

**B.Tech. (CE)**  
**R19 Course Structure**

**R19 Course Structure for B.Tech.(CE) (With effect from 2019-2020)**

<b>I YEAR I SEMESTER</b>							
<b>S.No</b>	<b>Subject</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>I</b>	<b>E</b>
1	Communicative English	2	-	-	2	40	60
2	Mathematics-I	2	1	0	3	40	60
3	Engineering Physics	3	-	-	3	40	60
4	Computer Programming	3	1	-	4	40	60
5	English Communication Skills Lab	-	-	3	1.5	40	60
6	Engineering Physics Lab	-	-	3	1.5	40	60
7	Computer Programming Lab	-	-	3	1.5	40	60
8	Constitution of India	3	0	0	0	-	-
<b>Total</b>		<b>13</b>	<b>2</b>	<b>9</b>	<b>16.5</b>	<b>280</b>	<b>420</b>
						<b>700</b>	
<b>I YEAR II SEMESTER</b>							
<b>S.No</b>	<b>Subject</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>I</b>	<b>E</b>
1	Mathematics-II	2	1	-	3	40	60
2	Engineering Chemistry	3	-	-	3	40	60
3	Engineering Graphics & Design	1	-	3	2.5	40	60
4	Problem Solving & Programming & Using Python	3	1	-	4	40	60
5	Elements of Electrical & Electronics Engineering	3	1	-	4	40	60
6	Engineering Chemistry Lab	-	-	3	1.5	40	60
7	Problem Solving & Programming Lab	-	-	3	1.5	40	60
8	Electrical & Electrons Engineering Lab	-	-	3	1.5	40	60
9	Engineering Workshop	-	-	3	1.5	40	60
10	Environmental Science	3	-	-	-	-	-
<b>Total</b>		<b>15</b>	<b>3</b>	<b>15</b>	<b>22.5</b>	<b>360</b>	<b>540</b>
						<b>900</b>	

<b>II YEAR I SEMESTER</b>							
<b>S.No</b>	<b>Subject</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>I</b>	<b>E</b>
1	Mathematics-III(Numerical methods & Applied Statistics)	2	1	-	3	40	60
2	Building Materials & Construction	3	-	-	3	40	60
3	Engineering Geology	3	-	-	3	40	60
4	Surveying & Geomatics	3	-	-	3	40	60
5	Engineering Mechanics	3	-	-	3	40	60
6	Engineering Geology Lab	-	-	3	1.5	40	60
7	Surveying Lab	-	-	3	1.5	40	60
8	Business English Communication Lab	-	-	3	1.5	40	60
9	Quantitative Aptitude-I	3	-	-	-	-	-
<b>Total</b>		<b>17</b>	<b>1</b>	<b>9</b>	<b>19.5</b>	<b>320</b>	<b>480</b>
						<b>800</b>	
<b>II YEAR II SEMESTER</b>							
<b>S.No</b>	<b>Subject</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>I</b>	<b>E</b>
1	Strength of Materials-I	3	-	-	3	40	60
2	Concrete Technology	3	-	-	3	40	60
3	Fluid Mechanics	3	-	-	3	40	60
4	Managerial Economics & Financial Analysis	3	-	-	3	40	60
5	Structural Analysis	3	-	-	3	40	60
6	Solid Mechanics Lab	-	-	3	1.5	40	60
7	Concrete Technology Lab	-	-	3	1.5	40	60
8	Fluid Mechanics Lab	-	-	3	1.5	40	60
9	Logical Reasoning	-	-	2	1	40	60
<b>Total</b>		<b>15</b>	<b>-</b>	<b>11</b>	<b>20.5</b>	<b>360</b>	<b>540</b>
						<b>900</b>	

III YEAR I SEMESTER							
S.No	Subject	L	T	P	C	I	E
1	Design & Drawing of Reinforced Concrete Structures	4	-	2	3	40	60
2	Strength of Materials-II	3	-	-	3	40	60
3	Geo-Technical Engineering	3	-	-	3	40	60
4	Hydraulics and Hydraulic Machinery	3	-	-	3	40	60
<b>Professional Elective I</b>							
5	1.Remote sensing Geographical Information Systems	3	-	-	3	40	60
	2.Solid Waste Management						
	3.Advanced surveying						
	4.Green Building Technologies						
<b>Open Elective I</b>							
6	1.MAT LAB and Simulink For Engineers	3	-	-	3	40	60
	2.Data Structures						
	3.Principles of Electronic Communication Systems						
	4.AI Tools, Techniques and Applications						
7	Geo-Technical Engineering Lab	-	-	3	1.5	40	60
8	Advanced English Communication Skills Lab	-	-	3	1.5	40	60
9	Quantitative Aptitude -II	-	-	2	1	40	60
<b>Total</b>		<b>19</b>	<b>-</b>	<b>10</b>	<b>22</b>	<b>360</b>	<b>540</b>
						<b>900</b>	

III YEAR II SEMESTER							
S.No	Subject	L	T	P	C	I	E
1	Design& Drawing Steel Structures	4	-	-	3	40	60
2	Foundation Engineering	3	-	-	3	40	60
3	Transportation Engineering	3	-	-	3	40	60
<b>Professional Elective II</b>							
4	1. Building planning and drawing	3	-	-	3	40	60
	2.Railway and Airport Engineering						
	3.Construction Management						
	4.Infrastructure Planning and Design						
<b>Open Elective II</b>							
5	1. Solar Energy Systems	3	-	-	3	40	60
	2. Management Science						
	3.Internet of Things						
	4. Industrial Robotics						
6	Oops Through Java	3	-	-	3	40	60
7	Building planning and drawing through AutoCAD	-	-	3	1.5	40	60
8	Transportation Engineering Lab	-	-	3	1.5	40	60
<b>Total</b>		<b>19</b>	<b>-</b>	<b>6</b>	<b>21</b>	<b>320</b>	<b>480</b>
						<b>800</b>	

IV YEAR I SEMESTER							
S.No	Subject	L	T	P	C	I	E
1	Estimation & Costing	3	-	-	3	40	60
2	Environmental Engineering	3	-	-	3	40	60
3	Pre stressed Concrete	3	-	-	3	40	60
4	Water Resources Engineering	3	-	-	3	40	60
<b>Professional Elective III</b>							
5	1.Traffic Engineering and Management	3	-	-	3	40	60
	2.Geotextiles synthetics and application						
	3.Pavement Analysis and Design						
	4.Urban Transportation Planning						
<b>Professional Elective IV</b>							
6	1.Finite Element Methods	3	-	-	3	40	60
	2.Bridge Engineering						
	3.Elements of Earthquake Engineering						
	4.Repair and Rehabilitation of structures						
7	Environmental Engineering Lab	-	-	3	1.5	40	60
8	GIS and CAD Lab	-	-	3	1.5	40	60
9	Major Project Phase-I	-	-	6	2	20	30
10	Survey Camp Industrial Training/ Internship/ Research Projects in National Laboratories / Academic Institute	-	-	-	2	20	30
<b>Total</b>		<b>18</b>	<b>-</b>	<b>12</b>	<b>25</b>	<b>360</b>	<b>540</b>
						<b>900</b>	

IV YEAR II SEMESTER							
S.No	Subject	L	T	P	C	I	E
<b>Open Elective III/ MOOC *</b>							
1	1. Software Engineering	3	-	-	3	40	60
	2. Power Plant Engineering						
	3. Quality and Reliability Engineering						
	4.Cyber Security						
<b>Professional Elective V / MOOC*</b>							
2	1.Environmental Impact Assessment and life Cycle Analysis	3	-	-	3	40	60
	2.Air and Noise Pollution						
	3.Ground improvement techniques						
	4.Irrigation Drawing						
3	Major Project Phase-II	-	-	12	7	80	120
<b>Total</b>		<b>6</b>	<b>-</b>	<b>12</b>	<b>13</b>	<b>160</b>	<b>240</b>
						<b>400</b>	

\*Note: The MOOC subjects are to be selected from the state of the Art Technical Subjects, Identified by BOS, by the time the student reaches IV B.Tech

<b>Subject</b>	<b>Communicative English</b>				
<b>Year/Semester</b>	<b>I B.Tech./I Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2019-20</b>	<b>3</b>	<b>0</b>	<b>3</b>	<b>2</b>

**Introduction:**

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

As far as the detailed textbook is concerned, the focus should be on the skills of listening, speaking, reading and writing.

Thus the stress in the syllabus is primarily on the development of communicative skills and fostering of ideas.

**Objectives:**

- ❖ Adopt activity based teaching-learning methods to ensure that the learners would be engaged in the use of language both in the classroom and the laboratory sessions.
- ❖ Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers.
- ❖ Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials.
- ❖ Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations.
- ❖ Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information.
- ❖ Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing.

**Methodology:**

1. The class are to be learner-centered where the learners are to read the texts to get a comprehensive idea of those texts on their own with the help of the peer group and the teacher.
2. Integrated skill development methodology has to be adopted with focus on individual language skills as per the tasks/exercise.
3. The tasks/exercises at the end of each unit should be completed by the learners only and the teacher intervention is permitted as per the complexity of the task/exercise.
4. The teacher is expected to use supplementary material wherever necessary and also generate activities/tasks as per the requirement.
5. The teacher is permitted to use lecture method when a completely new concept is introduced in the class.

**Detailed Textbook:**

**Prescribed by JNTUK for Reading and Writing**

**Non-Detailed Textbook:**

**Wings of Fire: APJ Abdul Kalam**

## Syllabus:

### UNIT -I

**Reading:** Skimming to get the main idea of a text

**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 :** Nouns and Pronouns; textual words

#### Learning Outcomes

At the end of the module, the learners will be able to

- employ suitable strategies for skimming to get the general idea of a text
- recognize paragraph structure with beginnings/endings
- using correct word forms of nouns and pronouns and textual words

### UNIT -II

**Reading:** Scanning to look for specific pieces of information.

**Writing:** Writing sentences with proper word order - Basic Sentence Structures

**Grammar and Vocabulary:** Verbs - tenses; use of synonyms

#### Learning Outcomes

At the end of the module, the learners will be able to

- Employ suitable strategies for scanning to identify specific information from a text
- Write accurately using proper grammatical structures

### UNIT -III

**Reading:** Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

**Writing:** Paragraph writing using suitable cohesive devices; mechanics of writing - punctuation, capital letters.

**Grammar and Vocabulary:** Cohesive devices - linkers, sign posts and transition signals; use of articles and zero article; prepositions; use of synonyms

#### Learning Outcomes

At the end of the module, the learners will be able to

- write well structured paragraphs.
- understand the use of cohesive devices.

<p><b>Assignment-I:</b> Each Student is required to present a report on a problem faced by individuals or the society with an analysis and possible solutions. He/she has to make an oral presentation of it in the class before the completion of MID-I Examination. It is mandatory for all the students. It is for Internal Assessment.</p>
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## UNIT - IV

**Reading:** Note making; making notes from the text/material.

**Writing:** Types of Paragraph writing

**Grammar and Vocabulary :** Subject-verb agreement, Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of antonyms

### Learning Outcomes

At the end of the module, the learners will be able to

- make notes of the important information of a text
- understanding types of paragraphs
- use language appropriate adjective and adverbs for descriptions

## UNIT-V

**Reading:** Reading for comprehension.

**Writing:** Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions.

**Grammar and Vocabulary:** direct and indirect speech, reporting verbs for academic purposes. **Learning Outcomes**

At the end of the module, the learners will be able to

- write summaries based on global comprehension of reading/listening texts
- understand a paragraph

## UNIT - VI

**Reading:** Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships etc.

**Writing:** Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables.

**Grammar and Vocabulary:** Active Voice- Passive Voice; editing short texts – identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

### Learning Outcomes

At the end of the module, the learners will be able to

- interpret data from the given charts/tables/graphs
- edit short texts by correcting common errors

<p><b>Assignment-II:</b> Each Student is required to present the information regarding one novel prescribed in course. He/she has to make an oral presentation of it in the class before the completion of MID-II Examination. It is mandatory for all the students. It is for Internal Assessment.</p>
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## Course Outcomes:

### Student should able to learn:

1. Identify the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English.
2. Formulate sentences using proper grammatical structures and correct word forms
3. Speak clearly on a specific topic using suitable discourse markers in informal discussions.
4. Write summaries based on global comprehension of reading/listening texts.
5. Produce a coherent paragraph interpreting a figure/graph/chart/table.
6. Take notes while listening to a talk/lecture to answer questions.

### 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.

### Sample Web Resources

#### 1. Grammar/Listening/Writing

[1-language.com](http://1-language.com)

<http://www.5minuteenglish.com/>

<https://www.englishpractice.com/>

#### 2. Grammar/Vocabulary

[English Language Learning Online](http://www.bbc.co.uk/learningenglish/)

<http://www.bbc.co.uk/learningenglish/>

<http://www.better-english.com/>

<http://www.nonstopenglish.com/>

<https://www.vocabulary.com/>

[BBC Vocabulary Games](http://www.bbc.co.uk/learningenglish/)

[Free Rice Vocabulary Game](http://www.bbc.co.uk/learningenglish/)

#### 3. Reading

<https://www.usingenglish.com/comprehension/>

<https://www.englishclub.com/reading/short-stories.htm>

<https://www.english-online.at/>

#### 4. Listening

<https://learningenglish.voanews.com/z/3613>

<http://www.englishmedialab.com/listening.html>

#### 5. Speaking

<https://www.talkenglish.com/>

[BBC Learning English – Pronunciation tips](http://www.bbc.co.uk/learningenglish/)

[Merriam-Webster – Perfect pronunciation Exercises](http://www.merriam-webster.com/pronunciation-exercises/)

#### 6. All Skills

<https://www.englishclub.com/>

<http://www.world-english.org/>

<http://learnenglish.britishcouncil.org/>

Online Dictionaries

[Cambridge dictionary online](http://www.cambridge.org/9781107628881)

[MacMillan dictionary](http://www.macmillan.com/dictionary)

[Oxford learner's dictionaries](http://www.oxfordlearnersdictionaries.com/)

<b>Subject</b>	<b>Mathematics-I (Linear Algebra &amp; Calculus)</b>				
<b>Year/Semester</b>	<b>I B.Tech./I Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2019-20</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>

### Course Objectives:

To enable the students to

1. know the importance of matrices to solve linear equations using matrices
2. identify and solve various differential equations using corresponding methods
3. apply methods of solving higher order linear differential equations
4. comprehend the theory of maxima and minima of a function of two variables.
5. analyze the techniques of tracing the curves and evaluate the lengths, areas, volumes of objects using multiple integrals

### Syllabus:

#### UNIT –I

#### **MATRICES - LINEAR SYSTEM OF EQUATIONS**

Introduction, Different types of matrices, Rank-Echelon form - Normal form , Solution of a System of Linear Equations – Non-homogeneous and homogeneous equations, Gauss- Jordan method, Gauss – Elimination Method, LU Decomposition, Applications of electric circuits.

#### UNIT- II

#### **EIGEN VALUES - EIGEN VECTORS**

Eigen values - Eigen vectors – Properties– Cayley-Hamilton Theorem - finding inverse and power of a matrix by using Cayley-Hamilton theorem, Diagonalization of matrices, Spectral Decomposition, Principal Component Analysis and Singular Value Decomposition

#### UNIT –III

#### **DIFFERENTIAL EQUATIONS OF FIRST ORDER AND FIRST DEGREE**

Differential equations of first order and first degree–Exact and Non-exact differential equations, Linear and Bernoulli differential equations. Orthogonal trajectories, Newton’s Law of cooling, Law of natural growth and decay, L-R and R-C Circuits.

#### UNIT –IV

#### **LINEAR DIFFERENTIAL EQUATIONS OF HIGHER ORDER**

Higher order homogenous and non - homogenous linear differential equations with constant coefficients - Particular integrals for the functions of type  $e^{ax}$ ,  $\sin(ax+b)$ ,  $\cos(ax+b)$ , Polynomial of  $x$ ,  $e^{ax} V(x)$ , L-C-R Circuits.

#### UNIT – V

#### **PARTIAL DIFFERENTIATION**

Functions of several variables- Partial derivatives, Total derivative, Chain rule, Change of variables, Jacobians, Functional dependence. Generalized Mean Value theorem –Taylor’s theorem and Maclaurin’s theorem (without proof) for a function of two variables, Maxima and Minima of functions of two variables, Lagrange’s method of undetermined multipliers.

## UNIT –VI

### Multiple Integrals and Applications

Review of Curve tracing-Cartesian-Polar and Parametric curves

Multiple integrals - double integrals - change of variables (Cartesian and Polar coordinates), Change of order of integration and Evaluation of triple integrals, computing area, surface areas and volume.

#### Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 42<sup>nd</sup> Ed., Khanna Publishers, New Delhi, 2012
2. Erwin .Kreyszig, Advanced Engineering Mathematics, 9<sup>th</sup> Ed., Wiley, 2012

#### References:

1. T.K.V.Iyengar, B. Krishna Ghandhi, S. Ranganathan and M.V.S.S.N.Prasad, Engineering Mathematics, Volume-I, 12<sup>th</sup> Ed., S. Chand Publishers, 2014
2. B. V. Ramana, Engineering Mathematics, 4<sup>th</sup> Ed., Tata McGraw Hill, New Delhi, 2009
3. D. S. Chandrashekharaiyah, Engineering Mathematics, Volume 1, Prism Publishers, 2010
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, reprint, 2008.

#### Course Outcomes:

After completing this course, the students will be able to

1. Solve linear system of equations in engineering problems
2. Find Eigen values and Eigen vectors of a matrix in engineering studies.
3. Model engineering problems as differential equations and solve analytically.
4. Model engineering problems as a differential equations and solve analytically the higher order differential equations.
5. Find out local /global optimum of functions of several variables.
6. Compute areas, surface areas and volumes.

Subject	Engineering Physics				
Year/Semester	I B.Tech./I Sem	L	T	P	C
Regulation Year	2019-20	3	-	-	3

### COURSE OBJECTIVES:

1. To highlight the importance of physics concepts in Engineering & Technology.
2. To facilitate the students with the aid of advanced insight in the applied science.
3. To focus the real time applications of physics in Engineering fields.
4. To prepare the students to face the challenges in core fields with the support of physical principles.
5. To motivate the students to understand the Engineering Principles through basic ideas in Physics.

### Syllabus:

#### UNIT-I

##### MECHANICS

Basic laws of vectors and scalars-rotational frames-conservative forces-  $F = -\text{grad } V$ , torque and angular momentum - Newton's laws in inertial and linear accelerating non-inertial frames of reference-rotating frame of reference with constant angular velocity-concept of pseudo forces (Centrifugal and Coriolis forces)-qualitative explanation of Foucault's pendulum-rigid body-angular velocity vector-moment of inertia tensor, ex: rod executing conical motion with fixed center of mass-gravitation and Kepler's laws.

#### UNIT-II

##### ACOUSTICS

Classification of Sound waves- Weber–Fechner law – Sabine's formula- derivation using growth and decay method – Absorption coefficient and its determination –factors affecting acoustics of buildings and their remedies.

#### UNIT-III

##### ULTRASONICS

Production and detection of ultrasonics- acoustic grating -Non Destructive Testing – pulse echo system through transmission and reflection modes - applications

#### UNIT-IV

##### ELASTICITY

Concepts of elasticity, plasticity, strain hardening, failure (fracture / yielding); Idealization of one dimensional stress-strain curve; Generalized Hooke's law with and without thermal strains for isotropic materials; elastic constants and their relationships; Strain energy.

#### UNIT-V

##### HEAT TRANSFER

Transfer of heat energy –thermal expansion of solids and liquids -bimetallic strips-thermal conduction, convection and radiation and their fundamental laws; –heat conduction in solids –thermal conductivity - Forbe's and Lee's disc method: theory and experiment – applications (qualitative only): working principles of refrigerators, ovens and solar water heaters.

## UNIT-VI

### SENSORS

Sensors:(qualitative description only): Different types of sensors and applications; Strain and Pressure, sensors- Piezoelectric, magnetostrictive sensors, Fibre optic methods of pressure sensing; Temperature sensors - bimetallic strip, pyroelectric detectors, Hall-effect sensor, smoke and fire detectors

### Learning Resources

#### Text Books

1. D.Kleppner and Robert Kolenkow“An introduction to Mechanics”-II -Cambridge University Press,2015
2. Gaur R.K. and Gupta S.L., “Engineering Physics”- Dhanpat Rai publishers, 2012
3. M.N.Avadhanulu&P.G.Kshirsagar“A Text book of Engineering Physics”-S.Chand Publications,2017
4. Ian R Sinclair, Sensor and Transducers 3rd eds, 2001, Elsevier (Newnes)

#### Reference text books:

1. M K Varma “Introduction to Mechanics”-Universities Press-2015.
2. D.K. Bhattacharya and A. Bhaskaran, “Engineering Physics”- Oxford Publications-2015

<b>Subject</b>	<b>Computer Programming Using C</b>				
<b>Year/Semester</b>	<b>I B. Tech/I Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2019-20</b>	<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>

### Course Objectives:

1. Formulating algorithmic solutions to problems and implementing algorithms in C.
2. Notion of Operation of a CPU, Notion of an algorithm and computational procedure, editing and executing programs in Linux.
3. Understanding branching, iteration and data representation using arrays.
4. Modular programming and recursive solution formulation.
5. Understanding pointers and dynamic memory allocation.
6. Understanding miscellaneous aspects of C.

### Syllabus:

#### UNIT-I

#### FUNDAMENTALS OF COMPUTER AND COMPUTATIONAL THINKING

Computer Block Diagram, Computer Hardware, Data Representation in Memory, components, Programming Languages - Machine Language, Assembly Language, Low- and High-Level Languages, Procedural and Object-Oriented Languages, Application and System Software, Translators, Algorithms, Flowcharts, The Software Development Process.

#### UNIT-II

#### INTRODUCTION TO C PROGRAMMING

Identifiers, The main () Function, The printf () Function **Programming Style** - Indentation, Comments, Data Types, Arithmetic Operations, Expression

Types, Variables and Declarations, Negation, Operator Precedence and Associativity, Declaration Statements, Initialization.

**Assignment** - Implicit Type Conversions, Explicit Type Conversions (Casts), Assignment Variations, Mathematical Library Functions, Interactive Input, Formatted Output, Format Modifiers.

#### UNIT-III

#### CONTROL FLOW-RELATIONAL EXPRESSIONS - LOGICAL OPERATORS

**Selection:** if-else Statement, nested if, examples, Multi-way selection: switch, else-if, examples.

**Repetition:** Basic Loop Structures, Pretest and Posttest Loops, Counter-Controlled and Condition-Controlled Loops, The while Statement, The for Statement, Nested Loops, The do-while Statement.

#### UNIT-IV

#### ARRAYS & POINTERS

**Arrays:** One-Dimensional Arrays, Input and Output of Array Values, Array Initialization, Two-Dimensional Arrays, Larger Dimensional Arrays- Matrices

**Pointers:** Concept of a Pointer, Initialisation of pointer variables, passing by address, Dangling memory, address arithmetic, Dynamic memory management functions, command line arguments.

