
2. May, Adolf Darlington. Traffic flow fundamentals. 1990.
3. Garber N.J., and Hoel L.A., Traffic and Highway Engineering, 4th Edition, Cengage Learning, 2009
4. Kadiyali, L.R., Traffic Engineering and Transport Planning, Khanna Publishers, New Delhi, 2013.

Reference Books:

1. Chakroborty, Partha, and Animesh Das. Principles of transportation engineering. PHI Learning Pvt. Ltd., 2017
2. Chandra, Satish, S. Gangopadhyay, S. Velmurugan, and Kayitha Ravinder. "Indian highway capacity manual (Indo-HCM)." (2017).
3. Gartner, Nathan H., Carrol Jl Messer, and Ajay Rathi. "Traffic flow theory-A state-of-the-art report: revised monograph on traffic flow heory." (2002).

E Resources:

1. https://archive.nptel.ac.in/courses/105/105/105105215/
2. https://archive.nptel.ac.in/courses/105/101/105101008/

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Construction Practice

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0172T	3:1:0:0	4	CIE:30 SEE:70	3Hours	MINOR

Course Objectives:

- To impart knowledge on basic building materials such as stone and clay products.
- To teach properties of binding materials such as gypsum, lime and cement.
- To disseminate knowledge on ferrous and nonferrous materials and its applications.
- To explain basic concepts of building components such as stair case and masonry.
- To describe the properties and applications of plumbing, electrical and sanitary fittings.
- To explain the methodology of surface finishes such as pointing, distempering and painting.

Syllabus **TotalHours:48**

UNIT-I	Basic Building materials	10 Hrs

Properties and characteristics of Basic building materials – Stone –characteristics of good building stone-types of stone masonry - bricks –characteristics of good quality bricks- manufacturing of bricks- types of bonds in brick work- Cavity wall & hollow block construction
- tiles-types of tiles- sand –sources of sand – properties of sand.

UNIT-II	Binding Materials	10 Hrs

Properties and characteristics of Binding materials –**Gypsum:** properties of gypsum plaster, building products made of gypsum and their uses. **Lime:** Manufacture of lime, classificationsof limes, properties of lime- putty-characteristics and usage **Cement:** Raw materials used, Process of Manufacturing, Chemical composition, Bouge`s Compounds - Types of cement, Tests on cement – Uses of cement.

UNIT-III	Ferrous & Non-Ferrous Materials	10Hrs

Steel –characteristics of reinforcing steel – Hardness, Tensile, Compression, Impact, wear, and corrosion testing, Micro hardness and indentation fracture toughness, Creep and stress rupture tests, fatigue testing – steel fibers and its applications–**Plastics**: classification, advantages of plastics, Mechanical properties and use of plastic in construction – polypropylene fibers and itsapplications– **Glass**: Ingredients, properties, types and use in construction – Glass fibers and its applications

UNIT-IV	Basics of Building Components:	9Hrs

Components of building, area considerations, Construction Principle and Methods for layout, Damp proofing, antitermite treatment in buildings, Vertical circulation means: stair cases and their types. Different types of floors, and flooring materials.

UNIT-V	**Internal and External Fittings of a Building:**	**9Hrs**

Doors and Windows: Construction details, types of doors and windows and their relative advantages & disadvantages. Types of roof – Lintels and Chajjas, Water Supply and Sanitaryfittings (Plumbing), Electric Fittings, Mechanical Lifts and Escalators, Fire Fighting and FireProtection of Buildings.
Plastering and its types, pointing, Distempering, Colour washing,
Painting.

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

- To understand the characteristics of various building materials such as stone and clay product.
- To evaluate the properties of the binding materials for their suitability in building construction.
- To apply the ferrous and non-ferrous materials in building construction.
- To understand the construction procedure of various building components such as staircases, masonry and flooring.
- To understand the installation of electrical, sanitary and plumbing fittings in buildings.

TextBooks:

1. SK Duggal, “Building Materials” New Age International
2. BC Punmia, “Building Construction” Laxmi Publication.
3. G.C Sahu and Joygopal Jena, “Building materials and construction”, Mc Graw Hill Education

ReferenceBooks:

1. PC Varghese, “Building Materials” PHI
2. Mehta, “Building Construction Principles, Materials & Systems” 2/e, Pearson Education Noida.
3. Sandeep Mantri, “Practical building Construction and its Management” Satya Publisher, NewDelhi.
4. Adams, “Adams’ Building Construction Adams” CRC Press Taylor & Francis Group.