## UNIT-V

### MODULAR PROGRAMMING

Function and Parameter Declarations, Returning a Value, Classifications of Functions, Variable Scope, Variable Storage Class, Local Variable Storage Classes, Global Variable Storage Classes, Pass by Reference, Passing Addresses to a Function, Array as a Function arguments.

Case Study: Recursion - Mathematical Recursion, Recursion versus Iteration.

## UNIT-VI

### STRINGS & STRUCTURES

**Strings:** String Fundamentals, String Input and Output, String Processing, Library Functions.

**Structures:** Derived types, Structures declaration, Initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields.

### TEXT BOOKS:

1. ANSI C Programming, Gary J. Bronson, Cengage Learning.
2. Let us C Authentic Guide to C Programming Language by yashavant kanetkar.
3. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.

### REFERENCE BOOKS:

1. C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage.
2. Programming with C, Bichkar, Universities Press.
3. Programming in C, ReemaThareja, OXFORD.
4. C by Example, Noel Kalicharan, Cambridge.

### Course Outcomes:

1. Understand the basic terminology used in computer programming
2. Write, compile and debug programs in C language.
3. Use different data types in a computer program.
4. Design programs involving decision structures, loops and functions.
5. Explain the difference between call by value and call by reference
6. Understand the dynamics of memory by the use of pointers
7. Use different data structures and Strings.

<b>Name of the Lab</b>	<b>English Communication Skills Lab</b>				
<b>Year/Semester</b>	<b>I B. Tech/I Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2019-20</b>	<b>-</b>	<b>-</b>	<b>3</b>	<b>1.5</b>

## **English Language Communication Skills Lab**

### **Course Objectives**

1. To sensitize the nuances of English speech sounds.
2. To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking.
3. To improve the fluency in spoken English in different contexts.
4. To demonstrate the synchronization of verbal and non verbal communication.
5. To speak with clarity and confidence.
6. To enrich the persuasive skills.

### **List of Experiments:**

#### **MODULE – I**

**Listening:** Identifying the topic, the context and overall idea by listening to short audio texts and answering a series of questions.

Non Verbal Communication (2 sessions)

#### **MODULE – II**

**Listening:** Answering a series of questions about specific information after listening to audio texts.

Introduction to Phonetics – Sounds of English – Vowels and Consonants (3 sessions)

#### **MODULE – III**

**Listening:** Answering a series of questions about main idea and supporting ideas after listening to audio texts.

Reading with proper Stress and Intonation –Speech shadowing (3 sessions)

#### **MODULE– IV**

**Listening:** Listening for global comprehension and summarizing what is listened to.

Situational Dialogues/Role Plays, Just a Minute (4 sessions)

#### **MODULE– V**

Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others (2 sessions)

#### **MODULE – VI**

Formal oral presentations on topics from academic contexts - without the use of PPT slides. (3 sessions)

### **INFRASTRUCTURE:**

1. 60 computer systems for a class of 60 students.
2. LAN facility and English Language Software for self-study by learners.
3. Audio System
4. Projector

### **SYSTEM REQUIREMENT: Hardware Component**

1. P – IV Processor
2. Speed – 2.8 GHZ



3. RAM – 512 MB minimum
4. Hard Disk – 80 GB
5. Headphones of high quality

### **SUGGESTED SOFTWARE**

1. Cambridge Advanced Learners' English Dictionary with CD.
2. Grammar Made Easy by Darling Kindersley
3. Punctuation Made Easy by Darling Kindersley
4. Clarity Pronunciation Power – Part I
5. Clarity Pronunciation Power – part II
6. Oxford Advanced Learner's Compass, 7th Edition
7. DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.
8. MELL - K Van Solutions Software
9. TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
10. English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge
11. English Pronunciation in Use, Cambridge University Press
12. Technical Communication, OUP
13. Communication Skills, OUP

### **COURSE OUTCOMES**

The students will be able to:

1. Comprehend the importance of phonetics and interpret phonetic symbols, vowels and Consonants.
2. Describe the speech sounds – vowels and consonants, stress and intonation.
3. Enable writing situational dialogues and enact Role Play.
4. Exemplify the synchronization of verbal and non verbal communication through the JAM session.
5. Enrich presentation skills through oral presentations - prepared and extempore.
6. Develop oratory skills through Debate.

### **SUGGESTED READING**

1. Speaking English Effectively 2 nd Edition by Krishna Mohan and N. P. Singh, 2011. Macmillan Publishers India Ltd. Delhi.
2. Sasi Kumar, V & Dhamija, P.V. How to Prepare for Group Discussion and Interviews. Tata McGraw Hill
3. Hancock, M. 2009. English Pronunciation in Use. Intermediate. Cambridge: CUP
4. Spoken English: A Manual of Speech and Phonetics by R. K. Bansal & J. B. Harrison. 2013 Orient Blackswan. Hyderabad.
5. Hewings, M. 2009. English Pronunciation in Use. Advanced. Cambridge: CUP
6. Marks, J. 2009. English Pronunciation in Use. Elementary. Cambridge: CUP
7. Nambiar, K.C. 2011. Speaking Accurately. A Course in International Communication. New Delhi : Foundation
8. Soundararaj, Francis. 2012. Basics of Communication in English. New Delhi: Macmillan
9. Spoken English (CIEFL) in 3 volumes with 6 cassettes, OUP.
10. English Pronouncing Dictionary Daniel Jones Current Edition with CD.

<b>Name of the Lab</b>	<b>Engineering Physics Lab</b>				
<b>Year/Semester</b>	<b>I B. Tech/I Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2019-20</b>	<b>-</b>	<b>-</b>	<b>3</b>	<b>1.5</b>

### **List of Experiments:**

1. Determination of wavelength of a source-Diffraction Grating-Normal incidence
2. Newton's rings –Radius of Curvature of Plano Convex Lens.
3. Determination of thickness of a thin object using parallel interference fringes.
4. Determination/ of Rigidity modulus of a material- Torsional Pendulum.
5. Determination of Acceleration due to Gravity and Radius of Gyration- Compound Pendulum.
6. Melde's experiment – Transverse and Longitudinal modes.
7. Verification of laws of stretched string – Sonometer.
8. Determination of velocity of sound – Volume resonator.
9. L C R Series Resonance Circuit
10. Study of I/V Characteristics of Semiconductor diode
11. I/V characteristics of Zener diode
12. Thermistor characteristics – Temperature Coefficient
13. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
14. Energy Band gap of a Semiconductor p-n junction.
15. Hall Effect for semiconductor.

### **REFERENCE:**

1. Engineering Physics Lab Manual by Dr.Y. Aparna & Dr.K.Venkateswarao (V.G.S.Book links)
2. Physics Practical Manual, Lorven Publication.

<b>Name of the Lab</b>	<b>Computer Programming Lab</b>				
<b>Year/Semester</b>	<b>I B. Tech/I Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2019-20</b>	<b>-</b>	<b>-</b>	<b>3</b>	<b>1.5</b>

### Course Objectives:

1. Understand the basic concept of C Programming, and its different modules that includes conditional and looping expressions, Arrays, Strings, Functions, Pointers Structures.
2. Acquire knowledge about the basic concept of writing a program.
3. Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.
4. Use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.
5. Role of functions involving the idea of Modularity.

### EXERCISE - 1

#### BASICS

- a) What is an OS Command, Familiarization of Editors - vi, Emacs
- b) Using commands like mkdir, ls, cp, mv, cat, pwd, and man
- c) C Program to Perform Adding, Subtraction, Multiplication and Division of two numbers From Command line

### EXERCISE - 2

#### BASIC MATH

- a) Write a C Program to Simulate 3 Laws at Motion
- b) Write a C Program to convert Celsius to Fahrenheit and vice versa

### EXERCISE - 3

#### CONTROL FLOW – I

- a) Write a C Program to Find Whether the Given Year is a Leap Year or not.
- b) Write a C Program to Add Digits & Multiplication of a number

### EXERCISE – 4

#### CONTROL FLOW – II

- a) Write a C Program to Find Whether the Given Number is
  - i) Prime Number
  - ii) Armstrong Number

- b) Write a C program to print Floyd Triangle
- c) Write a C Program to print Pascal Triangle

### EXERCISE – 5

#### FUNCTIONS

- a) Write a C Program demonstrating of parameter passing in Functions and returning values.
- b) Write a C Program illustrating Fibonacci, Factorial with Recursion without Recursion

### EXERCISE – 6

#### CONTROL FLOW – III

- a) Write a C Program to make a simple Calculator to Add, Subtract, Multiply or Divide Using switch...case
- b) Write a C Program to convert decimal to binary and hex (using switch call function the function)

## EXERCISE – 7

### FUNCTIONS – CONTINUED

Write a C Program to compute the values of  $\sin x$  and  $\cos x$  and  $e^x$  values using Series expansion. (use factorial function)

## EXERCISE – 8

### ARRAYS

Demonstration of arrays

- a) Search-Linear.
- b) Sorting-Bubble, Selection.
- c) Operations on Matrix.

## EXERCISES - 9

### STRUCTURES

- a) Write a C Program to Store Information of a Movie Using Structure
- b) Write a C Program to Store Information Using Structures with Dynamically Memory Allocation
- c) Write a C Program to Add Two Complex Numbers by Passing Structure to a Function

## EXERCISE - 10

### ARRAYS AND POINTERS

- a) Write a C Program to Access Elements of an Array Using Pointer
- b) Write a C Program to find the sum of numbers with arrays and pointers.

## EXERCISE – 11

### DYNAMIC MEMORY ALLOCATIONS

- a) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc () function.
- b) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc () function.

Understand the difference between the above two programs

## EXERCISE – 12

### STRINGS

- a) Implementation of string manipulation operations with library function.
  - i) copy
  - ii) concatenate
  - iii) length
  - iv) compare
- b) Implementation of string manipulation operations without library function.
  - i) copy
  - ii) concatenate
  - iii) length
  - iv) compare

### Course Outcomes:

1. Apply and practice logical ability to solve the problem.
2. Understand C programming development environment, compiling, debugging and linking and executing a program using the development environment.
3. Analyzing the complexity of problems, modularize the problems into small modules and then convert them into programs.
4. Understand and apply the inbuilt functions and customized functions for solving the problems.
5. Understand and apply the pointers, memory allocation techniques.

<b>Subject</b>	<b>Constitution of India</b>				
<b>Year/Semester</b>	<b>I B. Tech/I Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2019-20</b>	<b>2</b>	<b>-</b>	<b>-</b>	<b>-</b>

### **COURSE OBJECTIVES:**

1. To train students in understanding the basic structure of Indian Constitution.
2. To prepare students to live better and happily with other fellow beings through the application of Fundamental Rights in their lives.

#### **UNIT-I**

##### **INTRODUCTION TO INDIAN CONSTITUTION**

Meaning of the term Indian Constitution –Preamble- Constituent Assembly- Salient Features of Indian Constitution

#### **UNIT-II**

##### **FUNDAMENTAL RIGHTS**

Fundamental Rights -Fundamental Duties -The Directive Principles of State Policy

#### **UNIT-III**

##### **UNION GOVERNMENT**

Union Government -Union Legislature (Parliament) -Lok Sabha and Rajya Sabha (with Powers and Functions) -Union Executive -President of India (with Powers and Functions) -Prime Minister of India (with Powers and Functions) -Union Judiciary (Supreme Court) -Jurisdiction of the Supreme Court

#### **UNIT-IV**

##### **STATE GOVERNMENT**

State Government -State Legislature (Legislative Assembly / Vidhan Sabha, Legislative Council / Vidhan Parishad) -Powers and Functions of the State Legislature -State Executive-Governor of the State (with Powers and Functions) -The Chief Minister of the State (with Powers and Functions) -State Judiciary (High Courts)

#### **UNIT-V**

##### **LOCAL SELF GOVERNANCE**

Powers and functions of Municipalities, Panchyats, ZP's and Co – Operative Societies

#### **UNIT-VI**

##### **SOVEREIGN BODIES**

Election Commission of India (with Powers and Functions) -The Union Public Service Commission (with Powers and Functions)

**BOOKS:**

1. Introduction to constitution of India, Durga Das Basu, Lexis Nexis Publications
2. Constitution of India by PROFESSIONAL BOOK PUBLISHERS
3. The Constitution of India by Arun K Tiru vengadam, Blooms bury publishers.
4. The constitution of India by PM Bakshi, Universal law publishing co
5. The Constitution of India by S.R. Bhansali, Universal law publishing co

**COURSE OUTCOMES:**

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

1. Examine salient features of Indian Constitution and live accordingly in society.
2. Interpret the meaning of Fundamental Rights and Directive Principles of State Policy and develop an attitude which paves the way for better living conditions.
3. Discover various aspects of Union Government legislation and live up to the expectations of the rules.
4. Critically examine State Government legislation and improve your living standards by following the rules strictly
5. Examine powers and functions of local bodies such as Municipalities and Panchayats and, take advantage of available resources for better living
6. Analyze the powers and functions of Election Commission and The Union Public Service
7. Commission and decide upon it for safe and secured life.

**I YEAR II SEMESTER  
CIVIL ENGINEERING  
R19 SYLLABUS**

<b>Subject</b>	<b>Mathematics II</b>				
<b>Year/Semester</b>	<b>I B. Tech/II Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2019-20</b>	<b>2</b>	<b>1</b>	<b>-</b>	<b>3</b>

### **COURSE OBJECTIVES:**

To enable the students to

1. make the students learn modeling various physical phenomena as first and second order PDE
2. learn techniques to solve as first and second order PDE .

### **Syllabus:**

#### **UNIT-I**

#### **FIRST ORDER PARTIAL DIFFERENTIAL EQUATIONS**

Formation of Partial differential equations by elimination of arbitrary constants and arbitrary functions– solutions of first order linear (Lagrange) equations and nonlinear equations-standard types

#### **UNIT- II**

#### **HIGHER ORDER PARTIAL DIFFERENTIAL EQUATIONS**

Solutions of Linear Partial differential equations with constant coefficients. RHS terms of the type  $e^{ax+by}$ ,  $\sin(ax+by)$ ,  $\cos(ax+by)$ ,  $x^m y^n$ . Classification of second order partial differential equations- parabolic, elliptical and hyperbolic.

#### **UNIT-III**

#### **APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS**

Method of Separation of Variables-Applications to wave equation, heat conduction equation in one dimensions and Laplace equation in two dimensions

#### **UNIT-IV**

#### **LAPLACE TRANSFORMS**

Laplace transform-Definition-conditions for existence,– Linear Property -Shifting Theorems, Laplace transform of Standard Functions-Transforms of derivatives and integrals–Unit step function–Dirac delta function. Inverse Laplace transforms by Partial fractions–Convolution theorem (without proof) – inverse by convolution,Solving ordinary differential equations with constant coefficients.

#### **UNIT-V**

#### **VECTOR DIFFERENTIATION**

Vector Differentiation - Scalar and Vector Fields, Level surfaces, Directional Derivative, Gradient of a Scalar Field, Divergence, Curl of a vector field and applications , Vector Identities

#### **UNIT-VI**

#### **VECTOR INTEGRATION**

Vector Integration - Line integral, work done, areas, Surface integrals.

Vector integral theorems - Green's theorem, Stokes theorem and Gauss Divergence theorem (All theorems without proof) and applications areas ,surface areas and volumes.



**Text Books:**

3. B. S. Grewal, Higher Engineering Mathematics, 42nd Ed., Khanna Publishers, New Delhi, 2012
4. Erwin .Kreyszig, Advanced Engineering Mathematics, 9th Ed., Wiley, 2012

**References:**

5. T.K.V.Iyengar, B. Krishna Gandhi, S. Ranganathan and M.V.S.S.N.Prasad, Engineering Mathematics, Volume-I, 12<sup>th</sup> Ed., S. Chand Publishers, 2014
6. B. V. Ramana, Engineering Mathematics, 4<sup>th</sup> Ed., Tata McGraw Hill, New Delhi, 2009
7. D. S. Chandrashekharaiyah, Engineering Mathematics, Volume 1, Prism Publishers, 2010
8. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, reprint, 2008

**Course Outcomes:**

After completing this course, the students will be able to

1. model first order linear and non-linear partial differential equations and solve analytically.
2. model higher order homogeneous & non homogeneous linear partial differential equations and solve analytically.
3. model physical problems of engineering like steady and unsteady heat conduction, vibration of string.
4. use of Laplace transforms in solving the differential equations with the initial and boundary conditions.
5. understand electric and magnetic fields and their physical significance.
6. compute line, surface and volume integrals and evaluate the work done, flux, potential functions.

<b>Subject</b>	<b>Engineering Chemistry</b>				
<b>Year/Semester</b>	<b>I B. Tech/II Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2019-20</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>

### **COURSE OBJECTIVES:**

1. Plastics are nowadays used in household appliances; also they are used as composites in aerospace and automotive industries.
2. Fuels as a source of energy are a basic need of any industry, particularly industries like thermal power stations, steel industry, fertilizer industry etc., and hence they are introduced.
3. The basics for the construction of galvanic cells are introduced. Also if corrosion is to be controlled, one has to understand the mechanism of corrosion which itself is explained by electrochemical theory.
4. With the increase in demand, a wide variety of materials are coming up; some of them have excellent engineering properties and a few of these materials are introduced.
5. Water is a basic material in almost all the industries, more so where steam is generated and also where it is supplied for drinking purposes.
6. Materials used in major industries like steel industry, metallurgical industries and construction industries and electrical equipment manufacturing industries are introduced.

### **Syllabus:**

#### **UNIT I**

#### **HIGH POLYMERS AND PLASTICS**

Polymerization : Introduction- Methods of polymerization --Thermoplastics and Thermosetting plastics – Compounding and fabrication (4/5 techniques)- Preparation, properties and applications of polyethylene, PVC, Bakelite Teflon. Conducting polymers, Fiber Reinforced Plastics and Biodegradable Polymers.

**Elastomers** – Natural rubber - vulcanization – Synthetic rubbers : Buna S, Buna N and Thiokol – Applications of elastomers.

#### **UNIT II**

#### **FUEL TECHNOLOGY**

**Fuels:-** Introduction – Calorific value - HCV and LCV – Bomb calorimeter – Numerical problems – Coal – Proximate and ultimate analysis –Significance of the analyses – Liquid fuels – Petroleum- Refining – Cracking – Petrol knocking – Diesel knocking - Octane and Cetane ratings – Anti-knock agents –Gaseous fuels – Natural gas, LPG and CNG. Biofuels- Biodiesel and Power alcohol

#### **UNIT III**

#### **ELECTROCHEMICAL CELLS AND CORROSION**

Galvanic cells (Construction and working) – Electro chemical series and uses of this series- Standard electrodes (Hydrogen and Calomel electrodes) Batteries: Dry Leclanche Cell - Ni-Cd cells - Li cells.

**Corrosion:-** Definition – Theories of Corrosion (dry and wet) – Formation of galvanic cells by different metals, differential aeration - waterline corrosion – Pitting corrosion - Factors which influence the rate of corrosion - Protection from corrosion: Methods of application on metals (Galvanizing, Tinning, Electroplating, Electroless plating).

## UNIT- IV

### CHEMISTRY OF ADVANCED MATERIALS

**Nano materials:-** Introduction- Top down and Bottom up approach – Carbon nano tubes and fullerenes: Characterization of nonmaterials by BET and TEM methods- self assembled layers- Types, Preparation (Arc discharge Laser ablation and Chemical Vapour Deposition methods) properties and applications.

**Liquid crystals:** - Introduction – Types – Applications

**Superconductors:** - Type-I & Type-II, properties & applications.

**Green synthesis:** - Principles – Aqueous phase method, Super critical fluid extraction and Biocatalytic methods of synthesis with examples.

## UNIT -V

### WATER TECHNOLOGY

Hard water: - units of hardness – Boiler troubles-Priming and foaming, Caustic embrittlement, Scale and Sludge formation - Softening of Hard water: Lime – Soda process, Zeolite process and Ion Exchange process Reverse Osmosis and Electro Dialysis.

Potable water- Sterilization and disinfection of water- Break point of chlorination- BIS and WHO standards.

## UNIT -VI

### CHEMISTRY OF ENGINEERING MATERIALS AND FUEL CELLS

**Refractories:** - Definition, classification, properties of refractories.

**Lubricants:** - Definition and mechanism of lubricants.

**Cement:** - Constituents, manufacturing, setting and hardening of cement- Decay of cement.

**Insulators:** - Thermal and electrical insulators - Applications.

**Fuel cells:** - Hydrogen Oxygen fuel cells – Methanol Oxygen fuel cells.

#### Standard Books:

1. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publishing Co.
2. Engineering Chemistry by Shikha Agarwal; Cambridge University Press, 2015 edition.

#### Reference Books:

1. Engineering Chemistry by Prasanth Rath, Cengage Learning, 2015 edition.
2. A text book of engineering Chemistry by S. S. Dara; S. Chand & Co Ltd., Latest Edition

### COURSE OUTCOMES:

1. The advantages and limitations of plastic materials and their use in design would be understood.
2. Fuels which are used commonly and their economics, advantages and limitations are discussed.
3. Reasons for corrosion and some methods of corrosion control would be understood.
4. The students would be now aware of materials like nano materials and fullerenes and their uses. Similarly liquid crystals and superconductors are understood.

The importance of green synthesis is well understood and how they are different from conventional methods is also explained.

5. The impurities present in raw water, problems associated with them and how to avoid them are understood
6. The commonly used industrial materials are introduced.

<b>Subject</b>	<b>Engineering Graphics and Design</b>				
<b>Year/Semester</b>	<b>I B. Tech/II Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2019-20</b>	<b>2</b>	<b>-</b>	<b>3</b>	<b>2.5</b>

**COURSE OBJECTIVE:**

1. Engineering drawing being the principle method of communication for engineers, the objective is to introduce the students, the techniques of constructing the various types of polygons, curves and scales.
2. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

**Syllabus:**

**UNIT I**

**Objective:** To introduce the students to use drawing instruments and to draw polygons, Engg. Curves.

**Polygons:** Construction of regular polygons by general methods, inscribing and describing polygons on circles.

**Curves:** Ellipse, Parabola and Hyperbola by general methods, Tangent & Normal, and Ellipse by Oblong Method and Arcs of Circles Method. Cycloids, Involute, tangent & normal for the curves.

**UNIT II**

**Objective:** To introduce the students to use scales and orthographic projections, projections of points & simple lines.

**Scales:** Plain scale, Diagonal scale and Vernier scale.

**Orthographic Projections:** Introduction to Projections, Horizontal plane, Vertical plane, Profile plane, importance of reference lines.

**Projections of points** in various quadrants.

**UNIT III**

**Objective:** The objective is to make the students draw the projections of the lines inclined to both the planes.

**Projections of straight lines** inclined to one plane, inclined to both the planes, traces

**UNIT IV**

**Objective:** The objective is to make the students draw the projections of the plane inclined to both the planes.

**Projections of planes:** inclined to one reference plane; inclined to both the reference planes.

## UNIT V

**Objective:** The objective is to make the students draw the projections of the various types of solids in different positions inclined to one of the planes.