E Resources: https://archive.nptel.ac.in/courses/105/102/105102088/

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INTRODUCTION TO GEOTECHNICAL ENGINEERING

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0173T	3:1:0:0	4	CIE:30 SEE:70	3Hours	Minor

Course Objectives:

- To enable the student to find out the index properties of the soils and their classification.
- To enable the student to determine permeability of soils using various methods, and to understandthe concept of seepage of water through soil
- To concept of seepage of water through soil
- To enable the students to find understand the difference between compaction and consolidation.
- To impart knowledge on shear strength and its importance

Syllabus **TotalHours:48**

Unit-I	Soil Structure	10 Hrs

Soil formation – Soil structure – Adsorbed water – Mass- Volume relationship – Relative density. Index Properties Of Soils: Moisture Content, Specific Gravity, In-situ density, Grain size analysis – Sieve and Hydrometer methods – Consistency limits and indices – I.S. Classification of soils.

Unit -II	Permeability	10 Hrs

Soil water – Capillary rise – flow of water through soils – Darcy's law- permeability – Factors affecting – Laboratory determination of coefficient of permeability – Permeability of layered systems.

Unit -III	Seepage Through Soils	10 Hrs

SEEPAGE THROUGH SOILS: Total, neutral and effective stresses –Quick sand condition – Seepage through soils – Flow nets: Characteristics and Uses.

Unit -IV	Consolidation	9Hrs

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

Unit -V	Shear Strength Of Soils	9Hrs

Importance of shear strength – Mohr's– Coulomb Failure theories – Types of laboratory tests for strength parameters – strength tests based on drainage conditions – strength envelops – Critical voidratio –Liquefaction.

Course Outcomes (CO):
Student will be able to

- Carry out soil classification
- Solve any practical problems related to soil stresses permeability
- Understand about Seepage through different soils
- Solve practical problems related to consolidation settlement and time rate of settlement
- Determine the shear strength of soil

TextBooks:

1. Soil Mechanics and Foundation Engg. By K.R. Arora, Standard Publishers and Distributors Delhi 7th edition 2009
2. Geotechnical Engineering by C. Venkataramiah, New age International Pvt . Ltd, (2002).

ReferenceBooks:

1. Soil Mechanics and Foundation by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi 17th edition 2017
2. Geotechnical Engineering by Iqbal H.Khan, PHI pubilishers 4th edition.
3. Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New age International Pvt . Ltd,New Delhi 3rd edition 2016

E Resources: https://nptel.ac.in/courses/105101201 https://nptel.ac.in/courses/105105185

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Geographic Information System

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0174T	3:1:0:0	4	CIE: 30 SEE:70	3Hours	Minor

Course Objectives:

- Understand the basic concept of Remote Sensing and know about different types of satellite and sensors.
- Illustrate Energy interactions with atmosphere and with earth surface features, Interpretation of satelliteand top sheet maps
- Understand different components of GIS and Learning about map projection and coordinate system
- Develop knowledge on conversion of data from analogue to digital and working with GIS software.

Syllabus		Total Hours:48
Unit - I	**Geographic information system**	**10Hrs**

Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS. Data collection and input overview, data input and output

Unit - II	Mapping	10 Hrs

Coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS – File management,Spatial data – Layer based GIS, Feature based GIS mapping.

Unit - III	GIS spatial analysis	10 Hrs

Computational Analysis Methods (CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

Unit -IV	Remote sensing	9 Hrs

Basic concepts and foundation of remote sensing – Elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units. Energy resources, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite visual
interpretation techniques

Unit - V	Water resources applications	9 Hrs

Land use/Land cover in water resources, Surface water mapping and inventory -Watershed management for sustainable development and Watershed characteristics - Reservoir sedimentation, Fluvial Geomorphology.

Course Outcomes (CO): Student will be able to

- Create and input spatial data for GIS application.
- Apply RS and GIS concepts in water resources engineering.
- Applications of various satellite data.