**Projections of Solids** – Projections of Prisms, Pyramids, Cones and Cylinders simple positions, the axis inclined to one of the reference planes and axis inclined to both the reference planes.

## UNIT VI

**Objective:** The objective is to represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa.

Conversion of isometric views to **ORTHOGRAPHIC** views;

Conversion of orthographic views to **ISOMETRIC** views

### **COURSE OUTCOMES:**

Upon successful completion of this course, the student shall be able to:

1. Understand and construct the polygons and curves in engineering applications.
2. Visualize objects in 3D space and draw Orthographic Projections.
3. Interpret Orthographic and Isometric views of objects.

### **TEXT BOOKS:**

1. Engineering Drawing by N.D. Bhatt, Charotar Publishing House Pvt. Ltd
2. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill
3. Engineering Drawing + AutoCAD by K. Venugopal, V. Prabhu Raja, New Age

### **REFERENCE BOOKS:**

1. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publications
2. Engineering Graphics for Degree by K.C. John, PHI Learning
3. Engineering Graphics by PI Varghese, McGrawHill Publishers.
4. Engineering Drawing by P.S. Gill, S.K. Kataria & Sons

<b>Subject</b>	<b>Problem Solving and Programming using Python</b>				
<b>Year/Semester</b>	<b>I B. Tech/II Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2019-20</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>

### OBJECTIVES:

- Introduction to Scripting Language
- Exposure to various problems solving approaches of computer science

### Syllabus:

#### UNIT – I

**Introduction:** History of Python, Need of Python Programming, Applications Basics of Python Programming Using the REPL(Shell), Running Python Scripts, Variables, Assignment, Keywords, Input-Output, Indentation.

#### UNIT – II

**Types, Operators and Expressions:** Types - Integers, Strings, Booleans; Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations Control Flow- if, if-elif-else, for, while, break, continue, pass

#### UNIT – III

**Data Structures** Lists - Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences. Comprehensions.

#### UNIT – IV

**Functions** - Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions(Function Returning Values), Scope of the Variables in a Function - Global and Local Variables.

**Modules:** Creating modules, import statement, from. Import statement, name spacing,

**Python packages,** Introduction to PIP, Installing Packages via PIP, Using Python Packages

#### UNIT – V

**Object Oriented Programming OOP in Python:** Classes, 'self variable', Methods, Constructor Method, Inheritance, Overriding Methods, and Data hiding.

**Error and Exceptions:** Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User Defined Exceptions

#### UNIT – VI

**Brief Tour of the Standard Library** - Operating System Interface - String Pattern Matching, Mathematics, Internet Access, Dates and Times, Data Compression, Multithreading, GUI Programming, Turtle Graphics  
**Testing:** Why testing is required?, Basic concepts of testing, Unit testing in Python, Writing Test cases, Running Tests.

### OUTCOMES:

- Making Software easily right out of the box.
- Experience with an interpreted Language.
- To build software for real needs.
- Prior Introduction to testing software

### **TEXT BOOKS**

1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
2. Learning Python, Mark Lutz, Orielly

### **Reference Books:**

1. Think Python, Allen Downey, Green Tea Press
2. Core Python Programming, W.Chun, Pearson.
3. Introduction to Python, Kenneth A. Lambert, Cengage
4. Python Cookbook, O Reilly, David Beazley and Brian k.Jones

Subject	Elements of Electrical & Electronics Engineering				
Year/Semester	I B. Tech/II Sem	L	T	P	C
Regulation Year	2019-20	3	-	-	4

### Course Objectives:

This course covers the topics related to analysis of various electrical circuits, operation of various electrical machines, various electronic components to perform well in their respective fields.

### Learning Objectives:

1. To learn the basic principles of electrical law's and analysis of networks.
2. To understand the principle of operation and construction details of DC machines.
3. To understand the principle of operation and construction details of transformer.
4. To study the operation of PN junction diode, half wave, full wave rectifiers and OP-AMPs.
5. To learn the operation of PNP and NPN transistors and various amplifiers.

### Syllabus:

#### UNIT - I

##### DC CIRCUITS:

Electrical circuit elements (R - L and C) - Ohm's-Law, Kirchhoff laws - Series and parallel connection of resistances with DC excitation. Mesh Analysis and Nodal Analysis. Superposition Theorem

#### UNIT - II

##### AC CIRCUITS :

Representation of sinusoidal waveforms - peak and rms values - phasor representation - real power - reactive power - apparent power - power factor - Analysis of single-phase ac circuits consisting of RL - RC - RLC series circuits.

#### UNIT - III

##### 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 Motor

#### UNIT - IV

##### AC MACHINES:

Principle and operation of Single Phase Transformer - OC and SC test on transformer - principle and operation of Induction Motor [ Elementary treatment only ]

#### UNIT V

##### RECTIFIERS & LINEAR ICs:

PN junction diodes, diode applications (Half wave and bridge rectifiers). Characteristics of operation amplifiers (OP- AMP) - application of OP-AMPs (inverting, non inverting, integrator and differentiator).

#### UNIT VI

##### TRANSISTORS:

PNP and NPN junction transistor, transistor as an amplifier, single stage CE Amplifier, frequency response of CE amplifier, concepts of feedback amplifier.



**TEXT BOOKS:**

1. Electronic Devices and Circuits, R.L. Boylestad and Louis Nashelsky, 9th edition, PEI/PHI 2006.
2. Electrical Technology by Surinder Pal Bali, Pearson Publications.
3. Electrical Circuit Theory and Technology by John Bird, Routledge Taylor & Francis Group

**REFERENCE BOOKS:**

1. Basic Electrical Engineering by M.S.Naidu and S.Kamakshiah, TMH Publications.
2. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI Publications, 2nd edition.
3. Basic Electrical Engineering by Nagsarkar, Sukhija, Oxford Publications, 2nd edition.
4. Industrial Electronics by G.K. Mittal, PHI.

**COURSE OUTCOMES:**

1. Able to analyse the various electrical networks.
2. Able to understand the operation of DC generators, 3-point starter and conduct the Swinburne's Test.
3. Able to analyse the performance of transformer.
4. Able to analyse the operation of half wave, full wave rectifiers and OP- AMPS.
5. Able to explain the single stage CE amplifier and concept of feedback amplifier.

Name of the Lab	Engineering Chemistry Lab				
Year/Semester	I B. Tech/II Sem	L	T	P	C
Regulation Year	2019-20	-	-	3	1.5

### List of Experiments

1. Trial experiment - Determination of HCl using standard  $\text{Na}_2\text{CO}_3$  solution.
2. Determination of alkalinity of a sample containing  $\text{Na}_2\text{CO}_3$  and NaOH.
3. Determination of  $\text{KMnO}_4$  using standard Oxalic acid solution.
4. Determination of Copper using standard  $\text{K}_2\text{Cr}_2\text{O}_7$  solution.
5. Determination of temporary and permanent hardness of water using standard EDTA solution.
6. Determination of Vitamin – C
7. Determination of  $\text{P}^{\text{H}}$  of the given sample solution using  $\text{P}^{\text{H}}$  meter.
8. Conductometric titration between strong acid and strong base.
9. Potentiometric titration between strong acid and strong base.
10. Estimation of copper by Colorometry
11. Estimation of KCl by Ion exchange resin method.
12. Photo Chemical Reduction of Ferric Salt (Blue-Printing)
13. Adsorption of acetic acid on charcoal.
14. Determination of rate of corrosion.
15. Preparation of a polymer.

### Reference Books:

1. A Textbook of Quantitative Analysis, Arthur J. Vogel.
2. Dr. Jyotsna Cherukuris (2012) Laboratory Manual of engineering chemistry-II, VGS Techno Series
3. Chemistry Practical Manual, Lorven Publications
4. Practical Engineering Chemistry, K. Mukkanti (2009) B.S. Publication

**Outcomes:** The students entering into the professional course have practically very little exposure to lab classes. The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations; then they are exposed to a few instrumental methods of chemical analysis. Thus at the end of the lab course, the student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.

Name of the Lab	Problem Solving and Programming Lab				
Year/Semester	I B. Tech/II Sem	L	T	P	C
Regulation Year	2019-20	-	-	3	1.5

## List of Experiments

### Exercise 1 – Basics

- Running instructions in Interactive interpreter and a Python Script
- Write a program to purposefully raise Indentation Error and correct it

### Exercise 2 – Operations

- Write a program to compute distance between two points taking input from the user (Pythagorean Theorem)
- Write a program add.py that takes 2 numbers as command line arguments and prints its sum.

### Exercise - 3 Control Flow

- Write a Program for checking whether the given number is a even number or not.
- What is sequence? Write a program using a for loop that loops over a sequence.
- Write a Program to print the multiplication table of a number using for loop.
- Write a program using a while loop to count the number of digits of a number.

### Exercise 4 - Control Flow – Continued

- Find the sum of all the primes below two million.  
Hint: Make use of sieve of erathosenes

Fibonacci series:

Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be:

1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ...

- By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.

Hint: Use recursive formula for even Fibonacci numbers.

### Exercise - 5 – DS

- Write a program to get unique values from list.
- Write a program to count the number of vowels in a string using sets.

### Exercise - 6 DS - Continued

- Write a program to count the numbers of characters (character frequency) in the string and store them in a dictionary data structure
- Write a program to use split and join methods in the string and trace a birthday with a dictionary data structure.

### **Exercise - 7 Files**

- a) Write a program to print each line of a file in reverse order.
- b) Write a program to compute the number of characters, words and lines in a file.

### **Exercise - 8 Functions**

a) Write a function `ball_collide` that takes two balls as parameters and computes if they are colliding. Your function should return a Boolean representing whether or not the balls are colliding.

Hint: Represent a ball on a plane as a tuple of  $(x, y, r)$ ,  $r$  being the radius

If  $(\text{distance between two balls centers}) \leq (\text{sum of their radii})$  then (they are colliding)

b) Find mean, median, mode for the given set of numbers in a list.

### **Exercise - 9 Functions – Continued**

a) Write a function `nearly_equal` to test whether two strings are nearly equal. Two strings `a` and `b` are nearly equal when `a` can be generated by a single mutation on `b`.

b) Write a function `dups` to find all duplicates in the list.

### **Exercise - 10 - Functions - Problem Solving**

a) Write a function `cumulative_product` to compute cumulative product of a list of numbers.

b) Write a function `reverse` to reverse a list. Without using the `reverse` function.

c) Write function to compute `gcd`, `lcm` of two numbers. Each function shouldn't exceed one line.

### **Exercise 11 - Multi-D Lists**

a) Write a program that defines a matrix and prints

b) Write a program to perform addition of two square matrices

c) Write a program to perform multiplication of two square matrices

### **Exercise - 12 – Modules**

a) Install packages `requests`, `flask` and explore them. using `(pip)`

b) Write a script that imports `requests` and fetch content from the page. Eg. (Wiki)

c) Write a simple script that serves a simple `HTTPResponse` and a simple `HTML Page`

### **Exercise - 13 OOP**

a) Class variables and instance variable and illustration of the self variable

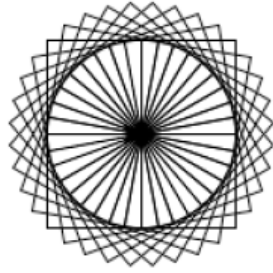
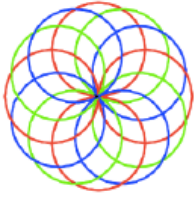
i) Robot

ii) Hospital Billing System

### **Exercise - 14 GUI, Graphics**

1. Write a GUI for an Expression Calculator using `tk`

2. Write a program to implement the following figures using `turtle`



**Exercise - 15 - Testing**

- a) Write a test-case to check the function `even_numbers` which return True on passing a list of all even numbers
- b) Write a test-case to check the function `reverse_string` which returns the reversed string

**Exercise - 16 - Advanced**

- a) Build any one classical data structure.
- b) Write a program to solve knapsack problem.

<b>Name of the Lab</b>	<b>Electrical &amp; Electronics Engineering Lab</b>				
<b>Year/Semester</b>	<b>I B. Tech/II Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2019-20</b>	<b>-</b>	<b>-</b>	<b>3</b>	<b>1.5</b>

The following experiments are required to be conducted as compulsory experiments:

#### **SECTION A: ELECTRICAL ENGINEERING**

1. Verification of Kirchhoff's Laws
2. Verification of Superposition Theorem.
3. Swinburne's test on D.C. Shunt machine (Predetermination of efficiency of a given D.C. Shunt machine working as motor and generator).
4. OC and SC tests on single phase transformer (Predetermination of efficiency and regulation at given power factors).
5. Speed control of D.C. Shunt motor by
  - a) Armature Voltage control b) Field flux control method
6. Brake test on D.C. Shunt Motor.

#### **SECTION B: ELECTRONICS ENGINEERING**

1. PN junction Diode characteristics A. Forward bias, B. Reverse bias. (Cut in voltage & Resistance calculations)
2. Transistor CE Characteristics (Input and Output).
3. Full wave Rectifier with and without filters.
4. CE Amplifiers.

Name of the Lab	Engineering Workshop				
Year/Semester	I B. Tech/II Sem	L	T	P	C
Regulation Year	2019-20	-	-	3	1.5

### **COURSE OBJECTIVE:**

- To impart hands-on practice on basic engineering trades and skills.

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

### **TRADES:**

#### **Carpentry**

1. T-Lap Joint
2. Cross Lap Joint
3. Dovetail Joint
4. Mortise and Tenon Joint

#### **Fitting**

1. Vee Fit
2. Square Fit
3. Half Round Fit
4. Dovetail Fit

#### **Black Smithy**

1. Round rod to Square
2. S-Hook
3. Round Rod to Flat Ring
4. Round Rod to Square headed bolt

#### **House Wiring**

1. Parallel / Series Connection of three bulbs
2. Stair Case wiring
3. Florescent Lamp Fitting
4. Measurement of Earth Resistance

#### **Tin Smithy**

1. Taper Tray
2. Square Box without lid
3. Open Scoop
4. Funnel

<b>Subject</b>	<b>Environmental Science</b>				
<b>Year/Semester</b>	<b>I B. Tech/II Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2019-20</b>	<b>3</b>	<b>-</b>	<b>-</b>	<b>-</b>

### **COURSE OBJECTIVES:**

1. To make the students get awareness on environment,
2. To understand the importance of protecting natural resources,
3. 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:**

#### **UNIT – I**

#### **MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL SCIENCE AND ECOSYSTEMS**

Definition, Scope and Importance and sustainability – Need for public awareness- Human population and Environment.

Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem. – Types of ecosystems- Forest, Grassland, Desert and Aquatic ecosystems- Food chains, food webs and ecological pyramids.

#### **UNIT – II**

#### **NATURAL RESOURCES**

Forest resources: Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people

Water resources: Conflicts over water, dams – benefits and problems

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.

Energy resources: Growing energy needs- renewable and non-renewable energy sources.

Food resources – World food problems

Land resources- Wasteland reclamation.

Role of an individual in conservation of natural resources.

#### **UNIT – III**

#### **BIODIVERSITY AND ITS CONSERVATION**

Definition: Genetic, species and ecosystem diversity- classification - Value of biodiversity: consumptive use, productive use, social - Biodiversity at national and local levels. Hot-spots of biodiversity - Threats to biodiversity - Endangered and endemic species of India - conservation of biodiversity.

#### **UNIT – IV**

#### **ENVIRONMENTAL POLLUTION**

Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies.

Solid Waste Management: Sources, effects and control measures of urban and industrial solid wastes.

Biomedical and e - waste management.

Global Environmental Challenges: Global warming and climate change, acid rains, ozone layer depletion.



## UNIT – V

### **SOCIAL ISSUES AND THE ENVIRONMENT**

Urban problems related to energy -Water conservation, rain water harvesting-Resettlement and rehabilitation of people. Environmental Protection Act –Air Act. –Water Act - Wildlife Protection Act - Forest Conservation Act- Public awareness.

International protocols: Stockholm and Rio Summit, Kyoto protocol and Montreal protocol.

## UNIT – VI

### **ENVIRONMENTAL MANAGEMENT**

Impact Assessment and its significance - various stages of EIA- Environmental audit, Ecotourism.

The student Visit of an Industry / Ecosystem.

#### **TEXT BOOKS:**

1. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi.
2. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
3. Environmental Studies, R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.

#### **REFERENCE BOOKS:**

1. Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawad
2. Text Book of Environmental Studies, Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
3. Text book of Environmental Science and Technology – Dr. M. Anji Reddy , BS Publications
4. Environment Studies, Anubha Kaushik, C P Kaushik, New Age International Publishers, 2014
5. Environmental Studies, P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai

#### **COURSE OUTCOMES:**

Students will be able to

1. Articulate the basic structure, functions, and processes of key social systems affecting the environment.
2. Explain how Natural resources should be used.
3. Identify the threats to biodiversity.
4. Understand Causes, effects and control measures of environmental pollution.
5. Gain knowledge about watershed management and environmental ethics.
6. Gain a rigorous foundation in various scientific disciplines as they apply to environmental science, such as ecology, evolutionary biology, hydrology, and human behavior.

**Course Structure – R19**  
**(With effect from 2019-2020)**

**I Year - I Semester**

S.No	Category	Course Title	L	T	P	C	IM	EM	TM
1	HS	Communicative English	2	-	-	2	40	60	100
2	BS	Mathematics-I	2	1	0	3	40	60	100
3	BS	Engineering Physics	3	-	-	3	40	60	100
4	ES	Computer Programming	3	1	-	4	40	60	100
5	HS	English Communication Skills Lab	-	-	3	1.5	40	60	100
6	BS	Engineering Physics Lab	-	-	3	1.5	40	60	100
7	ES	Computer Programming Lab	-	-	3	1.5	40	60	100
8	MC	Constitution of India	3	0	0	0	-	-	-
<b>Total</b>			<b>13</b>	<b>2</b>	<b>9</b>	<b>16.5</b>	<b>280</b>	<b>420</b>	<b>700</b>

**I Year - II Semester**

S.No	Category	Course Title	L	T	P	C	IM	EM	TM
1	BS	Mathematics-II	2	1		3	40	60	100
2	BS	Engineering Chemistry	3	-		3	40	60	100
3	ES	Engineering Graphics & Design	1	-		2.5	40	60	100
4	ES	Problem Solving & Programming & Using Python	3	1		4	40	60	100
5	ES	Elements of Electrical & Electronics Engineering	3	1		4	40	60	100
6	BS	Engineering Chemistry Lab	-	-		1.5	40	60	100
7	ES	Problem Solving & Programming Lab	-	-		1.5	40	60	100
8	ES	Electrical & Electrons Engineering Lab	-	-	3	1.5	40	60	100
9	LC	Engineering Workshop	-	-	3	1.5	40	60	100
10	MC	Environmental Science	3	-	-	-	-	-	-
<b>Total</b>			<b>15</b>	<b>3</b>	<b>15</b>	<b>22.5</b>	<b>360</b>	<b>540</b>	<b>900</b>

**II Year - I Semester**

S.No	Category	Course Title	L	T	P	C	IM	EM	TM
1	BS	Mathematics-III (Numerical methods & Applied Statistics)	2	1	-	3	40	60	100
2	PC	Building Materials & Construction	3	-	-	3	40	60	100
3	PC	Engineering Geology	3	-	-	3	40	60	100
4	PC	Surveying & Geomatics	3	-	-	3	40	60	100
5	ES	Engineering Mechanics	3	-	-	3	40	60	100
6	PC	Engineering Geology Lab	-	-	3	1.5	40	60	100
7	PC	Surveying Lab	-	-	3	1.5	40	60	100
8	BS	Business English Communication Lab	-	-	3	1.5	40	60	100
9	BS	Quantitative Aptitude-1	3	-	-	-	-	-	-
<b>Total</b>			<b>17</b>	<b>1</b>	<b>9</b>	<b>19.5</b>	<b>320</b>	<b>480</b>	<b>800</b>

**II Year - II Semester**

S.No	Category	Course Title	L	T	P	C	IM	EM	TM
1	PC	Strength of Materials-1	3	-	-	3	40	60	100
2	PC	Concrete Technology	3	-	-	3	40	60	100
3	PC	Fluid Mechanics	3	-	-	3	40	60	100
4	HS	Managerial Economics & Financial Analysis	3	-	-	3	40	60	100
5	PC	Structural Analysis	3	-	-	3	40	60	100
6	PC	Solid Mechanics Lab	-	-	3	1.5	40	60	100
7	PC	Concrete Technology Lab	-	-	3	1.5	40	60	100
8	PC	Fluid Mechanics Lab	-	-	3	1.5	40	60	100
9	BS	Logical Reasoning	-	-	2	1	40	60	100
<b>Total</b>			<b>15</b>	<b>0</b>	<b>11</b>	<b>20.5</b>	<b>360</b>	<b>540</b>	<b>900</b>

**III Year - I Semester**

S.No	Category	Course Title	L	T	P	C	IM	EM	TM
1	PC	Design & Drawing of Reinforced Concrete Structures	4	-	2	3	40	60	100
2	PC	Strength of Materials-II	3	-	-	3	40	60	100
3	PC	Geo-Technical Engineering	3	-	-	3	40	60	100
4	PE	<b>Professional Elective-I</b> 1. Remote sensing & Geographical Information Systems 2. Solid Waste Management 3. Advanced surveying 4. Green Building Technologies	3	-	-	3	40	60	100
5	PC	Hydraulics & Hydraulic Machinery	3	-	-	3	40	60	100
6	OE	<b>Open Elective-I</b> 1. MAT LAB and Simulink for Engineers 2. Data Structures 3. Principles of Electronic Communication Systems 4. AI Tools, Techniques and Applications	3	-	-	3	40	60	100
7	PC	Geo-Technical Engineering Lab	-	-	3	1.5	40	60	100
8	HS	Advanced English Communication Skills Lab	-	-	3	1.5	40	60	100
9	BS	Quantitative Aptitude-II	3	-	-	-	-	-	-
<b>Total</b>			<b>22</b>	<b>-</b>	<b>8</b>	<b>21</b>	<b>320</b>	<b>480</b>	<b>800</b>

**III Year - II Semester**

S.No	Category	Course Title	L	T	P	C	IM	EM	TM
1	PC	Design & Drawing of Steel Structures	4	-	2	3	40	60	100
2	PC	Foundation Engineering	3	-	-	3	40	60	100
3	PC	Transportation Engineering	3	-	-	3	40	60	100
4	PE	<b>Professional Elective-II</b> 1. Building planning and drawing 2. Railway and Airport Engineering 3. Construction Management 4. Infrastructure Planning and Design	3	-	-	3	40	60	100
5	ES	Oops Through Java	3	-	-	3	40	60	100
6	OE	<b>Open Elective-II</b> 1. Solar Energy Systems 2. Management Science 3. Internet of Things 4. Industrial Robotics	3	-	-	3	40	60	100
7	ES	Building planning and drawing through AutoCAD	-	-	3	1.5	40	60	100
8	PC	Transportation Engineering Lab	-	-	3	1.5	40	60	100
9		Socially relevant project	-	-	2	1	20	30	50
<b>Total</b>			<b>19</b>	<b>-</b>	<b>10</b>	<b>22</b>	<b>340</b>	<b>510</b>	<b>850</b>

**IV Year - I Semester**

S.No	Category	Course Title	L	T	P	C	IM	EM	TM
1	PC	Estimation & Costing	3	-	-	3	40	60	100
2	PC	Environmental Engineering	3	-	-	3	40	60	100
3	PC	Prestressed Concrete	3	-	-	3	40	60	100
4	PC	Water Resources Engineering	3	-	-	3	40	60	100
5	PE	<b>Professional Elective –III</b> 1.Traffic Engineering and Management 2. Geosynthetics and applications 3. Pavement Analysis and Design 4. Urban Transportation planning	3	-	-	3	40	60	100
6	PE	<b>Professional Elective –IV</b> 1. Finite Element methods 2. Bridge Engineering 3. Elements of earthquake Engineering 4. Repair and Rehabilitation of structures	3	-	-	3	40	60	100
7	PC	<b>Environmental Engineering Lab</b>	-	-	3	1.5	40	60	100
8	ES	GIS and CAD Lab	-	-	3	1.5	40	60	100
9	PR	Major Project Phase-I	-	-	4	2	20	30	50
10	PR	Survey Camp Industrial Training / Internship/Research Projects in National Laboratories/Academic Institute	-	-	3	2	20	30	50
<b>Total</b>			<b>18</b>	<b>-</b>	<b>12</b>	<b>25</b>	<b>360</b>	<b>540</b>	<b>900</b>

**IV Year - II Semester**

S.No	Category	Course Title	L	T	P	C	IM	EM	TM
1	OE	<b>Open Elective –III/MOOC*</b> 1. Software Engineering 2. Power Plant Engineering 3. Quality and Reliability Engineering 4. Cyber Security	3	-	-	3	40	60	100
2	PE	<b>Professional Elective –V/MOOC*</b> 1. Environmental Impact Assessment and life cycle Analysis 2. Air and Noise Pollution 3. Ground Improvement Techniques 4. Irrigation Drawing	3	-	-	3	40	60	100
3	PR	Major Project Phase -II	-	-	16	7	80	120	200
<b>Total</b>			<b>6</b>	<b>-</b>	<b>16</b>	<b>13</b>	<b>160</b>	<b>240</b>	<b>400</b>

**\*NOTE:** The MOOC Subjects are to be selected from the state of the Art Technical subjects, Identified by BOS, by the time the student reaches IV B.Tech.

**Course Structure – R19**  
**(With effect from 2019-2020)**

**I Year - I Semester**

S.No	Category	Course Code	Course Title	L	T	P	C	IM	EM	TM
1	HS	19BS1T01	Communicative English	2	-	-	2	40	60	100
2	BS	19BS1T02	Mathematics-1	2	1	0	3	40	60	100
3	BS	19BS1T04	Engineering Physics	3	-	-	3	40	60	100
4	ES	19IT1T02	Computer Programming	3	1	-	4	40	60	100
5	HS	19BS1P01	English Communication Skills Lab	-	-	3	1.5	40	60	100
6	BS	19BS1T03	Engineering Physics Lab	-	-	3	1.5	40	60	100
7	ES	19IT1P01	Computer Programming Lab	-	-	3	1.5	40	60	100
8	MC	19BS1A01	Constitution of India	3	0	0	0	-	-	-
<b>Total</b>				<b>13</b>	<b>2</b>	<b>9</b>	<b>16.5</b>	<b>280</b>	<b>420</b>	<b>700</b>



<b>Subject</b>	<b>Communicative English</b>				
<b>Year/Semester</b>	<b>I B.Tech./I Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2019-20</b>	<b>3</b>	<b>0</b>	<b>3</b>	<b>2</b>

**Introduction:**

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

As far as the detailed textbook is concerned, the focus should be on the skills of listening, speaking, reading and writing.

Thus, the stress in the syllabus is primarily on the development of communicative skills and fostering of ideas.

**Objectives:**

- ❖ Adopt activity-based teaching-learning methods to ensure that the learners would be engaged in the use of language both in the classroom and the laboratory sessions.
- ❖ Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers.
- ❖ Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials.
- ❖ Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations.
- ❖ Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information.
- ❖ Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing.

**Methodology:**

1. The class are to be learner-centered where the learners are to read the texts to get a comprehensive idea of those texts on their own with the help of the peer group and the teacher.
2. Integrated skill development methodology has to be adopted with focus on individual language skills as per the tasks/exercise.
3. The tasks/exercises at the end of each unit should be completed by the learners only and the teacher intervention is permitted as per the complexity of the task/exercise.
4. The teacher is expected to use supplementary material wherever necessary and also generate activities/tasks as per the requirement.
5. The teacher is permitted to use lecture method when a completely new concept is introduced in the class.



**VISHNU INSTITUTE OF TECHNOLOGY: BHIMAVARAM**  
**(AUTONOMOUS)**  
**DEPARTMENT OF CIVIL ENGINEERING**

**Detailed Textbook:**

**Prescribed by JNTUK for Reading and Writing**

**Non-Detailed Textbook:**

**Wings of Fire: APJ Abdul Kalam**

**Syllabus:**

**UNIT -I**

**Reading:** Skimming to get the main idea of a text

**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:** Nouns and Pronouns; textual words

**Learning Outcomes**

At the end of the module, the learners will be able to

- employ suitable strategies for skimming to get the general idea of a text
- recognize paragraph structure with beginnings/endings
- using correct word forms of nouns and pronouns and textual words

**UNIT -II**

**Reading:** Scanning to look for specific pieces of information.

**Writing:** Writing sentences with proper word order - Basic Sentence Structures

**Grammar and Vocabulary:** Verbs - tenses; use of synonyms

**Learning Outcomes**

At the end of the module, the learners will be able to

- Employ suitable strategies for scanning to identify specific information from a text
- Write accurately using proper grammatical structures

**UNIT -III**

**Reading:** Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

**Writing:** Paragraph writing using suitable cohesive devices; mechanics of writing - punctuation, capital letters.

**Grammar and Vocabulary:** Cohesive devices - linkers, sign posts and transition signals; use of articles and zero article; prepositions; use of synonyms.

**Learning Outcomes**

At the end of the module, the learners will be able to

- write well-structured paragraphs.
- understand the use of cohesive devices.

**Assignment-I:** Each Student is required to present a report on a problem faced by individuals or the society with an analysis and possible solutions. He/she has to make an oral presentation of it in the class before the completion of MID-I Examination. It is mandatory for all the students. It is for Internal Assessment.

#### **UNIT - IV**

**Reading:** Note making; making notes from the text/material.

**Writing:** Types of Paragraph writing

**Grammar and Vocabulary:** Subject-verb agreement, quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of antonyms

#### **Learning Outcomes**

At the end of the module, the learners will be able to

- make notes of the important information of a text
- understanding types of paragraphs
- use language appropriate adjective and adverbs for descriptions

#### **UNIT-V**

**Reading:** Reading for comprehension.

**Writing:** Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions.

**Grammar and Vocabulary:** direct and indirect speech, reporting verbs for academic purposes.

#### **Learning Outcomes**

At the end of the module, the learners will be able to

- write summaries based on global comprehension of reading/listening texts
- understand a paragraph

#### **UNIT - VI**

**Reading:** Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships etc.

**Writing:** Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables.

**Grammar and Vocabulary:** Active Voice- Passive Voice; editing short texts – identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

#### **Learning Outcomes**

At the end of the module, the learners will be able to

- interpret data from the given charts/tables/graphs
- edit short texts by correcting common errors

**Assignment-II:** Each Student is required to present the information regarding one novel prescribed in course. He/she has to make an oral presentation of it in the class before the completion of MID-II Examination. It is mandatory for all the students. It is for Internal Assessment.

**Course Outcomes:**

**Student should able to learn:**

1. Identify the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English.
2. Formulate sentences using proper grammatical structures and correct word forms
3. Speak clearly on a specific topic using suitable discourse markers in informal discussions.
4. Write summaries based on global comprehension of reading/listening texts.
5. Produce a coherent paragraph interpreting a figure/graph/chart/table.
6. Take notes while listening to a talk/lecture to answer questions.

**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.

**Sample Web Resources**

1. Grammar/Listening/Writing

[1-language.com](http://1-language.com)

<http://www.5minuteenglish.com/>

<https://www.englishpractice.com/>

2. Grammar/Vocabulary

[English Language Learning Online](#)

<http://www.bbc.co.uk/learningenglish/>

<http://www.better-english.com/>

<http://www.nonstopenglish.com/>

<https://www.vocabulary.com/>

[BBC Vocabulary Games](#)

[Free Rice Vocabulary Game](#)

3. Reading

<https://www.usingenglish.com/comprehension/>

<https://www.englishclub.com/reading/short-stories.htm>



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<https://www.english-online.at/>

4.Listening

<https://learningenglish.voanews.com/z/3613>

<http://www.englishmedialab.com/listening.html>

5.Speaking

<https://www.talkenglish.com/>

[BBC Learning English – Pronunciation tips](#)

[Merriam-Webster – Perfect pronunciation Exercises](#)

6.All Skills

<https://www.englishclub.com/>

<http://www.world-english.org/>

<http://learnenglish.britishcouncil.org/>

Online Dictionaries

[Cambridge dictionary online](#)

[MacMillan dictionary](#)

[Oxford learner's dictionaries](#)

<b>Subject</b>	<b>Mathematics-I (Linear Algebra &amp; Calculus)</b>				
<b>Year/Semester</b>	<b>I B.Tech./I Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2019-20</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

To enable the students to

1. know the importance of matrices to solve linear equations using matrices
2. identify and solve various differential equations using corresponding methods
3. apply methods of solving higher order linear differential equations
4. comprehend the theory of maxima and minima of a function of two variables.
5. analyze the techniques of tracing the curves and evaluate the lengths, areas, volumes of objects using multiple integrals

**Syllabus:**

**UNIT –I**

**MATRICES - LINEAR SYSTEM OF EQUATIONS**

Introduction, Different types of matrices, Rank-Echelon form - Normal form, Solution of a System of Linear Equations – Non-homogeneous and homogeneous equations, Gauss- Jordan method, Gauss – Elimination Method, LU Decomposition, Applications of electric circuits.

**UNIT- II**

**EIGEN VALUES - EIGEN VECTORS**

Eigen values - Eigen vectors – Properties– Cayley-Hamilton Theorem - finding inverse and power of a matrix by using Cayley-Hamilton theorem, Diagonalization of matrices, Spectral Decomposition, Principal Component Analysis and Singular Value Decomposition

**UNIT –III**

**DIFFERENTIAL EQUATIONS OF FIRST ORDER AND FIRST DEGREE**

Differential equations of first order and first degree–Exact and Non-exact differential equations, Linear and Bernoulli differential equations. Orthogonal trajectories, Newton ‘s Law of cooling, Law of natural growth and decay, L-R and R-C Circuits.

**UNIT –IV**

**LINEAR DIFFERENTIAL EQUATIONS OF HIGHER ORDER**

Higher order homogenous and non - homogenous linear differential equations with constant coefficients - Particular integrals for the functions of type  $e^{ax}$ ,  $\sin(ax+b)$ ,  $\cos(ax+b)$ , Polynomial of  $x$ ,  $e^{ax} V(x)$ , L-C-R Circuits.



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**UNIT – V**

**PARTIAL DIFFERENTIATION**

Functions of several variables- Partial derivatives, Total derivative, Chain rule, Change of variables, Jacobians, Functional dependence. Generalized Mean Value theorem –Taylor's theorem and Maclaurin's theorem (without proof) for a function of two variables, Maxima and Minima of functions of two variables, Lagrange's method of undetermined multipliers.

**UNIT –VI**

**Multiple Integrals and Applications**

Review of Curve tracing-Cartesian-Polar and Parametric curves. Multiple integrals - double integrals - change of variables (Cartesian and Polar coordinates), Change of order of integration and Evaluation of triple integrals, computing area, surface areas and volume.

**Text Books:**

1. B. S. Grewal, Higher Engineering Mathematics, 42<sup>nd</sup> Ed., Khanna Publishers, New Delhi.
2. Erwin. Kreyszig, Advanced Engineering Mathematics, 9<sup>th</sup> Ed., Wiley, 2012

**References:**

1. T.K.V.Iyengar, B. Krishna Ghandhi, S. Ranganathan and M.V.S.S.N.Prasad, Engineering Mathematics, Volume-I, 12<sup>th</sup> Ed., S. Chand Publishers, 2014
2. B. V. Ramana, Engineering Mathematics, 4<sup>th</sup> Ed., Tata McGraw Hill, New Delhi, 2009
3. D. S. Chandrashekharaiyah, Engineering Mathematics, Volume 1, Prism Publishers, 2010
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications.

**Course Outcomes:**

After completing this course, the students will be able to

1. Solve linear system of equations in engineering problems
2. Find Eigen values and Eigen vectors of a matrix in engineering studies.
3. Model engineering problems as differential equations and solve analytically.
4. Model engineering problems as a differential equation and solve analytically the higher order differential equations.
5. Find out local /global optimum of functions of several variables.
6. Compute areas, surface areas and volumes.

<b>Subject</b>	<b>Engineering Physics</b>				
<b>Year/Semester</b>	<b>I B.Tech./I Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2019-20</b>	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>

**COURSE OBJECTIVES:**

1. To highlight the importance of physics concepts in Engineering & Technology.
2. To facilitate the students with the aid of advanced insight in the applied science.
3. To focus the real time applications of physics in Engineering fields.
4. To prepare the students to face the challenges in core fields with the support of physical principles.
5. To motivate the students to understand the Engineering Principles through basic ideas in Physics.

**Syllabus:**

**UNIT-I**  
**MECHANICS**

Basic laws of vectors and scalars-rotational frames-conservative forces-  $F = - \text{grad } V$ , torque and angular momentum - Newton's laws in inertial and linear accelerating non-inertial frames of reference-rotating frame of reference with constant angular velocity-concept of pseudo forces (Centrifugal and Coriolis forces)-qualitative explanation of Foucault's pendulum-rigid body-angular velocity vector-moment of inertia tensor, ex: rod executing conical motion with fixed center of mass-gravitation and Kepler's laws.

**UNIT-II**  
**ACOUSTICS**

Classification of Sound waves- Weber–Fechner law – Sabine's formula- derivation using growth and decay method – Absorption coefficient and its determination –factors affecting acoustics of buildings and their remedies.

**UNIT-III**  
**ULTRASONICS**

Production and detection of ultrasonics- acoustic grating -Non-Destructive Testing – pulse echo system through transmission and reflection modes – applications.

**UNIT-IV**  
**ELASTICITY**

Concepts of elasticity, plasticity, strain hardening, failure (fracture / yielding); Idealization of one-dimensional stress-strain curve; Generalized Hooke's law with and without thermal strains for isotropic materials; elastic constants and their relationships; Strain energy.



### **UNIT-V**

#### **HEAT TRANSFER**

Transfer of heat energy –thermal expansion of solids and liquids -bimetallic strips-thermal conduction, convection and radiation and their fundamental laws; –heat conduction in solids – thermal conductivity - Forbe’s and Lee’s disc method: theory and experiment – applications (qualitative only): working principles of refrigerators, ovens and solar water heaters.

### **UNIT-VI**

#### **SENSORS**

Sensors:(qualitative description only): Different types of sensors and applications; Strain and Pressure, sensors- Piezoelectric, magnetostrictive sensors, Fibre optic methods of pressure sensing; Temperature sensors - bimetallic strip, pyroelectric detectors, Hall-effect sensor, smoke and fire detectors

### **Learning Resources**

#### **Text Books**

1. D.Kleppner and Robert Kolenkow“An introduction to Mechanics”-II -Cambridge University Press,2015
2. Gaur R.K. and Gupta S.L., “Engineering Physics”- Dhanpat Rai publishers, 2012
3. M.N.Avadhanulu & P.G.Kshirsagar“A Text book of Engineering Physics”-S.Chand Publications,2017
4. Ian R Sinclair, Sensor and Transducers 3rd eds, 2001, Elsevier (Newnes)

#### **Reference text books:**

1. M K Varma “Introduction to Mechanics”-Universities Press-2015.
2. D.K. Bhattacharya and A. Bhaskaran, “Engineering Physics”- Oxford Publications-2015



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<b>Subject</b>	<b>Computer Programming Using C</b>				
<b>Year/Semester</b>	<b>I B. Tech/I Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2019-20</b>	<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>

**Course Objectives:**

1. Formulating algorithmic solutions to problems and implementing algorithms in C.
2. Notion of Operation of a CPU, Notion of an algorithm and computational procedure, editing and executing programs in Linux.
3. Understanding branching, iteration and data representation using arrays.
4. Modular programming and recursive solution formulation.
5. Understanding pointers and dynamic memory allocation.
6. Understanding miscellaneous aspects of C.

**Syllabus:**

**UNIT-I**

**FUNDAMENTALS OF COMPUTER AND COMPUTATIONAL THINKING**

Computer Block Diagram, Computer Hardware, Data Representation in Memory, components, Programming Languages - Machine Language, Assembly Language, Low- and High-Level Languages, Procedural and Object-Oriented Languages, Application and System Software, Translators, Algorithms, Flowcharts, The Software Development Process.

**UNIT-II**

**INTRODUCTION TO C PROGRAMMING**

Identifiers, The main () Function, The printf () Function **Programming Style** - Indentation, Comments, Data Types, Arithmetic Operations, Expression

Types, Variables and Declarations, Negation, Operator Precedence and Associativity, Declaration Statements, Initialization.

**Assignment** - Implicit Type Conversions, Explicit Type Conversions (Casts), Assignment Variations, Mathematical Library Functions, Interactive Input, Formatted Output, Format Modifiers.



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**UNIT-III**

**CONTROL FLOW-RELATIONAL EXPRESSIONS - LOGICAL OPERATORS**

**Selection:** if-else Statement, nested if, examples, multi-way selection: switch, else-if, examples.

**Repetition:** Basic Loop Structures, Pretest and Posttest Loops, Counter-Controlled and Condition-Controlled Loops, The while Statement, The for Statement, Nested Loops, The do-while Statement.

**UNIT-IV**

**ARRAYS & POINTERS**

**Arrays:** One-Dimensional Arrays, Input and Output of Array Values, Array Initialization, Two-Dimensional Arrays, Larger Dimensional Arrays- Matrices

**Pointers:** Concept of a Pointer, Initialisation of pointer variables, passing by address, Dangling memory, address arithmetic, Dynamic memory management functions, command line arguments.

**UNIT-V**

**MODULAR PROGRAMMING**

Function and Parameter Declarations, returning a Value, Classifications of Functions, Variable Scope, Variable Storage Class, Local Variable Storage Classes, Global Variable Storage Classes, Pass by Reference, Passing Addresses to a Function, Array as a Function arguments.

Case Study: Recursion - Mathematical Recursion, Recursion versus Iteration.

**UNIT-VI**

**STRINGS & STRUCTURES**

**Strings:** String Fundamentals, String Input and Output, String Processing, Library Functions.



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**Structures:** Derived types, Structures declaration, Initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields.

**TEXT BOOKS:**

1. ANSI C Programming, Gary J. Bronson, Cengage Learning.
2. Let us C Authentic Guide to C Programming Language by yashavant kanetkar.
3. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.

**REFERENCE BOOKS:**

1. C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage.
2. Programming with C, Bichkar, Universities Press.
3. Programming in C, ReemaThareja, OXFORD.
4. C by Example, Noel Kalicharan, Cambridge.

**Course Outcomes:**

1. Understand the basic terminology used in computer programming
2. Write, compile and debug programs in C language.
3. Use different data types in a computer program.
4. Design programs involving decision structures, loops and functions.
5. Explain the difference between call by value and call by reference
6. Understand the dynamics of memory by the use of pointers
7. Use different data structures and Strings.

<b>Name of the Lab</b>	<b>English Communication Skills Lab</b>				
<b>Year/Semester</b>	<b>I B. Tech/I Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2019-20</b>	<b>-</b>	<b>-</b>	<b>3</b>	<b>1.5</b>

### **Course Objectives**

1. To sensitize the nuances of English speech sounds.
2. To bring about a consistent accent and intelligibility in students 'pronunciation of English by providing an opportunity for practice in speaking.
3. To improve the fluency in spoken English in different contexts.
4. To demonstrate the synchronization of verbal and nonverbal communication.
5. To speak with clarity and confidence.
6. To enrich the persuasive skills.

### **List of Experiments:**

#### **MODULE – I**

**Listening:** Identifying the topic, the context and overall idea by listening to short audio texts and answering a series of questions.

Non-Verbal Communication (2 sessions)

#### **MODULE – II**

**Listening:** Answering a series of questions about specific information after listening to audio texts.

Introduction to Phonetics – Sounds of English – Vowels and Consonants (3 sessions)

#### **MODULE – III**

**Listening:** Answering a series of questions about main idea and supporting ideas after listening to audio texts.

Reading with proper Stress and Intonation –Speech shadowing (3 sessions)

#### **MODULE– IV**

**Listening:** Listening for global comprehension and summarizing what is listened to.

Situational Dialogues/Role Plays, just a Minute (4 sessions)

#### **MODULE– V**

Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others (2 sessions)

#### **MODULE – VI**

Formal oral presentations on topics from academic contexts - without the use of PPT slides. (3 sessions)



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**INFRASTRUCTURE:**

1. 60 computer systems for a class of 60 students.
2. LAN facility and English Language Software for self-study by learners.
3. Audio System
4. Projector

**SYSTEM REQUIREMENT: Hardware Component**

1. P – IV Processor
2. Speed – 2.8 GHZ
3. RAM – 512 MB minimum
4. Hard Disk – 80 GB
5. Headphones of high quality

**SUGGESTED SOFTWARE**

1. Cambridge Advanced Learners' English Dictionary with CD.
2. Grammar Made Easy by Darling Kindersley
3. Punctuation Made Easy by Darling Kindersley
4. Clarity Pronunciation Power – Part I
5. Clarity Pronunciation Power – part II
6. Oxford Advanced Learner 's Compass, 7th Edition
7. DELTA 's key to the Next Generation TOEFL Test: Advanced Skill Practice.
8. MELL - K Van Solutions Software
9. TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
10. English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge
11. English Pronunciation in Use, Cambridge University Press
12. Technical Communication, OUP
13. Communication Skills, OUP

**COURSE OUTCOMES**

The students will be able to:

1. Comprehend the importance of phonetics and interpret phonetic symbols, vowels
2. and Consonants.
3. Describe the speech sounds – vowels and consonants, stress and intonation.
4. Enable writing situational dialogues and enact Role Play.



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5. Exemplify the synchronization of verbal and nonverbal communication through the JAM session.
6. Enrich presentation skills through oral presentations - prepared and extempore.
7. Develop oratory skills through Debate.