Test Books:

1. Remote Sensing and GIS by B. Bhatta, Oxford University Press, New Delhi 3rd edition2021
2. Remote Sensing and its applications by L. R. A. Narayana, University Press 19992

Reference Books:

1. Fundamentals of remote sensing, by George Joseph, Universities press, Hyderabad 3rd edition2018
2. Advanced surveying: Total station GIS and remote sensing, by Satheesh Gopi, Pearson publication 2nd edition 2017
3. Concepts & Techniques of GIS, by C. P. Lo Albert, K.W. Yonng, Prentice Hall (India) Publications.
4. Remote sensing and GIS, by M. Anji Reddy B. S. Publications, New Delhi

E Resources:
https://nptel.ac.in/courses/10510313

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PROJECT PLANNING AND CONTROL

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0175T	3:1:0:0	4	CIE: 30 SEE:70	3Hours	Minor

Course Objectives:

- This course will cover the basic concepts in Project Planning and Control with a focus on construction projects.
- The course is relevant to Civil Engineering senior level undergraduate as well as post-graduate students in the area of construction management.
- To minimize the variance in costs and schedule from what was originally planned.
- determine the purpose of the project, as well as specific goals that need to be meet.

Syllabus		Total Hours:48
Unit - I	**INTRODUCTION**	**10 Hrs**

Introduction, Course Context, Construction Project Management, Time Management, Work Breakdown Structure (WBS), Gantt Charts

Unit - II	NETWORK ANALYSIS	10 Hrs

Duration Estimation, Network Representation & Analysis -1,Network Representation & Analysis -2,Two-Span Bridge: Scheduling, Network Analysis and Application, Time-Cost Trade-off (Crashing), Resource Scheduling

Unit - III	FINANCIAL ANALYSIS	10 Hrs

Cost of project and means of financing; Major cost components; Planning capital structure; Financing schemes of financial institutions. Profitability and Financial Projections: Cost of production; Break even analysis; Projected balance sheet, profit and loss account and cash flow statement.

Unit -IV	PROJECT MONITORING & CONTROL	9 Hrs

Precedence Diagramming Method (PDM), Project Monitoring & Control (Earned ValueConcepts), Uncertainty in Project Schedules (PERT)

Unit - V	PROJECT COST AND TIME CONTROL	9 Hrs

Monitoring the time progress and cost controlling measures in a construction project, Time costtrade-off process: direct and indirect project costs, cost slope, Process of crashing of activities, determination of the optimum duration of a project, updating of project networks, resources allocation.

Course Outcomes (CO):
Student will be able to

- Understand the basic concepts in Project Planning and Control with a focus on construction projects.
- Understand the current state of the project management profession.
- Provide a shared vision for what the project aims to accomplish.

Text books:

1. Project Management, Planning and Control: Managing Engineering, Construction and Manufacturing Projects to PMI, APM and BSI Standards 7th Edition by Eur Ing Albet Lester

2. Construction Project Scheduling and Control 3rd Edition by Saleh Mubarak

3. Project Control: Integrating Cost and Schedule in Construction by wayne J.del picoh

E-Resources:
https://archive.nptel.ac.in/courses/105/106/105106149/

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Water Supply Engineering

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0176T	3:1:0:0	4	CIE:30 SEE:70	3Hours	MINOR

Course Objectives:

- To impart knowledge on Water Requirements, Sources of Water
- To explain the theory of Conventional Treatment Processes
- To disseminate knowledge on Water Softening.
- To explain basic concepts of taste and Colour of water
- To describe the process of Reverse Osmosis, Electro dialysis.
- To explain the concepts of Transportation and Distribution of Water

Syllabus **Total Hours:48**

UNIT-I	**Introduction**	**10 Hrs**

Water Requirements, Sources of Water, Water Supply Considerations, Water Quality, Drinking Water Standards, Secondary Standards-Toxic Water Pollutants, Quality Criteria for Surface Water, Purpose of Water Treatment Selection of Water Processes, Water-Processing Sludges

UNIT-II	**Conventional Treatment Processes**	**10 Hrs**

Sedimentation, Type of Sedimentation, Zone Settling, filtration, Gravity Glandular-Media Filtration, Head Losses, Back Washing and Media Fluidization - Pressure Filters - Slow Sand Filters, Coagulationand Flocculation Coagulants, Coagulants, Coagulant Aids, Rapid Mixing Devices, Disinfection, Disinfection Methods, Cl2 Handling and Dosage, Control of Thms, Fluoridation, Defluorination.

UNIT-III	**Water Softening**	**10Hrs**

: Lime Soda Process Variations-Ion Exchange Softening and Nitrate Removal. Iron and Manganese Removal: Iron Corrosion, Water Stabilization-Cathodic Protection

UNIT-IV	**Taste and Odour**	**9Hrs**

Methods for Control, Aeration, Adsorption, Control of Algae Growth-Reduction of Dissolved Salts: Distillation, Reverse Osmosis, Electro dialysis.