**SUGGESTED READING**

1. Speaking English Effectively 2 nd Edition by Krishna Mohan and N. P. Singh, 2011. Macmillan Publishers India Ltd. Delhi.
2. Sasi Kumar, V & Dhamija, P.V. How to Prepare for Group Discussion and Interviews. Tata McGraw Hill
3. Hancock, M. 2009. English Pronunciation in Use. Intermediate. Cambridge: CUP
4. Spoken English: A Manual of Speech and Phonetics by R. K. Bansal & J. B. Harrison. 2013 Orient Blackswan. Hyderabad.
6. Hewings, M. 2009. English Pronunciation in Use. Advanced. Cambridge: CUP
7. Marks, J. 2009. English Pronunciation in Use. Elementary. Cambridge: CUP
8. Nambiar, K.C. 2011. Speaking Accurately. A Course in International Communication. New Delhi: Foundation
9. Soundararaj, Francis. 2012. Basics of Communication in English. New Delhi: Macmillan
10. Spoken English (CIEFL) in 3 volumes with 6 cassettes, OUP.
11. English Pronouncing Dictionary Daniel Jones Current Edition with CD.

Name of the Lab	Engineering Physics Lab				
Year/Semester	I B. Tech/I Sem	L	T	P	C
Regulation Year	2019-20	-	-	3	1.5

**List of Experiments:**

1. Determination of wavelength of a source-Diffraction Grating-Normal incidence
2. Newton's rings –Radius of Curvature of Plano Convex Lens.
3. Determination of thickness of a thin object using parallel interference fringes.
4. Determination/ of Rigidity modulus of a material- Torsional Pendulum.
5. Determination of Acceleration due to Gravity and Radius of Gyration- Compound Pendulum.
6. Melde's experiment – Transverse and Longitudinal modes.
7. Verification of laws of stretched string – Sonometer.
8. Determination of velocity of sound – Volume resonator.
9. L C R Series Resonance Circuit
10. Study of I/V Characteristics of Semiconductor diode
11. I/V characteristics of Zener diode
12. Thermistor characteristics – Temperature Coefficient
13. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
14. Energy Band gap of a Semiconductor p-n junction.
15. Hall Effect for semiconductor.

**REFERENCE:**

1. Engineering Physics Lab Manual by Dr.Y. Aparna & Dr.K.Venkateswarao (V.G.S.Book links)



2. Physics Practical Manual, Lorven Publication.

<b>Name of the Lab</b>	<b>Computer Programming Lab</b>				
<b>Year/Semester</b>	<b>I B. Tech/I Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2019-20</b>	<b>-</b>	<b>-</b>	<b>3</b>	<b>1.5</b>

**Course Objectives:**

1. Understand the basic concept of C Programming, and its different modules that includes conditional and looping expressions, Arrays, Strings, Functions, Pointers Structures.
2. Acquire knowledge about the basic concept of writing a program.
3. Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.
4. Use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.
5. Role of functions involving the idea of Modularity.

**EXERCISE - 1**

**BASICS**

- a) What is an OS Command, Familiarization of Editors - vi, Emacs
- b) Using commands like mkdir, ls, cp, mv, cat, pwd, and man
- c) C Program to Perform Adding, Subtraction, Multiplication and Division of two numbers From Command line

**EXERCISE - 2**

**BASIC MATH**

- a) Write a C Program to Simulate 3 Laws at Motion
- b) Write a C Program to convert Celsius to Fahrenheit and vice versa

**EXERCISE - 3**

**CONTROL FLOW – I**

- a) Write a C Program to Find Whether the Given Year is a Leap Year or not.
- b) Write a C Program to Add Digits & Multiplication of a number

**EXERCISE – 4**

**CONTROL FLOW – II**

- a) Write a C Program to Find Whether the Given Number is
  - i) Prime Number
  - ii) Armstrong Number

- b) Write a C program to print Floyd Triangle
- c) Write a C Program to print Pascal Triangle

#### **EXERCISE – 5**

##### **FUNCTIONS**

- a) Write a C Program demonstrating of parameter passing in Functions and returning values.
- b) Write a C Program illustrating Fibonacci, Factorial with Recursion without Recursion

#### **EXERCISE – 6**

##### **CONTROL FLOW – III**

- a) Write a C Program to make a simple Calculator to Add, Subtract, Multiply or Divide Using switch...case
- b) Write a C Program to convert decimal to binary and hex (using switch call function the function)

#### **EXERCISE – 7**

##### **FUNCTIONS – CONTINUED**

Write a C Program to compute the values of  $\sin x$  and  $\cos x$  and  $e^x$  values using Series expansion. (Use factorial function)

#### **EXERCISE – 8**

##### **ARRAYS**

Demonstration of arrays

- a) Search-Linear.
- b) Sorting-Bubble, Selection.
- c) Operations on Matrix.

#### **EXERCISES - 9**

##### **STRUCTURES**

- a) Write a C Program to Store Information of a Movie Using Structure
- b) Write a C Program to Store Information Using Structures with Dynamically Memory Allocation
- c) Write a C Program to Add Two Complex Numbers by Passing Structure to a Function

#### **EXERCISE - 10**

##### **ARRAYS AND POINTERS**

- a) Write a C Program to Access Elements of an Array Using Pointer
- b) Write a C Program to find the sum of numbers with arrays and pointers.

**EXERCISE – 11**

**DYNAMIC MEMORY ALLOCATIONS**

- a) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc () function.
  - b) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc () function.
- Understand the difference between the above two programs

**EXERCISE – 12**

**STRINGS**

- a) Implementation of string manipulation operations with library function.
  - i) copy
  - ii) concatenate
  - iii) length
  - iv) compare
- b) Implementation of string manipulation operations without library function.
  - i) copy
  - ii) concatenate
  - iii) length
  - iv) compare

**Course Outcomes:**

1. Apply and practice logical ability to solve the problem.
2. Understand C programming development environment, compiling, debugging and linking and executing a program using the development environment.
3. Analysing the complexity of problems, modularize the problems into small modules and then convert them into programs.
4. Understand and apply the inbuilt functions and customized functions for solving the problems.
5. Understand and apply the pointers, memory allocation techniques.



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**DEPARTMENT OF CIVIL ENGINEERING**

<b>Subject</b>	<b>CONSTITUTION OF INDIA</b>				
<b>Year/Semester</b>	<b>I B. Tech/I Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2019-20</b>	<b>2</b>	<b>-</b>	<b>-</b>	<b>-</b>

**COURSE OBJECTIVES:**

1. To train students in understanding the basic structure of Indian Constitution.
2. To prepare students to live better and happily with other fellow beings through the application of Fundamental Rights in their lives.

**UNIT-I**

**INTRODUCTION TO INDIAN CONSTITUTION**

Meaning of the term Indian Constitution –Preamble- Constituent Assembly- Salient Features of Indian Constitution

**UNIT-II**

**FUNDAMENTAL RIGHTS**

Fundamental Rights -Fundamental Duties -The Directive Principles of State Policy

**UNIT-III**

**UNION GOVERNMENT**

Union Government -Union Legislature (Parliament) -Lok Sabha and Rajya Sabha (with Powers and Functions) -Union Executive -President of India (with Powers and Functions) -Prime Minister of India (with Powers and Functions) -Union Judiciary (Supreme Court) -Jurisdiction of the Supreme Court

**UNIT-IV**

**STATE GOVERNMENT**

State Government -State Legislature (Legislative Assembly / Vidhan Sabha, Legislative Council / Vidhan Parishad) -Powers and Functions of the State Legislature -State Executive-Governor of the State (with Powers and Functions) -The Chief Minister of the State (with Powers and Functions) -State Judiciary (High Courts)



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**UNIT-V**

**LOCAL SELF GOVERNANCE**

Powers and functions of Municipalities, Panchayats, ZP's and Co – Operative Societies

**UNIT-VI**

**SOVEREIGN BODIES**

Election Commission of India (with Powers and Functions) -The Union Public Service Commission (with Powers and Functions)

**BOOKS:**

1. Introduction to constitution of India, Durga Das Basu, Lexis Nexis Publications
2. Constitution of India by PROFESSIONAL BOOK PUBLISHERS
3. The Constitution of India by Arun K Tiru vengadam, Blooms bury publishers.
4. The constitution of India by PM Bakshi, Universal law publishing co
5. The Constitution of India by S.R. Bhansali, Universal law publishing co

**COURSE OUTCOMES:**

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

1. Examine salient features of Indian Constitution and live accordingly in society.
2. Interpret the meaning of Fundamental Rights and Directive Principles of State Policy and develop an attitude which paves the way for better living conditions.
3. Discover various aspects of Union Government legislation and live up to the expectations of the rules.
4. Critically examine State Government legislation and improve your living standards by following the rules strictly
5. Examine powers and functions of local bodies such as Municipalities and Panchayats and, take advantage of available resources for better living
6. Analyze the powers and functions of Election Commission and The Union Public Service Commission and decide upon it for safe and secured life.
7. Commission and decide upon it for safe and secured life.



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**Course Structure – R19  
(With effect from 2019-2020)**

**I Year - II Semester**

S.No	Category	Course Code	Course Title	L	T	P	C	IM	EM	TM
1	BS	19BS2T02	Mathematics-II	2	1	-	3	40	60	100
2	BS	19BS2T04	Engineering Chemistry	3	-	-	3	40	60	100
3	ES	19ME2T02	Engineering Graphics & Design	1	-	3	2.5	40	60	100
4	ES	19IT2T03	Problem Solving & Programming Using Python	3	1	-	4	40	60	100
5	ES	19EE2T03	Elements of Electrical & Electronics Engineering	3	1	-	4	40	60	100
6	BS	19BS2P03	Engineering Chemistry Lab	-	-	3	1.5	40	60	100
7	ES	19IT2P02	Problem Solving & Programming Lab	-	-	3	1.5	40	60	100
8	ES	19EE2P02	Electrical & Electrons Engineering Lab	-	-	3	1.5	40	60	100
9	LC	19ME2P02	Engineering Workshop	-	-	3	1.5	40	60	100
10	MC	19BS2A02	Environmental Science	3	-	-	-	-	-	-
<b>Total</b>				<b>15</b>	<b>3</b>	<b>15</b>	<b>22.5</b>	<b>360</b>	<b>540</b>	<b>900</b>

Subject	MATHEMATICS II				
Year/Semester	I B. Tech/II Sem	L	T	P	C
Regulation Year	2019-20	2	1	-	3

**COURSE OBJECTIVES:**

To enable the students to

1. make the students learn modeling various physical phenomena as first and second order PDE
2. learn techniques to solve as first and second order PDE.

**Syllabus:**

**UNIT-I**

**FIRST ORDER PARTIAL DIFFERENTIAL EQUATIONS**

Formation of Partial differential equations by elimination of arbitrary constants and arbitrary functions– solutions of first order linear (Lagrange) equations and nonlinear equations-standard types

**UNIT- II**

**HIGHER ORDER PARTIAL DIFFERENTIAL EQUATIONS**

Solutions of Linear Partial differential equations with constant coefficients. RHS terms of the type  $e^{ax + by}$ ,  $\sin(ax+by)$ ,  $\cos(ax+by)$ ,  $x^m y^n$ . Classification of second order partial differential equations-parabolic, elliptical and hyperbolic.

**UNIT-III**

**APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS**

Method of Separation of Variables-Applications to wave equation, heat conduction equation in one dimensions and Laplace equation in two dimensions

**UNIT-IV**

**LAPLACE TRANSFORMS**

Laplace transform-Definition-conditions for existence, – Linear Property -Shifting Theorems, Laplace transform of Standard Functions-Transforms of derivatives and integrals–Unit step function–Dirac delta function. Inverse Laplace transforms by Partial fractions–Convolution theorem (without proof) – inverse by convolution, Solving ordinary differential equations with constant coefficients.

**UNIT-V**

**VECTOR DIFFERENTIATION**

Vector Differentiation - Scalar and Vector Fields, Level surfaces, Directional Derivative, Gradient of a Scalar Field, Divergence, Curl of a vector field and applications, Vector Identities



## **UNIT-VI**

### **VECTOR INTEGRATION**

Vector Integration - Line integral, work done, areas, Surface integrals.

Vector integral theorems - green's theorem, Stokes theorem and Gauss Divergence theorem (All theorems without proof) and applications areas, surface areas and volumes.

#### **Text Books:**

1. B. S. Grewal, Higher Engineering Mathematics, 42nd Ed., Khanna Publishers, New Delhi, 2012
2. Erwin. Kreyszig, Advanced Engineering Mathematics, 9th Ed., Wiley, 2012

#### **References:**

1. T.K.V.Iyengar, B. Krishna Ghandhi, S. Ranganathan and M.V.S.S.N.Prasad, Engineering Mathematics, Volume-I, 12<sup>th</sup> Ed., S. Chand Publishers, 2014
2. B. V. Ramana, Engineering Mathematics, 4<sup>th</sup> Ed., Tata McGraw Hill, New Delhi, 2009
3. D. S. Chandrashekharaiyah, Engineering Mathematics, Volume 1, Prism Publishers, 2010
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, reprint, 2008

#### **Course Outcomes:**

After completing this course, the students will be able to

1. model first order linear and non-linear partial differential equations and solve analytically.
2. model higher order homogeneous & non homogeneous linear partial differential equations and solve analytically.
3. model physical problems of engineering like steady and unsteady heat conduction, vibration of string.
4. use of Laplace transforms in solving the differential equations with the initial and boundary conditions.
5. understand electric and magnetic fields and their physical significance.
6. compute line, surface and volume integrals and evaluate the work done, flux, potential functions.

<b>Subject</b>	<b>ENGINEERING CHEMISTRY</b>				
<b>Year/Semester</b>	<b>I B. Tech/II Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2019-20</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>

**COURSE OBJECTIVES:**

1. Plastics are nowadays used in household appliances; also, they are used as composites in aerospace and automotive industries.
2. Fuels as a source of energy are a basic need of any industry, particularly industries like thermal power stations, steel industry, fertilizer industry etc., and hence they are introduced.
3. The basics for the construction of galvanic cells are introduced. Also, if corrosion is to be controlled, one has to understand the mechanism of corrosion which itself is explained by electrochemical theory.
4. With the increase in demand, a wide variety of materials are coming up; some of them have excellent engineering properties and a few of these materials are introduced.
5. Water is a basic material in almost all the industries, more so where steam is generated and also where it is supplied for drinking purposes.
6. Materials used in major industries like steel industry, metallurgical industries and construction industries and electrical equipment manufacturing industries are introduced.

**Syllabus:**

**UNIT I**

**HIGH POLYMERS AND PLASTICS**

Polymerization: Introduction- Methods of polymerization --Thermoplastics and Thermosetting plastics – Compounding and fabrication (4/5 techniques)- Preparation, properties and applications of polyethylene, PVC, Bakelite Teflon. Conducting polymers, Fiber Reinforced Plastics and Biodegradable Polymers.

**Elastomers** – Natural rubber - vulcanization – Synthetic rubbers: Buna S, Buna N and Thiokol – Applications of elastomers.

**UNIT II**

**FUEL TECHNOLOGY**

**Fuels:** - Introduction – Calorific value - HCV and LCV – Bomb calorimeter – Numerical problems – Coal — Proximate and ultimate analysis –Significance of the analyses – Liquid fuels – Petroleum- Refining – Cracking – Petrol knocking – Diesel knocking - Octane and Cetane ratings – Anti-knock agents –Gaseous fuels – Natural gas, LPG and CNG. Biofuels- Biodiesel and Power alcohol

### **UNIT III**

#### **ELECTROCHEMICAL CELLS AND CORROSION**

Galvanic cells (Construction and working) – Electro chemical series and uses of this series- Standard electrodes (Hydrogen and Calomel electrodes) Batteries: Dry Leclanche Cell - Ni-Cd cells - Li cells.

**Corrosion:** - Definition – Theories of Corrosion (dry and wet) – Formation of galvanic cells by different metals, differential aeration - waterline corrosion – Pitting corrosion - Factors which influence the rate of corrosion - Protection from corrosion: Methods of application on metals (Galvanizing, Tinning, Electroplating, Electroless plating).

### **UNIT- IV**

#### **CHEMISTRY OF ADVANCED MATERIALS**

**Nano materials:** - Introduction- Top down and Bottom up approach – Carbon nano tubes and fullerenes: Characterization of nonmaterials by BET and TEM methods- self assembled layers- Types, Preparation (Arc discharge Laser ablation and Chemical Vapour Deposition methods) properties and applications.

**Liquid crystals:** - Introduction – Types – Applications

**Superconductors:** - Type-I & Type-II, properties & applications.

**Green synthesis:** - Principles – Aqueous phase method, Super critical fluid extraction and Biocatalytic methods of synthesis with examples.

### **UNIT -V**

#### **WATER TECHNOLOGY**

Hard water: - units of hardness – Boiler Troubles-Priming and foaming, Caustic embrittlement, Scale and Sludge formation - Softening of Hard water: Lime – Soda process, Zeolite process and Ion Exchange process Reverse Osmosis and Electro Dialysis.

Potable water- Sterilization and disinfection of water- Break point of chlorination- BIS and WHO standards.

### **UNIT -VI**

#### **CHEMISTRY OF ENGINEERING MATERIALS AND FUEL CELLS**

**Refractories:** - Definition, classification, properties of refractories.

**Lubricants:** - Definition and mechanism of lubricants.

**Cement:** - Constituents, manufacturing, setting and hardening of cement- Decay of cement.

**Insulators:** - Thermal and electrical insulators - Applications.

**Fuel cells:** - Hydrogen Oxygen fuel cells – Methanol Oxygen fuel cells.



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**Standard Books:**

1. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publishing Co.
2. Engineering Chemistry by Shikha Agarwal; Cambridge University Press, 2015 edition.

**Reference Books:**

1. Engineering Chemistry by Prasanth Rath, Cengage Learning, 2015 edition.
2. A text book of engineering Chemistry by S. S. Dara; S. Chand & Co Ltd., Latest Edition

**COURSE OUTCOMES:**

1. The advantages and limitations of plastic materials and their use in design would be understood.
2. Fuels which are used commonly and their economics, advantages and limitations are discussed.
3. Reasons for corrosion and some methods of corrosion control would be understood.
4. The students would be now aware of materials like nano materials and fullerenes and their uses. Similarly liquid crystals and superconductors are understood.
5. The impurities present in raw water, problems associated with them and how to avoid them are understood
6. The commonly used industrial materials are introduced.

<b>Subject</b>	<b>ENGINEERING GRAPHICS AND DESIGN</b>				
<b>Year/Semester</b>	<b>I B. Tech/II Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2019-20</b>	<b>2</b>	<b>-</b>	<b>3</b>	<b>2.5</b>

**COURSE OBJECTIVE:**

1. Engineering drawing being the principal method of communication for engineers, the objective is to introduce the students, the techniques of constructing the various types of polygons, curves and scales.
2. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

**Syllabus:**

**UNIT I**

**Objective:** To introduce the students to use drawing instruments and to draw polygons, Engg. Curves.

**Polygons:** Construction of regular polygons by general methods, inscribing and describing polygons on circles.

**Curves:** Ellipse, Parabola and Hyperbola by general methods, Tangent & Normal, and Ellipse by Oblong Method and Arcs of Circles Method. Cycloids, Involute, tangent & normal for the curves.

**UNIT II**

**Objective:** To introduce the students to use scales and orthographic projections, projections of points & simple lines.

**Scales:** Plain scale, Diagonal scale and Vernier scale.

**Orthographic Projections:** Introduction to Projections, Horizontal plane, Vertical plane, Profile plane, importance of reference lines.

**Projections of points** in various quadrants.

**UNIT III**

**Objective:** The objective is to make the students draw the projections of the lines inclined to both the planes.

**Projections of straight lines** inclined to one plane, inclined to both the planes, traces

**UNIT IV**

**Objective:** The objective is to make the students draw the projections of the plane inclined to both the planes.



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**Projections of planes:** inclined to one reference plane; inclined to both the reference planes.

**UNIT V**

**Objective:** The objective is to make the students draw the projections of the various types of solids in different positions inclined to one of the planes.

**Projections of Solids** – Projections of Prisms, Pyramids, Cones and Cylinders simple positions, the axis inclined to one of the reference planes and axis inclined to both the reference planes.

**UNIT VI**

**Objective:** The objective is to represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa.

Conversion of isometric views to **ORTHOGRAPHIC** views;

Conversion of orthographic views to **ISOMETRIC** views

**COURSE OUTCOMES:**

Upon successful completion of this course, the student shall be able to:

1. Understand and construct the polygons and curves in engineering applications.
2. Visualize objects in 3D space and draw Orthographic Projections.
3. Interpret Orthographic and Isometric views of objects.

**TEXT BOOKS:**

1. Engineering Drawing by N.D. Bhatt, Charotar Publishing House Pvt. Ltd
2. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill
3. Engineering Drawing + AutoCAD by K. Venugopal, V. Prabhu Raja, New Age

**REFERENCE BOOKS:**

1. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publications
2. Engineering Graphics for Degree by K.C. John, PHI Learning
3. Engineering Graphics by PI Varghese, McGrawHill Publishers.
4. Engineering Drawing by P.S. Gill, S.K. Kataria & Sons



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Subject	PROBLEM SOLVING AND PROGRAMMING USING PYTHON				
Year/Semester	I B. Tech/II Sem	L	T	P	C
Regulation Year	2019-20	4	0	0	4

**OBJECTIVES:**

- Introduction to Scripting Language
- Exposure to various problems solving approaches of computer science

**Syllabus:**

**UNIT – I**

**Introduction:** History of Python, Need of Python Programming, Applications Basics of Python Programming Using the REPL(Shell), Running Python Scripts, Variables, Assignment, Keywords, Input-Output, Indentation.

**UNIT – II**

**Types, Operators and Expressions:** Types - Integers, Strings, Booleans; Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations Control Flow- if, if-elif-else, for, while, break, continue, pass

**UNIT – III**

**Data Structures** Lists - Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences. Comprehensions.

**UNIT – IV**

**Functions** - Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function - Global and Local Variables.

**Modules:** Creating modules, import statement, from. Import statement, name spacing,

**Python packages,** Introduction to PIP, Installing Packages via PIP, Using Python Packages

**UNIT – V**

**Object Oriented Programming OOP in Python:** Classes, 'self-variable', Methods, Constructor Method, Inheritance, Overriding Methods, and Data hiding.

**Error and Exceptions:** Difference between an error and Exception, Handling Exception, try



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except block, Raising Exceptions, User Defined Exceptions

**UNIT – VI**

**Brief Tour of the Standard Library** - Operating System Interface - String Pattern Matching, Mathematics, Internet Access, Dates and Times, Data Compression, Multithreading, GUI Programming, Turtle Graphics

**Testing:** Why testing is required? Basic concepts of testing, Unit testing in Python, Writing Test cases, Running Tests.

**OUTCOMES:**

- Making Software easily right out of the box.
- Experience with an interpreted Language.
- To build software for real needs.
- Prior Introduction to testing software

**TEXT BOOKS**

1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
2. Learning Python, Mark Lutz, Orielly

**Reference Books:**

1. Think Python, Allen Downey, Green Tea Press
2. Core Python Programming, W.Chun, Pearson.
3. Introduction to Python, Kenneth A. Lambert, Cengage
4. Python Cookbook, O Reilly, David Beazley and Brain k.Jones



<b>Subject</b>	<b>ELEMENTS OF ELECTRICAL &amp; ELECTRONICS ENGINEERING</b>				
<b>Year/Semester</b>	<b>I B. Tech/II Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2019-20</b>	<b>3</b>	<b>-</b>	<b>-</b>	<b>4</b>

**Course Objectives:**

This course covers the topics related to analysis of various electrical circuits, operation of various electrical machines, various electronic components to perform well in their respective fields.

**Learning Objectives:**

1. To learn the basic principles of electrical laws and analysis of networks.
2. To understand the principle of operation and construction details of DC machines.
3. To understand the principle of operation and construction details of transformer.
4. To study the operation of PN junction diode, half wave, full wave rectifiers and OP-AMPs.
5. To learn the operation of PNP and NPN transistors and various amplifiers.

**Syllabus:**

**UNIT - I**

**DC CIRCUITS:**

Electrical circuit elements (R - L and C) - Ohm's-Law, Kirchhoff laws - Series and parallel connection of resistances with DC excitation. Mesh Analysis and Nodal Analysis. Superposition Theorem

**UNIT - II**

**AC CIRCUITS :**

Representation of sinusoidal waveforms - peak and rms values - phasor representation - real power - reactive power - apparent power - power factor - Analysis of single-phase ac circuits consisting of RL - RC - RLC series circuits.

**UNIT - III**

**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 Motor

**UNIT - IV**

**AC MACHINES:**

Principle and operation of Single Phase Transformer - OC and SC test on transformer - principle and operation of Induction Motor [ Elementary treatment only ]

### **UNIT V**

#### **RECTIFIERS & LINEAR ICs:**

PN junction diodes, diode applications (Half wave and bridge rectifiers). Characteristics of operation amplifiers (OP- AMP) - application of OP-AMPs (inverting, non-inverting, integrator and differentiator).

### **UNIT VI**

#### **TRANSISTORS:**

PNP and NPN junction transistor, transistor as an amplifier, single stage CE Amplifier, frequency response of CE amplifier, concepts of feedback amplifier.

#### **TEXT BOOKS:**

1. Electronic Devices and Circuits, R.L. Boylestad and Louis Nashelsky, 9th edition, PEI/PHI 2006.
2. Electrical Technology by Surinder Pal Bali, Pearson Publications.
3. Electrical Circuit Theory and Technology by John Bird, Routledge Taylor & Francis Group

#### **REFERENCE BOOKS:**

1. Basic Electrical Engineering by M.S.Naidu and S.Kamakshiah, TMH Publications.
2. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI Publications, 2nd edition.
3. Basic Electrical Engineering by Nagsarkar, Sukhija, Oxford Publications, 2nd edition.
4. Industrial Electronics by G.K. Mittal, PHI.

#### **COURSE OUTCOMES:**

1. Able to analyse the various electrical networks.
2. Able to understand the operation of DC generators, 3-point starter and conduct the Swinburne's Test.
3. Able to analyse the performance of transformer.
4. Able to analyse the operation of half wave, full wave rectifiers and OP- AMPS.
5. Able to explain the single stage CE amplifier and concept of feedback amplifier.

Name of the Lab	ENGINEERING CHEMISTRY LAB				
Year/Semester	I B. Tech/II Sem	L	T	P	C
Regulation Year	2019-20	-	-	3	1.5

**List of Experiments**

1. Trial experiment - Determination of HCl using standard Na<sub>2</sub>CO<sub>3</sub> solution.
2. Determination of alkalinity of a sample containing Na<sub>2</sub>CO<sub>3</sub> and NaOH.
3. Determination of KMnO<sub>4</sub> using standard Oxalic acid solution.
4. Determination of Copper using standard K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> solution.
5. Determination of temporary and permanent hardness of water using standard EDTA solution.
6. Determination of Vitamin – C
7. Determination of P<sup>H</sup> of the given sample solution using P<sup>H</sup> meter.
8. Conductometric titration between strong acid and strong base.
9. Potentiometric titration between strong acid and strong base.
10. Estimation of copper by Colorometry
11. Estimation of KCl by Ion exchange resin method.
12. Photo Chemical Reduction of Ferric Salt (Blue-Printing)
13. Adsorption of acetic acid on charcoal.
14. Determination of rate of corrosion.
15. Preparation of a polymer.

**Reference Books:**

1. A Textbook of Quantitative Analysis, Arthur J. Vogel.
2. Dr. Jyotsna Cherukuris (2012) Laboratory Manual of engineering chemistry-II, VGS Techno Series
3. Chemistry Practical Manual, Lorven Publications
4. Practical Engineering Chemistry, K. Mukkanti (2009) B.S. Publication

**Outcomes:** The students entering into the professional course have practically very little exposure to lab classes. The experiments introduce volumetric analysis; redox titrations with

different indicators; EDTA titrations; then they are exposed to a few instrumental methods of chemical analysis. Thus, at the end of the lab course, the student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.

Name of the Lab	PROBLEM SOLVING AND PROGRAMMING LAB				
Year/Semester	I B. Tech/II Sem	L	T	P	C
Regulation Year	2019-20	-	-	3	1.5

### List of Experiments

#### Exercise 1 – Basics

- Running instructions in Interactive interpreter and a Python Script
- Write a program to purposefully raise Indentation Error and correct it

#### Exercise 2 – Operations

- Write a program to compute distance between two points taking input from the user (Pythagorean Theorem)
- Write a program add.py that takes 2 numbers as command line arguments and prints its sum.

#### Exercise - 3 Control Flow

- Write a Program for checking whether the given number is a even number or not.
- What is sequence? Write a program using a for loop that loops over a sequence.
- Write a Program to print the multiplication table of a number using for loop.
- Write a program using a while loop to count the number of digits of a number.

#### Exercise 4 - Control Flow – Continued

- Find the sum of all the primes below two million.  
Hint: Make use of sieve of erathosenes

Fibonacci series:

Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be:

1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ...

- By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.

Hint: Use recursive formula for even Fibonacci numbers.

### **Exercise - 5 – DS**

- a) Write a program to get unique values from list.
- b) Write a program to count the number of vowels in a string using sets.

### **Exercise - 6 DS - Continued**

- a) Write a program to count the numbers of characters (character frequency) in the string and store them in a dictionary data structure
- b) Write a program to use split and join methods in the string and trace a birthday with a dictionary data structure.

### **Exercise - 7 Files**

- a) Write a program to print each line of a file in reverse order.
- b) Write a program to compute the number of characters, words and lines in a file.

### **Exercise - 8 Functions**

- a) Write a function `ball_collide` that takes two balls as parameters and computes if they are colliding. Your function should return a Boolean representing whether or not the balls are colliding.

Hint: Represent a ball on a plane as a tuple of  $(x, y, r)$ ,  $r$  being the radius

If (distance between two balls centers)  $\leq$  (sum of their radii) then (they are colliding)

- b) Find mean, median, mode for the given set of numbers in a list.

### **Exercise - 9 Functions – Continued**

- a) Write a function `nearly equal` to test whether two strings are nearly equal. Two strings `a` and `b` are nearly equal when `a` can be generated by a single mutation on `b`.
- b) Write a function `dups` to find all duplicates in the list.

### **Exercise - 10 - Functions - Problem Solving**

- a) Write a function `cumulative product` to compute cumulative product of a list of numbers.
- b) Write a function `reverse` to reverse a list. Without using the reverse function.
- c) Write function to compute gcd, lcm of two numbers. Each function shouldn't exceed one line.

### **Exercise 11 - Multi-D Lists**

- a) Write a program that defines a matrix and prints
- b) Write a program to perform addition of two square matrices
- c) Write a program to perform multiplication of two square matrices

### **Exercise - 12 – Modules**

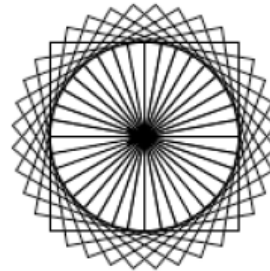
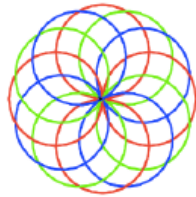
- a) Install packages requests, flask and explore them. using (pip)
- b) Write a script that imports requests and fetch content from the page. Eg. (Wiki)
- c) Write a simple script that serves a simple HTTPResponse and a simple HTML Page

### **Exercise - 13 OOP**

- a) Class variables and instance variable and illustration of the self variable
  - i) Robot
  - ii) Hospital Billing System

### **Exercise - 14 GUI, Graphics**

1. Write a GUI for an Expression Calculator using tk
2. Write a program to implement the following figures using turtle



### **Exercise - 15 - Testing**

- a) Write a test-case to check the function even\_numbers which return True on passing a list of all even numbers
- b) Write a test-case to check the function reverse\_string which returns the reversed string

### **Exercise - 16 - Advanced**

- a) Build any one classical data structure.
- b) Write a program to solve knapsack problem.

<b>Name of the Lab</b>	<b>ELECTRICAL &amp; ELECTRONICS ENGINEERING LAB</b>				
<b>Year/Semester</b>	<b>I B. Tech/II Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2019-20</b>	<b>-</b>	<b>-</b>	<b>3</b>	<b>1.5</b>

The following experiments are required to be conducted as compulsory experiments:

**SECTION A: ELECTRICAL ENGINEERING**

1. Verification of Kirchhoff's Laws
2. Verification of Superposition Theorem.
3. Swinburne's test on D.C. Shunt machine (Predetermination of efficiency of a given D.C. Shunt machine working as motor and generator).
4. OC and SC tests on single phase transformer (Predetermination of efficiency and regulation at given power factors).
5. Speed control of D.C. Shunt motor by
  - a) Armature Voltage control b) Field flux control method
6. Brake test on D.C. Shunt Motor.

**SECTION B: ELECTRONICS ENGINEERING**

1. PN junction Diode characteristics A. Forward bias, B. Reverse bias. (Cut in voltage & Resistance calculations)
2. Transistor CE Characteristics (Input and Output).
3. Full wave Rectifier with and without filters.
4. CE Amplifiers.

Name of the Lab	ENGINEERING WORKSHOP				
Year/Semester	I B. Tech/II Sem	L	T	P	C
Regulation Year	2019-20	-	-	3	1.5

**COURSE OBJECTIVE:**

- To impart hands-on practice on basic engineering trades and skills.

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

**TRADES:**

**Carpentry**

1. T-Lap Joint
2. Cross Lap Joint
3. Dovetail Joint
4. Mortise and Tenon Joint

**Fitting**

1. Vee Fit
2. Square Fit
3. Half Round Fit
4. Dovetail Fit

**Black Smithy**

1. Round rod to Square
2. S-Hook
3. Round Rod to Flat Ring
4. Round Rod to Square headed bolt

**House Wiring**

1. Parallel / Series Connection of three bulbs
2. Stair Case wiring
3. Florescent Lamp Fitting
4. Measurement of Earth Resistance

**Tin Smithy**



1. Taper Tray
2. Square Box without lid
3. Open Scoop
4. Funnel

<b>Subject</b>	<b>ENVIRONMENTAL SCIENCE</b>				
<b>Year/Semester</b>	<b>I B. Tech/II Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2019-20</b>	<b>3</b>	<b>-</b>	<b>-</b>	<b>-</b>

**COURSE OBJECTIVES:**

1. To make the students get awareness on environment,
2. To understand the importance of protecting natural resources,
3. 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:**

**UNIT – I**

**MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL SCIENCE AND ECOSYSTEMS**

Definition, Scope and Importance and sustainability – Need for public awareness- Human population and Environment.

Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem. – Types of ecosystems- Forest, Grassland, Desert and Aquatic ecosystems- Food chains, food webs and ecological pyramids.

**UNIT – II**

**NATURAL RESOURCES**

Forest resources: Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people

Water resources: Conflicts over water, dams – benefits and problems

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.

Energy resources: Growing energy needs- renewable and non-renewable energy sources.

Food resources – World food problems

Land resources- Wasteland reclamation.

Role of an individual in conservation of natural resources.

**UNIT – III**

**BIODIVERSITY AND ITS CONSERVATION**

Definition: Genetic, species and ecosystem diversity- classification - Value of biodiversity: consumptive use, productive use, social - Biodiversity at national and local levels. Hot-spots of biodiversity - Threats to biodiversity - Endangered and endemic species of India - conservation of biodiversity.



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**UNIT – IV**

**ENVIRONMENTAL POLLUTION**

Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies.

Solid Waste Management: Sources, effects and control measures of urban and industrial solid wastes.

Biomedical and e - waste management.

Global Environmental Challenges: Global warming and climate change, acid rains, ozone layer depletion.

**UNIT – V**

**SOCIAL ISSUES AND THE ENVIRONMENT**

Urban problems related to energy -Water conservation, rain water harvesting-Resettlement and rehabilitation of people. Environmental Protection Act –Air Act. –Water Act - Wildlife Protection Act -Forest Conservation Act- Public awareness.

International protocols: Stockholm and Rio Summit, Kyoto protocol and Montreal protocol.

**UNIT – VI**

**ENVIRONMENTAL MANAGEMENT**

Impact Assessment and its significance - various stages of EIA- Environmental audit, Ecotourism.

The student Visit of an Industry / Ecosystem.

**TEXT BOOKS:**

1. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi.
2. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
3. Environmental Studies, R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.

**REFERENCE BOOKS:**

1. Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawad
2. Text Book of Environmental Studies, Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
3. Text book of Environmental Science and Technology – Dr. M. Anji Reddy , BS Publications
4. Environment Studies, Anubha Kaushik, C P Kaushik, New Age International Publishers, 2014
5. Environmental Studies, P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai

**COURSE OUTCOMES:**

Students will be able to

1. Articulate the basic structure, functions, and processes of key social systems affecting the environment.
2. Explain how Natural resources should be used.
3. Identify the threats to biodiversity.



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4. Understand Causes, effects and control measures of environmental pollution.
5. Gain knowledge about watershed management and environmental ethics.

**Course Structure – R19**  
**(With effect from 2019-2020)**

**II Year - I Semester**

S.No	Category	Course Code	Course Title	L	T	P	C	IM	EM	TM
1	BS	19BS3T01	Mathematics-III (Numerical methods & Applied Statistics)	2	1	-	3	40	60	100
2	PC	19CE3T01	Building Materials & Construction	3	-	-	3	40	60	100
3	PC	19CE3T02	Engineering Geology	3	-	-	3	40	60	100
4	PC	19CE3T03	Surveying & Geomatics	3	-	-	3	40	60	100
5	ES	19CE3T04	Engineering Mechanics	3	-	-	3	40	60	100
6	PC	19CE3P01	Engineering Geology Lab	-	-	3	1.5	40	60	100
7	PC	19CE3P02	Surveying Lab	-	-	3	1.5	40	60	100
8	BS	19BS3P01	Business English Communication Lab	-	-	3	1.5	40	60	100
9	BS	19BS3A01	Quantitative Aptitude-1	3	-	-	-	-	-	-
<b>Total</b>				<b>17</b>	<b>1</b>	<b>9</b>	<b>19.5</b>	<b>320</b>	<b>480</b>	<b>800</b>

Subject	MATHEMATICS –III (Numerical Methods and Applied Statistics) (19BS3T01)				
	Year/semester	II B.Tech/I Sem	L	T	P
Regulation year	2020-2021	2	1	0	3

**Course Objectives:**

1. know the standard numerical methods to find roots of functions in practical engineering problems
2. identify the concepts of interpolation, to estimate the unknown functional values.
3. identify the methods for finding the values of derivatives and finite integrals using numerical techniques
4. make use of method of least squares to fit a best curve for the given data and apply the regression analysis to fit the curves
5. understand various statistical distribution
6. decide the null or alternative hypotheses using the suitable test statistic

**SYLLABUS:**

**UNIT-I**

**Solution of Algebraic and Transcendental Equations**

Introduction- algebraic function and transcendental function - Bisection method, Regula –Falsi Method, Iteration Method, Newton- Raphson method.

**UNIT-II**

**Interpolation**

Introduction, Finite Differences, Forward –Backward- Central Differences – Newton’s forward and backward formulae – Gauss Forward and Backward formulae – Lagrange’s Interpolation Formula.

**UNIT-III**

**Numerical Integration and Solution of Ordinary Differential Equations**

Numerical Integration-Trapezoidal rule – Simpson’s 1/3 rd Rule –Simpson’s 3/8 th Rule. Solution by Taylor’s method, Picard’s method, Euler’s & Modified Euler’s method, Runge-Kutta Methods.

#### **UNIT-IV**

##### **Curve Fitting & Correlation and Regression**

Least Squares Method - Quadratic, Power and Exponential models.

Correlation and Regression: Simple Bivariate Correlation: Karl Pearson's coefficient of correlation, Spearman's Rank correlation coefficient. **Linear Regression** - Regression lines, Regression coefficients, properties.

#### **UNIT-V**

##### **Distributions**

Random variables, Discrete and continuous distributions- Normal and Sampling distributions

#### **UNIT-VI**

##### **Tests of Hypothesis**

Null and Alternative Hypothesis, One tail and two tailed tests, Type I and Type II errors. Tests of hypotheses concerning single mean, difference of means using Z- distribution and Student 's t- test.

##### **Text Books:**

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, reprint, 2008.
2. B. V. Ramana, Engineering Mathematics, 4<sup>th</sup> Ed., Tata McGraw Hill, New Delhi, 2009
3. S.C. Gupta, V.K. Kapoor Fundamentals of Mathematical Statistics a Modern Approach, 10th Edition 2000

##### **References:**

1. T.K.V.Iyengar, B. Krishna Ghandhi, S. Ranganathan and M.V.S.S.N.Prasad, Engineering Mathematics, Volume-I, 12<sup>th</sup> Ed., S. Chand Publishers, 2014
2. S.S.Sastry, Introductory methods of Numerical Analysis, Prentice Hall of India Pvt. Ltd., 4th Ed., 2006

<b>Subject</b>	<b>BUILDING MATERIALS AND CONSTRUCTION (19CE3T01)</b>				
<b>Year/semester</b>	<b>II B.Tech/I Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation year</b>	<b>2020-2021</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**COURSE OBJECTIVES:**

1. Initiating the student with the knowledge of basic building materials and their properties.
2. Imparting the knowledge of course pattern in masonry construction and flat roofs and techniques of forming foundation, columns, beams, walls, sloped and flat roofs.
3. The student is to be exposed to the various patterns of floors, walls, different types of paints and varnishes.
4. Imparting the students with the techniques of formwork and scaffolding.
5. The students should be exposed to classification of aggregates, moisture content of the aggregate.

**SYLLABUS:**

**UNIT – I**

**STONES, BRICKS AND TILES**

Properties of Building Stones – Relation to Their Structural Requirements. Classification of Stones – Stone Quarrying – Precautions in Blasting, Dressing of Stone, Composition of Good Brick Earth, Various Methods of Manufacturing of Bricks. Characteristics of Good Tile – Manufacturing Methods, Types of Tiles. Use of Materials like Aluminum, Gypsum, Glass and Bituminous Materials – Their Quality.

**UNIT-II**

**MASONRY**

Types of Masonry, English and Flemish Bonds, Rubble and Ashlar Masonry, Cavity and Partition Walls.

**WOOD:** Structure – Properties – Seasoning of Timber. Classification of Various Types of Woods Used In Buildings – Defects in Timber. Alternative Materials for Wood, Galvanized Iron, Fiber-Reinforced Plastics, Steel, Aluminum.

**UNIT – III**

**LIME AND CEMENT**

**Lime:** Various ingredients of lime – Constituents of lime stone – classification of lime – various methods of manufacture of lime.

**Cement:** Portland cement – Chemical Composition - hydration, Setting and Fineness of cement. Various types of cement and their properties. Various field and laboratory tests for Cement. Various ingredients of Cement concrete and their importance – various tests for concrete.

#### **UNIT-IV**

##### **BUILDING COMPONENTS**

Lintels, Arches, Vaults - stair cases – Types. Different types of floors-Concrete, Mosaic, Terrazzo floors, pitched, flat Roofs. Lean-to-Roof, Coupled Roofs, Trussed roofs- King and Queen Post Trusses. RCC Roofs, Madras Terrace and pre-fabricated roofs.

#### **UNIT-V**

##### **FINISHINGS:**

Damp Proofing and water proofing materials and uses- Plastering, pointing, white washing and distempering

Paints: Constituents of a paint – Types of paints – Painting of new/old Wood – Varnish

Form works and scaffoldings.

#### **UNIT – VI**

##### **AGGREGATES**

Classification of aggregate – Coarse and fine aggregates – Particle shape and Texture – Bond and strength of Aggregate – Specific gravity – Bulk density, porosity and Absorption – Moisture content of Aggregate – Bulking of sand- Sieve analysis -Various tests for aggregates

##### **TEXT BOOKS:**

TB1: Building Materials, S. S. Bhavikatti, Vices publications House private ltd.

TB2: Building Materials, B. C. Punmia, Laxmi Publications private ltd.

##### **REFERENCES:**

R1: Building Materials, S. K. Duggal, New Age International Publications.

R2: Building Materials, P. C. Verghese, PHI learning (P) ltd.

R3: Building Materials, M. L. Gambhir, Tata McGraw Hill Publishing Co. Ltd. NewDelhi..

R4: Building Materials, Construction and Planning, S. MahaboobBasha, Anuradha Publications, Chennai.

##### **COURSE OUT COMES:**

1. Able to Impart the knowledge about the characteristics, sources and defects in various materials used for construction purposes.
2. Able to attain the knowledge of different components of building, their Classification, materials and methods of construction and causes of their failures.
3. Able to understand the types and functions of main building services to be Provided and the defects in the buildings along with the remedial measures for proper Maintenance of the buildings.
4. Able to design and test the materials either in the laboratory or in the field before their actual use at the site.



<b>Subject</b>	<b>ENGINEERING GEOLOGY (19CE3T02)</b>				
<b>Year /semester</b>	<b>II B.Tech/I Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation year</b>	<b>2020-21</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**COURSE OBJECTIVES:**

1. To introduce the Engineering Geology as a subject in Civil Engineering.
2. To enable the student to use subject in civil engineering applications.
3. To know the Geological history of India.

**SYLLABUS:**

**UNIT I**

**INTRODUCTION:** Branches of Geology, Importance of Geology in Civil Engineering with case studies.

Weathering: Weathering of rocks, Geological agents, weathering process of Rock, River process and their development.