UNIT-V	**Transportation and Distribution of Water**	**9Hrs**

Aqueducts, Hydraulic Consideration, Design of Transportation System, Distribution System Configuration, Distribution System Design and Analysis, Distribution Reservoirs and Service Storage.

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

- To understand the concept of Water Quality, Drinking Water Standards.
- To evaluate the Conventional Treatment Processes.
- To understand the methods of Water Softening.
- To describe the taste and Colour of drinking water.
- To understand the process of Reverse Osmosis, Electro dialysis.

Text Books:

1. Environmental Engineering (2015) by Peavy, Rowe and Tchobanoglous; Publisher - McGraw- Hill

2. Water Quality Engineering: Physical / Chemical Treatment Processes (2013), by Lawler and Benjamin; Publisher - John Wiley & Sons .

3. Water Supply and Pollution Control (2008) by Warren Viessman Jr. and Mark J. Hammer; Publisher: Pearson Education

Reference Books:

1 Viessman Jr., Mark J. Hammer: Water Supply and Pollution Control

2. Peavy H.S., Row D.R. and Tchobanaglous G.: "Environmental Engineering", Mc Graw Hill International Edition, 1988.

3. Fair, Gair, Okun: Water Supply Engineering, John Wiley, 1990.

E Resources: https://archive.nptel.ac.in/courses/105/105/105105201/

GEETHANJALI INSTITUTE OF SCIENCE &TECHNOLOGY

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Unit of USHODAYA EDUCATIONAL SOCIETY

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Railway Engineering

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0177T	3:1:0:0	4	CIE:30 SEE:70	3Hours	Minor

Course Objectives:

The objective of this course is to:

- Comprehend different parts of railway track and their functions.
- Teach track construction and engineering applications
- Explain different essential features and requirements of different types of crossings
- Demonstrate signaling system and maintenance of tracks

Syllabus — **TotalHours:48**

Unit-I	**Introduction to Indian Railways**	**10 Hrs**

History and Importance of Indian Railways Construction and Maintenance-Permanent Way - Components-Rails, sleepers, ballast-functions and requirements-Gauges, Types, Uniformity of Gauge-Different Gauges in Indian Railways -

Unit -II	**Alignment and Rail Sections**	**10Hrs**

Ideal Alignment-Standard Rail Sections-Causes and Effects of Creep-Measurement to Reduce Creep-Fixtures and Fastenings.

Unit -III	**Rail way signals**	**9Hrs**

Classification of Railway Signals –Semaphore Signals-Working Philosophy Of Semaphore Signal –Other Types Of Signals –Their Functions.

Unit -IV	**Railway Stations and Yards**	**10 Hrs**

Railway Stations and Yards: Purposes-Facilities Required at Railway Stations-Classification of Stations -Requirements Of Station Yard-Classification Of Yards –Terminals –Junctions –Layouts.

Unit -V	**Railway Control Systems**	**9Hrs**

Railway Control Systems: Introduction –Different Types of Control Systems –Absolute Block System –Automatic Block System –Operational Philosophy of these systems.

Course Outcomes (CO): Student will be able to

- Explain components of Railway track, different Gauges.
- Understanding about Alignment and Rail Sections
- Identify surface defects on Railway Track and their remedial measures
- Explain interlocking and modern signal systems.
- Understand purposes and facilities at railway stations.
- Understand Railway Control Systems

Text Books:

1.S. C. Saxena and S. P. Arora, “A Text book of Railway Engineering”, Dhanpatrai & Sons, Delhi.
2.C.Venkataramaiah., “Transportation Engineering (Vol –II)”, Universities Press Pvt Ltd, Hyderabad.

Reference Books:

1.Satish Chandra and M. M. Agarwal, “Railway Engineering”,Oxford University Press, New Delhi
2.R. Srinivasa Kumar, “Transportation Engineering”,Railways, Airports, Docks and HarborsUniversities Press Pvt Ltd, Hyderabad. 2014.
3.Vazirani & Chandola, “Transportation Engineering Vol I & II”
4.K. P. Subramanian, “Highway, Railway, Airport and Harbor Engineering”, Sci.Tech publishers.

E Resources: https://nptel.ac.in/courses/105107123