**UNIT II**

**MINERALOGY AND PETROLOGY:** Definitions of mineral and rock, Different methods of study of mineral and rock, The study of physical properties of minerals and rocks for megascopic study for the following minerals and rocks, Common rock forming minerals are Feldspar, Quartz Group, Olivine, Augite, Hornblende, Mica Group, Asbestos, Talc, Chlorite, Kyanite, Garnet, Calcite and other ore forming minerals are Pyrite, Hematite, Magnetite, Chlorite, Galena, Pyrolusite, Graphite, Chromite, Magnetite And Bauxite. Classification, structures, textures and forms of Igneous rocks, Sedimentary rocks, Metamorphic rocks, and their megascopic study of granite varieties, (pink, gray, green). Pegmatite, Dolerite, Basalt etc., Shale, Sand Stone, Lime Stone, Laterite, Quartzite, Gneiss, Schist, Marble, Khondalite and Slate.

**UNIT III:**

**STRUCTURAL GEOLOGY:** Strike , Dip and Outcrop study of common geological structures associating with the rocks such as Folds, Faults, Joints and Unconformities- parts, types, mechanism and their importance in Civil Engineering.

**UNIT IV**

**GROUND WATER:** Water table, Cone of depression, Geological controls of Ground Water Movement, Ground Water Exploration Techniques.

**Earthquakes And Land Slides:** Terminology, Classification, causes and effects, Shield areas and Seismic bells, Richter scale intensity, Precautions of building constructions in seismic areas. Classification of Landslides, Causes and Effects, measures to be taken prevent their occurrence at Landslides.



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**UNIT V**

**GEOPHYSICS:** Importance of Geophysical methods, Classification, Principles of Geophysical study by Gravity method, Magnetic method, Electrical methods, Seismic methods, Radiometric method and Electrical resistivity, Seismic refraction methods and Engineering properties of rocks.

**UNIT VI**

**GEOLOGY OF DAMS, RESERVOIRS AND TUNNELS:** Types and purpose of Dams, Geological considerations in the selection of a Dam site. Life of Reservoirs Purpose of Tunneling, effects, Lining of Tunnels. Influence of Geology for successful Tunneling.

**TEXT BOOKS:**

1. 'Engineering Geology' by Subinoy Gangopadhyay, Oxford University press.
2. 'Engineering Geology' by D. Venkat Reddy, Vikas Publishing House pvt. Ltd, 2013.
3. 'Engineering Geology' by N. Chenn Kesavulu, Trinity Press (Laxmi Publications), 2<sup>nd</sup> Edition, 2014.
4. 'Engineering Geology' by Vasudev Kanithi, University Press.

**REFERENCES:**

1. Engineering Geology for Civil Engineers' by P.C. Varghese, PHI learning pvt. Ltd.
2. 'Geology for Engineers and Environmental Society' by Alan E Kehew, person publications, 3rd edition
3. 'Fundamentals of Engineering Geology' by P.G. Bell, B.S.P. Publications, 2012.
4. 'Engineering Geology' by V.Parthesarathi et al., Wiley Publications
5. 'Environmental Geology' by K.S. Valdiya, McGraw Hill Publications, 2nd edition

**COURSE OUTCOMES:**

1. Identify and classify the geological minerals.
2. Judge the strength & suitability of various rocks for civil engineering use.
3. Identify earthquake prone areas to make necessary hazard mitigation.
4. Prepare, analyze and interpret the Engineering Geologic maps for the ground conditions.
5. Test the geological materials and ground to check the suitability of civil engineering project construction.
6. Do site selection for mega engineering projects like Dams, Tunnels, and disposal sites.

SUBJECT	SURVEYING AND GEOMATICS (19CE3T03)				
Year/ Semester	II B.Tech/ I Sem	L	T	P	C
Regulation Year	2020-21	3	-	-	3

**COURSE OBJECTIVES:**

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

1. Know the principle and methods of surveying.
2. Measure horizontal and vertical- distances and angles
3. Recording of observation accurately
4. Perform calculations based on the observation
5. Identification of source of errors and rectification methods
6. Apply surveying principles to determine areas and volumes and setting out curves

**SYLLABUS:**

**UNIT-I**

**Introduction and Basic Concepts:** Introduction, Objectives, classification and principles of surveying, Surveying accessories. Introduction to Compass, levelling and Plane table surveying.

**Measurement of Linear distances-** Approximate methods, Direct Methods- Chains- Tapes, ranging, Tape corrections.

**UNIT-II**

**Prismatic Compass-** Bearings, included angles, Local Attraction, Magnetic Declination, and dip – W.C.B systems and Q.B. system of locating bearings.

**Leveling-** Types of levels, temporary and permanent adjustments, methods of levelling, booking and Determination of levels, Effect of Curvature of Earth and Refraction.

**Contouring-** Characteristics and uses of Contours, methods of contour surveying.

**UNIT-III**

**Areas -** Determination of areas consisting of irregular boundary and regular boundary.

**Volumes -**Determination of volume of earth work in cutting and embankments for level section, volume of borrow pits, capacity of reservoirs.

**Theodolite Surveying:** Types of Theodolites, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometrical levelling when base is accessible and inaccessible.

#### **UNIT-IV**

**Traversing:** Methods of traversing, traverse computations and adjustments, Introduction to Omitted measurements.

**Curves:** Types of curves and their necessity, elements of simple, compound, reverse curves

#### **UNIT-V**

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

**Modern Surveying Methods:** Principle and types of E.D.M. Instruments, Total station- advantages and Applications. Introduction to Global Positioning System

#### **UNIT-VI**

##### **Photogrammetry Surveying:**

Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; Stereoscopy, ground control extension for photographic mapping- aerial triangulation, radial triangulation, methods; photographic mapping- mapping using paper prints, mapping using stereoplottling instruments, mosaics, map substitutes.

#### **TEXT BOOKS:**

1. Surveying (Vol – 1, 2 & 3), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) Ltd., New Delhi.
2. Chandra A M, “Plane Surveying and Higher Surveying”, New age International Pvt. Ltd., Publishers, New Delhi.
3. Duggal S K, “Surveying (Vol – 1 & 2), Tata McGraw Hill Publishing Co. Ltd. New Delhi.

#### **REFERENCES:**

1. Arthur R Benton and Philip J Taety, Elements of Plane Surveying, McGraw Hill.
2. Surveying and levelling by R. Subramanian, Oxford university press, New Delhi
3. Arora K R “Surveying Vol 1, 2 & 3), Standard Book House, Delhi.

#### **COURSE OUTCOMES:**

Course will enable the student to:

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

<b>Subject</b>	<b>ENGINEERING MECHANICS (19CE3T04)</b>				
<b>Year /semester</b>	<b>II B.Tech/I Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation year</b>	<b>2020-21</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**COURSE OBJECTIVES:**

The students completing this course are expected to

1. Understand the concepts of forces and its resolution in different planes, resultant of force system.
2. Know about forces acting on a body, their free body diagrams using graphical methods.
3. Understand the concepts of centre of gravity and moments of inertia and their application.
4. Have knowledge about different types of motion, friction and application of work - energy method.

**SYLLABUS:**

**UNIT-I**

**INTRODUCTION TO ENGINEERING MECHANICS & FORCE SYSTEMS:** Introduction to Engineering Mechanics covering, Force Systems Basic concepts, System of Forces, Coplanar Concurrent Forces, Resultant Force, Moment of Forces and its Application, Couples. Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems.

**UNIT-II**

**FRICTION:** Friction covering, Types of friction, Limiting friction and impending motion, coulomb's laws of dry friction, coefficient of friction, cone of friction, Laws of Friction, Static and Dynamic Friction, Motion of Bodies, ladder friction, wedge friction, screw jack & differential screw jack.

**UNIT-III**

**CENTRIOD:** Centroid and Centre of Gravity covering, Centroids of simple figures from first principle Centroid of composite sections Centre of gravity of simple solid bodies from first principle, Centre of gravity of simple body centre of gravity of composite bodies, Pappus theorems.

**UNIT-IV**

**MOMENT OF INERTIA:** Area moment of inertia- Definition, Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia. **Mass moment** Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies inertia of thin solid rod circular plate M.I of Circular ring M.I of Cylinder, Cone, and Sphere.

### **UNIT-V**

**KINEMATICS & KINETICS:** Review of particle Kinematics, Rectilinear motion and Plane curvilinear motion- Velocity and Acceleration –Motion of Rigid Body. **Kinetics** of Rigid Bodies covering Basic terms, general principles in dynamics Types of motion Instantaneous centre of rotation in plane motion and simple problems, Impulse-momentum Kinetics of rigid body rotation.

### **UNIT-VI**

**WORK, ENERGY, POWER:** Work energy principle, Application in plane motion of connected bodies, Plane motion, impulse momentum method.

#### **TEXT BOOKS:**

1. Irving H. Shames (2006), Engineering Mechanics, 4th Edition, Prentice Hall
2. F. P. Beer and E. R. Johnston (2011), Vector Mechanics for Engineers, Vol I - Statics, Vol II, – Dynamics, 9th Ed, Tata McGraw Hill
3. Timoshenko solutions Manual 5<sup>th</sup> edition – Engineering Mechanics by Timoshenko.
4. R. C. Hibbler (2006), Engineering Mechanics: Principles of Statics and Dynamics, Pearson Press.
5. Andy Ruina and Rudra Pratap (2011), Introduction to Statics and Dynamics, Oxford

#### **REFERENCES:**

1. Shames and Rao (2006), Engineering Mechanics, Pearson Education
2. Hibler and Gupta (2010), Engineering Mechanics (Statics, Dynamics) by Pearson Education
3. Reddy Vijaykumar K. and K. Suresh Kumar (2010), Singer's Engineering Mechanics
4. Bansal R.K. (2010), A Text Book of Engineering Mechanics, Laxmi Publications
5. Khurmi R.S. (2010), Engineering Mechanics, S. Chand & Co.

#### **COURSE OUTCOMES:**

1. Understand the concepts of force and friction, direction and its application.
2. Know the application of free body diagrams and make solution to problems using graphical methods and law of triangle of forces.
3. Calculate the centroid and centre of gravity.
4. Exposed to concepts of moment of inertia and polar moment of inertia including transfer methods and their applications.
5. Exposed to motion in straight line and in curvilinear paths, its velocity and acceleration computation and methods of representing plane motion.

Subject	ENGINEERING GEOLOGY LAB (19CE3P01)				
Year /semester	II B.Tech/I Sem	L	T	P	C
Regulation year	2020-21	0	0	3	1.5

6. Exposed to concepts of work, energy and particle motion.

**LABORATORY OBJECTIVES:**

1. To identify the mega-scopic types of Ore minerals & Rock forming minerals and the mega-scopic types of Igneous, Sedimentary, Metamorphic rocks.
2. To identify the topography of the site & material selection

**LIST OF EXPERIMENTS:**

EXP1: Physical and Engineering properties of minerals: Mega-scopic identification of Rock forming minerals – Quartz group, Feldspar group, Garnet group, Mica group & Talc,

EXP2: Physical and Engineering properties of minerals: Mega-scopic identification of Rock forming minerals – Chlorite, Olivine, Kyanite, Asbestos, Tourmaline, Calcite, Gypsum. etc.

EXP3: Physical and Engineering properties of minerals: Megascopic identification of Ore forming minerals – Magnetite, Hematite, Pyrite, Pyralusite, Graphite, Chromite, etc.

EXP4: Megascopic description and identification of Igneous rocks – Types of Granite, Pegmatite, Gabbro, Dolerite, Syenite, Granite Poryphery, Basalt etc.

EXP5: Megascopic description and identification of Sedimentary rocks – Sand stone, Ferruginous sand stone, Lime stone, Shale, Laterite, Conglomerate

EXP6: Megascopic description and identification of Metamorphic rocks – Biotite – Granite Gneiss, Slate, Muscovite & Biotite, schist, Marble, Khondalite, etc.

EXP7: Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities etc..

EXP8: Simple Structural Geology Problems.

EXP9: Field work – To identify Minerals, Rocks, and Geomorphology & Structural Geology.



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EXP10: To identify the minerals and rocks Augite, Hornblende, Bauxite, Galena, Soapstone

**TEXT BOOKS:**

1. 'Engineering Geology' by Subinoy Gangopadhyay, Oxford University press.
2. 'Engineering Geology' by D. Venkat Reddy, Vikas Publishing House pvt. Ltd, 2013.
3. 'Engineering Geology' by N. Chenna Kesavulu, Trinity Press (Laxmi Publications), 2<sup>nd</sup> Edition, 2014.
4. 'Engineering Geology' by Vasudev Kanithi, University Press.

**REFERENCES:**

1. Engineering Geology for Civil Engineers by P.C. Varghese, PHI learning pvt. Ltd.
2. 'Geology for Engineers and Environmental Society' by Alan E Kehew, person publications, 3rd edition
3. 'Fundamentals of Engineering Geology' by P.G. Bell, B.S.P. Publications, 2012.
4. 'Engineering Geology' by V.Parthesarathi et al., Wiley Publications
5. 'Environmental Geology' by K.S. Valdiya, McGraw Hill Publications, 2nd edition

**LABORATORY OUTCOMES:**

- 1: Understand the physical properties of Rocks & Minerals
- 2: Know the occurrence of materials using the strike & Dip problems.
- 3: Capable to draw the sections for geological maps showing faults & unconformities.
- 4: Investigate the site for civil engineering projects.



Name Of The Lab	SURVEYING LABORATORY (19CE3P02)				
Year/ Semester	II B.Tech/ I Sem	L	T	P	C
Regulation Year	2020-21	0	0	3	1.5

**COURSE OBJECTIVES:**

1. Aimed at acquiring practical knowledge of various components of chain Surveying.
2. To understand compass surveying, plane table surveying, leveling & theodolite.
3. Understand the usage and functions of Total Station & DGPS

**LIST OF EXPERIMENTS:**

1. Chaining across obstacles and determine its area.
2. Surveying of a given area by prismatic compass (closed traverse) and plotting after adjustment.
3. Radiation method or intersection methods by plane Table survey
4. Two point or three-point problems in plane table survey
5. Leveling H.I & Rise & fall
6. Two exercises on contouring.
7. Measurement of horizontal and vertical angles by method of Repetition and Reiteration.
8. Trigonometric Leveling - Heights and distance problem.
9. Heights and distance using Principles of tachometric surveying.
10. Curve setting – different methods.
11. Total Station Surveying - Measurements of Distances and Angles, Slope distances, Height, Traversing,
12. DGPS Surveying – Coordinate Measurements.

**TEXT BOOKS:**

1. Arora, K.R., Surveying, Vol-I, II and III, Standard Book House, 2015.
2. Madhu, N, Sathikumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson India, 2006.
3. B.C.Punimia, Surveying, Vol-I, II and III, Laxmi Publications.

**REFERENCES:**

1. Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International, 2010
2. Anji Reddy, M., Remote sensing and Geographical information system, B.S.

<b>Subject</b>	<b>BUSINESS ENGLISH COMMUNICATION LAB (19BS3P01)</b>				
<b>Year/semester</b>	<b>II B.Tech/I Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation year</b>	<b>2020-2021</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

Publications, 2001

**COURSE OUTCOMES:**

1. Able to Use handle Linear and angular measurements.
2. Able to draw contour maps. Knowledge on calculating elevations of ground. Familiar in using modern tools.

**COURSE OBJECTIVES:**

- To expose student to different situations for better communication
- To inculcate the habit of learning vocabulary for effective communication
- To enable students to acquire Business English communication

**UNIT – I: (2 sessions)**

**Listening:** Listening to short conversations or monologues

**Speaking:** Giving information about oneself and their opinions and giving a short talk on business related topics

**Reading:** Reading short and simple texts to understand the central idea/theme.

**Writing:** Writing a piece of internal business communication of 30-40 words (Email)

**UNIT – II: (2 sessions)**

**Listening :** Listening to a conversation/ monologue and taking notes

**Speaking :** Giving short talk on business related topics.

**Reading:** Matching descriptions of people to short texts. Matching statements to information given in a graph or graphs.

**Writing :** Writing a piece of internal business communication of 30-40 words (Message)

**UNIT – III (2 sessions)**

**Listening:** Listening to longer conversations/interviews.

**Speaking:** Debates. Extempore.

**Reading :** Reading a longer text and deciding whether the statements about the text are right or wrong or if the information is not given.

**Writing :** Write a business letter 60-80 words, based on an input text and some notes.

**UNIT – IV (2 sessions)**



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**Listening:** Listening to TV news channels and taking notes.

Listening to songs and writing down the lyrics.

**Speaking:** Interview sessions

**Reading:** Read a longer text and answering questions.

**Writing:** Writing a Business Report

**UNIT – V: (2 sessions)**

**Listening:** Watching short documentaries and making notes. (General)

**Speaking:** Short plays, Presentations.

**Reading :** Read short texts and fill in a form using information from the texts.

**Writing :** Write a skit and enact.

**UNIT – VI: (2 sessions)**

**Listening:** Watching documentaries and making notes. (Business specific)

**Speaking:** Nail your point.

**Reading :** Critical Reading to know author's perspective.

**Writing :** Write a skit and enact.

**REFERENCE BOOKS:**

1. Cambridge English – Business English Certificate Preliminary
2. Suresh Kumar. E. & Sreehari P.A (2007), Handbook for English Language Laboratories,
3. Cambridge University Press India Pvt. Ltd, New Delhi.
4. Mandal S. K (2006), Effective Communication & Public Speaking, Jaico Publishing House, New Delhi.
5. Grant Taylor (2004), English Conversation Practice, Tata McGraw Hill, New Delhi.
6. Balasubramanian. T (2000), A text book of English Phonetics for Indian Student, MacMillan Publishers, India.
7. Kamalesh Sadanand, Susheela Punitha (2008), Spoken English: A foundation Course: Parts 1& 2, New Delhi, Orient Longman Pvt. Ltd

**WEB REFERENCES:**

1. [www.cambridgeenglish.org](http://www.cambridgeenglish.org).
2. [www.esl-lab.com](http://www.esl-lab.com)

**COURSE OUTCOMES:**

1. Understand and interpret conversations in informal and formal contexts.
2. Exhibit one's vocabulary, body language, pronunciation and intonation with proper Etiquette.
3. Critique various written texts.
4. Construct appropriate Business English writing skills.
5. Develop skit exhibiting all LSRW skills.

<b>Subject</b>	<b>QUANTITATIVE APTITUDE-I (19BS3A01)</b>				
<b>Year/Semester</b>	<b>II B. Tech / I Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2020-21</b>	<b>3</b>	<b>-</b>	<b>-</b>	<b>0</b>

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op the skill of note making.

**Course Objectives:**

1. Understand different number systems, factorization, divisibility and concept of LCM and HCF.
2. Find averages, relation between ratio and proportion, average price of mixture of different quantities and relation between fraction and percentage.
3. Know the concepts of CP,SP, MRP, profit or loss incurred in a transaction.
4. Know the concepts of principal, interest, difference between SI and CI, EMIs.
5. Understand the relation between speed, distance and time for trains and boats in a river.
6. Understand the relation between time and efficiency, combined work and wages paid for the work.

**Syllabus**

**UNIT –I**

**Number Systems**

Basic number systems –Face and Place Value, Digital Sum-Applications, Factors, Multipliers, Prime, & Composite Numbers, Divisibility Rules, LCM and HCF-Remainder Rules.

**UNIT- II**

**Averages, Ratio& Proportion**

Average-Weighted average, Ratio-Concept and properties, Proportions-Mean, Third and Fourth proportions, Mixtures & Allegations-Definition-Allegation Rule, Percentages-Conversion of Percentages to Fractions and Vice-Versa.

**UNIT –III**



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**Profit & Loss**

Cost Price- Selling Price- Marked Price, Discount- Successive Discounts, Profit or Loss Percentage, False Weights- Dishonest Dealer.

**UNIT –IV**

**Simple & Compound Interest**

Principal-Interest Rate-Tenure, Simple Interest-Formula-Sum, Compound Interest-Formula-Relation Between Simple & Compound Interest, loan-EMI, Investments-Shares.

**UNIT – V**

**Time & Distance**

Time-Distance-Speed-Relation, Conversion of Speed , Average Speed, Trains-Relative Speed-Same and Opposite –Platform, Races, Boats-Streams-Upstream and Downstream.

**UNIT –VI**

**Time & Work**

Work-Time-Efficiency, Combined Work-Partnership-Division of Wages, Chain Rule, Pipes and Cisterns-Inlet-Outlet.

**Text Books:**

1. Dr. R.S. Aggarwal, Quantitative Aptitude for competitive Examinations, Sultan Chand Publications, 2017.

**References:**

1. Arun Sharma, How to Prepare for Quantitative Aptitude for the CAT, Tata McGraw Hill Publishing Company, 2016.
2. Dinesh Khattar, The Pearson Guide to Quantitative Aptitude for Competitive Examinations, Pearson India, 2016

**Course Outcomes:**

After completing this course, the students will be able to

1. Find number of factors, LCM and HCF of numbers and fractions, least and greatest number divisible by given numbers and leaving some remainder(s).
2. Evaluate average of numbers, Proportions of given ratio, ratio or average price of two quantities of different prices when mixed to get new mix, use relation between fractions and percentages in calculation.
3. Identify the profit or loss incurred in a transaction and how cheating is possible by an



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unfair trader.

4. Calculate the simple and compound interests, difference between them and the EMI repayment for a loan.
5. Evaluate the time taken by a train/car for crossing a static object or a moving object and time taken by a person to row a boat in a river.
6. Calculate the time required for individual or combined work, shares of amount for their work and time taken for a tank/cistern to get filled by inlets and outlet.

**Course Structure – R19  
(With effect from 2019-2020)**

**II Year - II Semester**

S.No	Category	Course code	Course Title	L	T	P	C	IM	EM	TM
1	PC	19CE4T01	Strength of Materials-1	3	-	-	3	40	60	100
2	PC	19CE4T02	Concrete Technology	3	-	-	3	40	60	100
3	PC	19CE4T03	Fluid Mechanics	3	-	-	3	40	60	100
4	HS	19MB4T01	Managerial Economics & Financial Analysis	3	-	-	3	40	60	100
5	PC	19CE4T04	Structural Analysis	3	-	-	3	40	60	100
6	PC	19CE4P01	Solid Mechanics Lab	-	-	3	1.5	40	60	100
7	PC	19CE4P02	Concrete Technology Lab	-	-	3	1.5	40	60	100
8	PC	19CE4P03	Fluid Mechanics Lab	-	-	3	1.5	40	60	100
9	BS	19BS4T01	Logical Reasoning	-	-	2	1	40	60	100
<b>Total</b>				<b>15</b>	<b>0</b>	<b>11</b>	<b>20.5</b>	<b>360</b>	<b>540</b>	<b>900</b>

Subject	STRENGTH OF MATERIALS – 1				
Year / Semester	II B.Tech/II Sem	L	T	P	C
Regulation Year	2020-21	3	0	0	3

**Course Learning Objectives:**

1. To impart preliminary concepts of Strength of Material and Principles of Elasticity and Plasticity Stress strain behavior of materials and their governing laws. Introduce student the moduli of Elasticity and their relations
2. To impart concepts of Bending Moment and Shear force for beams with different boundary and loading conditions and to draw the diagrams of variation across the length.
3. To give concepts of stresses developed in the cross section and bending equations calculation of section modulus of sections with different cross sections
4. The concepts above will be utilized in measuring deflections in beams under various loading and support conditions
5. To classify cylinders based on their thickness and to derive equations for measurement of stresses across the cross section when subjected to external pressure.

**SYLLABUS:**

**UNIT – I**

**Simple Stresses and Strains and Strain Energy:** Elasticity and plasticity – Types of stresses and strains – Hooke’s law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson’s ratio and volumetric strain – Elastic module and the relationship between them – Bars of varying section – composite bars – Temperature stresses.

**Strain Energy** – Resilience – Gradual, sudden, impact and shock loadings – simple applications.

**UNIT – II**

**Shear Force and Bending Moment:** Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, u.d.l., uniformly varying loads and combination of these loads – Point of contraflexure – Relation between S.F., B.M and rate of loading at a section of a beam.

**UNIT – III**

**Flexural Stresses:** Theory of simple bending – Assumptions – Derivation of bending equation:  $M/I = f/y = E/R$ , 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.



#### **UNIT –IV**

**Shear Stresses:** Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle sections, built up beams, shear centre.

#### **UNIT – V**

**Deflection Of Beams:** Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay’s methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, - U.D.L. Uniformly varying load. Mohr’s theorems – Moment area method – application to simple cases including overhanging beams.

#### **UNIT – VI**

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

**Thick Cylinders:** Introduction Lamé’s theory for thick cylinders – Derivation of Lamé’s formulae – distribution of hoop and radial stresses across thickness – design of thick cylinders – compound cylinders – Necessary difference of radii for shrinkage – Thick spherical shells.

#### **TEXT BOOKS:**

1. Strength of Materials by Strength of materials, R. K. Rajput, S. Chand & Co, New Delhi
2. Strength of Materials by S. Ramamrutham,

#### **REFERENCES:**

1. Strength of Materials by R.K Bansal, Lakshmi Publication
2. Strength of Materials by R.Subramanian, Oxford University Press, New Delhi
3. Mechanics of Materials by B.C Punmia, Jain and Jain.

#### **Course Outcomes:**

1. The student will be able to understand the basic materials behavior under the influence of different external loading conditions and the support conditions
2. The student will be able to draw the diagrams indicating the variation of the key performance features like bending moment and shear forces
3. The student will have knowledge of bending concepts and calculation of section modulus and for determination of stresses developed in the beams and deflections due to various loading conditions
4. The student will be able to assess stresses across section of the thin and thick cylinders to arrive at optimum sections to withstand the internal pressure using Lamé’s equation.

<b>Subject</b>	<b>CONCRETE TECHNOLOGY</b>				
<b>Year / Semester</b>	<b>II B.Tech/II Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2020-21</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**COURSE OBJECTIVES:**

1. To learn the concepts of Concrete production and its behavior in various environments.
2. To learn the test procedures for the determination of properties of concrete.
3. To understand durability properties of concrete in various environments.
4. Knowledge on mix design of concrete
5. Students Will be having Knowledge in emerging technologies of concrete.

**UNIT I**

**CEMENTS & ADMIXTURES:** Portland cement – Chemical composition – Hydration, Setting of cement, Fineness of cement, Structure of hydrate cement – Tests for physical properties – Different grades of cements - Admixtures

**UNIT II**

**AGGREGATES:** Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregates – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand – Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Gap graded and well graded aggregate as per relevant IS code – Maximum aggregate size

**UNIT III**

**FRESH CONCRETE:** Steps in manufacturing of concrete- proportion, Mixing, Placing, Compaction, Finishing, Workability – Factors affecting– Measurement of workability by different tests – Setting times of concrete – Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete, Ready mixed concrete.

**UNIT IV**

**HARDENED CONCRETE:** Water / Cement ratio – Abram’s Law – Gel space ratio – Nature of strength of concrete –Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compression & tensile strength - Curing.

**TESTING OF HARDENED CONCRETE:** Compression tests – Tension tests – Factors affecting strength – Flexure tests –Splitting tests – Non-destructive testing methods – Codal provisions for NDT.

### **UNIT V**

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

### **UNIT VI**

**MIX DESIGN:** Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Concepts Proportioning of concrete mixes by BIS method of mix design. Self-Compact Concrete and Fiber Reinforced Concrete.

**SPECIAL CONCRETE :** Ready mixed concrete, Shotcrete, Light weight aggregate concrete, Cellular concrete, No-fines concrete, High density concrete, Fibre reinforced concrete, Different types of fibres, Factors affecting properties of F.R.C, Polymer concrete, Types of Polymer concrete, Properties of polymer concrete, High performance concrete- Self consolidating concrete, SIFCON, self-healing concrete.

#### **TEXT BOOKS:**

1. Concrete Technology by M. S. Shetty. – S. Chand & Co.; 2004
2. Properties of Concrete by A. M. Neville – PEARSON – 4th edition
3. Concrete Technology by A.R. Santha Kumar, Oxford University Press, New Delhi
4. Concrete Technology by M.L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi

#### **REFERENCES:**

1. Text Book of Concrete Technology, Mahaboob Bhasha, Anuradha publications,
2. Advanced Concrete Technology – by Zongjin Li (Author)
3. Advanced Concrete Technology - Author: John Newman, B S Choo

#### **COURSE OUTCOMES:**

1. Identify and classify the properties of Cement, Aggregate and Concrete.
2. Understand the behaviour of concrete in various environments.
3. Illustrate the importance of quality of concrete.
4. Know how to test the fresh and hardened concrete.
5. Differentiate the concepts and effects of the Elasticity, Creep & Shrinkage.
6. Design the concrete mix by IS method.
7. Understand the behavior of different types of concrete in various loading And environmental conditions.

SUBJECT	FLUID MECHANICS				
YEAR/SEMESTER	II B.Tech/II SEM	L	T	P	C
REGULATION YEAR	2020-21	3	-	-	3

**Course Learning Objectives:**

1. To understand the properties of fluids and fluid statics
2. To derive the equation of conservation of mass and its application
3. To solve kinematic problems such as finding particle paths and stream lines
4. To use important concepts of continuity equation, Bernoulli's equation and
5. turbulence, and apply the same to problems
6. To analyze laminar and turbulent flows
7. To understand the various flow measuring devices
8. To study in detail about boundary layers theory.

**Syllabus:**

**UNIT - I**

**Introduction :** Dimensions and units – Physical properties of fluids – specific gravity, viscosity, surface tension, vapour pressure and their influences on fluid motion, pressure at a point, Pascal's law, Hydrostatic law -atmospheric, gauge and vacuum pressure measurement of pressure. Pressure gauges, Manometers: Differential and Micro Manometers.

**UNIT – II**

**Hydrostatics:** Hydrostatic forces on submerged plane, Horizontal, Vertical, inclined and curved surfaces – Center of pressure. Derivations and problems.

**Fluid Kinematics:** Description of fluid flow, Stream line, path line and streak line and stream tube. Classification of flows: Steady, unsteady, uniform, non-uniform, laminar, turbulent, rotational and irrotational flows – Equation of continuity for one, two, three dimensional flows – stream and velocity potential functions, flow net analysis.

**UNIT – III**

**Fluid Dynamics:** Surface and body forces – Euler's and Bernoulli's equations for flow along a stream line for 3D flow, Navier statistical equations - Momentum equation and its application – forces on pipe bend.

**UNIT – IV**

**Laminar Flow and Turbulent Flows:** Reynold's experiment – Characteristics of Laminar & Turbulent flows, Shear and velocity distributions, Laws of Fluid friction, Hagen-Poiseulle Formula, Flow between parallel plates, Flow through long tubes, hydro dynamically smooth and rough flows.

**Closed Conduit Flow:** Darcy-Weisbach equation, Minor losses – pipes in series – pipes in parallel – Total energy line and hydraulic gradient line, variation of friction factor with Reynold's

number – Moody's Chart, Pipe network problems, Hazen-William's formula, Hard-Cross Method

#### **UNIT – V**

**Measurement of Flow:** Pitot tube, Venturi meter and Orifice meter –classification of orifices, small orifice and large orifice, flow over rectangular, triangular, trapezoidal and Stepped notches –Broad crested weirs

#### **UNIT – VI**

**Boundary Layer Theory:** Boundary layer (BL) – concepts, Prandtl contribution, Characteristics of boundary layer along a thin flat plate, Vonkarman momentum integral equation, laminar and turbulent Boundary layers (no deviations)- BL in transition, separation of BL, Control of BL, flow around submerged objects-Drag and Lift- Magnus effect.

#### **Text Books:**

1. Fluid Mechanics, P. N. Modi and S. M. Seth, Standard book house, New Delhi
2. A text of Fluid mechanics and hydraulic machines, R. K. Bansal - Laxmi Publications (P)ltd., New Delhi

#### **References:**

1. Mechanics of Fluids, Merle C. Potter, David C. Wiggert and Bassem H. Ramadan, CENGAGE Learning
2. Fluid Mechanics and Machinery, C.S.P. Ojha, R. Berndtsson and P.N. Chandramouli, Oxford Higher Education.

#### **Course Outcomes:**

1. Understand the various properties of fluids and their influence on fluid motion and analyse a variety of problems in fluid statics and dynamics.
2. Calculate the forces that act on submerged planes and curves.
3. Identify and analyse various types of fluid flows.
4. Apply the integral forms of the three fundamental laws of fluid mechanics to turbulent and laminar flow through pipes and ducts in order to predict relevant pressures, velocities and forces.
5. Draw simple hydraulic and energy gradient lines.
6. Measure the quantities of fluid flowing in pipes, tanks and channels.

<b>Subject</b>	<b>MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS</b>				
<b>Year / Semester</b>	<b>II B.Tech /II Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2020-21</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**COURSE OBJECTIVES:**

The objective of the course is to create awareness about different economic business and accounting issues.

**UNIT-I**

**Introduction to Managerial Economics and demand Analysis:**

Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects –Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting,

**UNIT – II**

**Production and Cost Analysis:**

Concept of Production function- Cobb-Douglas Production function - Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs- Fixed costs, Variable Costs and Total costs –Cost –Volume-Profit analysis-Determination of Breakeven point(simple problems)Managerial significance and limitations of Breakeven point.

**UNIT – III**

**Introduction to Markets & Pricing Policies:**

Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination - Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing: (Flat Rate Pricing, Usage sensitive pricing) and Priority Pricing.

**UNIT – IV**

**Types of Business Organization and Business Cycles:**



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Features and Evaluation of Sole Trader, Partnership, Joint Stock Company – State/Public Enterprises and their forms – Business Cycles: Meaning and Features – Phases of a Business Cycle.

**UNIT – V**

**Introduction to Accounting:**

Double Entry Systems – Personal account, Real account, Nominal account GAAP-Preparation of final accounts –Trading account, Profit and Loss account, Balance sheet simple problems - Ratio Analysis .

**UNIT – VI**

**Capital and Capital Budgeting:**

Meaning of Capital- Capital Budgeting- Traditional Methods (payback period, accounting rate of return) and modern methods (Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index)

**REFERENCES:**

1. Dr. B. Kuberudu and Dr. T. V. Ramana: Managerial Economics & Financial Analysis, Himalaya Publishing House, 2014.
2. V. Maheswari: Managerial Economics, Sultan Chand. 2014
3. Suma Damodaran: Managerial Economics, Oxford 2011.
4. Vanitha Agarwal: Managerial Economics, Pearson Publications 2011.
5. Sanjay Dhameja: Financial Accounting for Managers, Pearson.
6. Maheswari: Financial Accounting, Vikas Publications.
7. S. A. Siddiqui & A. S. Siddiqui: Managerial Economics and Financial Analysis, New Age International Publishers, 2012
8. Ramesh Singh, Indian Economy, 7th Edn., TMH 2015
9. Pankaj Tandon A Text Book of Microeconomic Theory, Sage Publishers, 2015
10. Shailaja Gajjala and Usha Munipalle, Universities press, 2015

<b>Subject</b>	<b>STRUCTURAL ANALYSIS</b>				
<b>Year / Semester</b>	<b>II B.Tech/IISem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2020-21</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Cour**

**se Learning Objectives:**

1. To give preliminary concepts of assessment of bending moment and shear force in Propped cantilevers.
2. To give preliminary concepts of assessment of bending moment and shear force in fixed beams and continuous beams due to various loading conditions.
3. To impart concepts of Bending Moment and Shear force for beams with different boundary and loading conditions.
4. The procedure for development of slope deflection equations and moment distribution method to solve application to continuous beams with and without settlement of supports.
5. Equip student with concepts of Arches.
6. The concepts of moving loads and influence lines are imparted for assessment of maximum SF and BM at a given section when loads of varying spans rolling loads of Pratt and Warren trusses. Familiarize Students with Different types of Structures.

**SYLLABUS:**

**UNIT – I**

**Propped Cantilever:** Analysis of propped cantilevers-shear force and Bending moment diagram-Deflection of propped cantilevers.

**UNIT - II**

**Fixed Beams:** Introduction to statically indeterminate beams with U. D. load, central point load, eccentric point load, number of point loads, uniformly varying load, couple and combination of loads - shear force and Bending moment diagrams-Deflection of fixed beams including effect of sinking of support, effect of rotation of a support.

**UNIT - III**

**Continuous Beams:** Introduction- Clapeyron's theorem of three moments-Analysis of continuous beams with constant moment of inertia with one or both ends fixed-continuous beams



with overhang, continuous beams with different moment of inertia for different spans-Effects of sinking of supports-shear force and Bending moment diagrams.

#### **UNIT - IV**

**Slope-Deflection Method:** Introduction, derivation of slope deflection equation, application to continuous beams with and without settlement of supports.

**Moment Distribution Method:** Stiffness and carry over factors – Distribution factors – Analysis of continuous beams with and without sinking of supports – Portal frames – including Sway-Substitute frame analysis by two cycle.

#### **UNIT – V**

**Three Hinged Arches:** Elastic theory of arches – Eddy's theorem – Determination of horizontal thrust, bending moment, normal thrust and radial shear – effect of temperature. Hinges with supports at different levels.

#### **UNIT – VI**

**Moving Loads And Influence Lines:** 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, U. D load shorter than the span, two point loads with fixed distance between them and several point loads-Equivalent uniformly distributed load-Focal length.

**INFLUENCE LINES:** 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 sections, single point load, U.D. load longer than the span, U.D. load shorter than the span- Influence lines for forces in members of Pratt and Warren trusses.

#### **Text Books:**

1. Basic Structural Analysis, C. S. Reddy Tata Mc.Graw-Hill, New Delhi.
2. Analysis of Structures by T.S. Thandavamoorthy, Oxford University Press, New Delhi
3. Analysis of Structures- Vol. I and II, V. N. Vazirani and M. M. Ratwani, Khanna Publishers, New Delhi
4. Structural Analysis, R.C. Hibbeler, Pearson Education, India



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5. Theory of Structures – II, B. C. Punmia, Jain & Jain, Laxmi Publications, India.

**References:**

1. Theory of Structures, B. C Punmia, A. K Jain & Arun K. Jain, Lakshmi Publications
2. Theory of Structures, R.S. Khurmi, S. Chand Publishers.
3. Structural Analysis-I, Hemanth Patel, Yogesh Patel, Synergy Knowledgeware, Mumbai
4. Structural Analysis I Analysis of Statically Determinate Structures, P. N. Chandramouli, Yesdee Publishing Pvt Limited, Chennai
5. Theory of structures, Ramamuratham, Dhanpatrai Publications.
6. Comprehensive Structural Analysis-Vol. I & 2, R. Vaidyanathan & P. Perumal- Laxmi Publications Pvt. Ltd., New Delhi.

**Course Outcomes:**

1. Distinguish between the determinate and indeterminate structures.
2. Identify the behavior of structures due to the expected loads, including the moving loads, acting on the structure.
3. Estimate the bending moment and shear forces in beams for different fixity conditions.
4. Analyze the continuous beams using various methods -, three moment method, slope deflection method, energy theorems.
5. Draw the influence line diagrams for various types of moving loads on beams/bridges.
6. Analyze the loads in Pratt and Warren trusses when loads of different types and spans are passing over the truss.
7. Analyze structures using Moment Distribution.

<b>Subject</b>	<b>SOLID MECHANICS LAB</b>				
<b>Year / Semester</b>	<b>II B.Tech/II Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2020-21</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**COURSE OBJECTIVES:**

1. To determine the tension & bending of beam
2. To Conduct the Torsion, Hardness & Spring Test
3. To Conduct Compression test on Concrete
4. To verify Maxwell's Reciprocal theorem on beams

**List of Experiments:**

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

**List of Major Equipment:**

1. UTM for conducting tension test on rods
2. Steel beam for flexure test

3. Wooden beam for flexure test
4. Torsion testing machine
5. Brinnell's / Rock well's hardness testing machine
6. Setup for spring tests
7. Compression testing machine
8. Izod Impact machine
9. hear testing machine
10. Beam setup for Maxwell's theorem verification.
11. Continuous beam setup

<b>Subject</b>	<b>CONCRETE TECHNOLOGY LAB</b>				
<b>Year/Semester</b>	<b>II B.Tech/II Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2020-21</b>	-	-	<b>3</b>	<b>1.5</b>

12. Electrical Resistance gauge.

**LABORATORY OBJECTIVES:**

1. To test the basic properties ingredients of concrete, fresh and hardened concrete properties.

**LIST OF EXPERIMENTS**

- EXP1: Determination of normal Consistency and fineness of cement.
- EXP2: Determination of initial setting time and final setting time of cement.
- EXP3: Determination of specific gravity and soundness of cement.
- EXP4: Determination of compressive of strength of cement.
- EXP5: Determination of grading and fineness modulus of coarse aggregate by Sieve analysis.
- EXP6: Determination of specific gravity of coarse aggregate
- EXP7: Determination of grading and fineness modulus of fine aggregate (sand ) By sieve analysis.
- EXP8: Determination of bulking of sand.
- EXP9: Determination of workability of concrete by compaction factor method.
- EXP10: Determination of workability of concrete by slump test
- EXP11: Determination of compressive strength of cement concrete and its young's modulus.
- EXP12: Determination of split tensile strength of concrete.
- EXP13: Non-Destructive testing on concrete (for demonstration)

Note: Minimum of 10 Experiments to be done.

**LABORATORY OUTCOMES:**

1. Capable to conduct test on Cement determine the basic properties of cement.

2. Able to determine the basic properties of Coarse aggregates and fine aggregates
3. Understand the properties of concrete.
4. Able to determine the Compressive strength of concrete.

**REFERENCES:**

List of IS Codes for Cement and Concrete

1. IS 269:1989 – Specification for ordinary Portland cement, 33 grade
2. IS 383:1970 – Specification for coarse and fine aggregates from natural sources for concrete
3. IS 455:1989 Specification for Portland slag cement
4. IS 516:1959 Method of test for strength of concrete
5. IS 650:1991 Specification for standard sand for testing of cement
6. IS 1199:1959 Methods of sampling and analysis of concrete
7. IS 1727:1967 Methods of test for pozzolanic materials
8. IS 2386(Part 1):1963 Methods of test for aggregates for concrete: Part 1 Particle size and shape
9. IS 2386(Part 2):1963 Methods of test for aggregates for concrete: Part 2 Estimation of deleterious materials and organic impurities
10. IS 2386(Part 5):1963 Methods of test for aggregates for concrete: Part 5 Soundness
11. IS 2386(Part 6):1963 Methods of test for aggregates for concrete: Part 6 Measuring mortar making properties of fine aggregates
12. IS 3085:1965 Method of test for permeability of cement mortar and concrete
13. IS 3466:1988 Specification for masonry cement
14. IS 3535:1986 Methods of sampling hydraulic cement
15. IS 3812(Part 2):2003 Specification for pulverized fuel ash Part 2 For use as admixture in cement mortar and concrete
16. IS 5513:1996 Specification for vicat apparatus
17. IS 5514:1996 Specification for apparatus used in Le-Chatelier test
18. IS 5515:1983 Specification for compaction factor apparatus
19. IS 5816:1999 Method of test for splitting tensile strength of concrete.
20. IS 8142:1976 Method of test for determining setting time of concrete by penetration.
21. IS 9284:1979 Method of test for abrasion resistance of concrete

<b>Name of the Lab</b>	<b>FLUID MECHANICS LAB</b>				
<b>Year/Semester</b>	<b>II B.Tech/II SEM</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2020-21</b>	<b>-</b>	<b>-</b>	<b>3</b>	<b>1.5</b>

**COURSE OBJECTIVES:**

1. To calibrate the various discharge measuring instruments for flow through pipes.
2. To determine the coefficient of discharge through small orifice and mouth piece
3. To calibrate the notches for discharge measurement for flow through open channels.
4. To determine the friction factor and losses for flow through pipes
5. To verify the Bernoulli's theorem.

**List of Experiments**

1. Calibration of Venturimeter & Orifice meter
2. Determination of Coefficient of discharge for a small orifice by a constant head method.
3. Determination of Coefficient of discharge for an external mouth piece by variable head method.
4. Calibration of contracted Rectangular Notch and /or Triangular Notch
5. Determination of Coefficient of loss of head in a sudden contraction and friction factor.
6. Verification of Bernoulli's equation.

7. Impact of jet on vanes
8. Study of Hydraulic jump.
9. Performance test on Pelton wheel turbine
10. Performance test on Francis turbine.
11. Efficiency test on centrifugal pump.
12. Efficiency test on reciprocating pump

**List of Equipment:**

1. Venturimeter setup.
2. Orifice meter setup.
3. Small orifice setup.
4. External mouthpiece setup.
5. Rectangular and Triangular notch setups.
6. Friction factor test setup.
7. Bernoulli's theorem setup.
8. Impact of jets.
9. Hydraulic jump test setup.
10. Pelton wheel and Francis turbines.
11. Centrifugal and Reciprocating pumps.

**References:**



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1. Mechanics of Fluids, Merle C. Potter, David C. Wiggert and Bassem H. Ramadan,  
CENGAGE Learning
2. Fluid Mechanics and Machinery, C.S.P. Ojha, R. Berndtsson and P.N. Chandramouli,  
Oxford Higher Education.

**COURSE OUTCOMES:**

1. Apply the theoretical principles in calibrating the flow measuring devices used in pipes, channels and tanks.
2. Understand the concept of friction factor and losses through pipes.

<b>Subject</b>	<b>LOGICAL REASONING</b>				
<b>Year/Semester</b>	<b>II B. Tech / II Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2020-21</b>	<b>0</b>	<b>-</b>	<b>2</b>	<b>1</b>

**Course Objectives:**

Enable the students to

1. Be familiar with different relations in a family, concepts of clocks and calendars.
2. Find position and order of a person /object, routes between points.
3. Understand the techniques of coding and decoding.
4. Understand the validity of statements and inferences from them.
5. Draw valid conclusions from given statements.
6. Understand the concept of analogy and properties of dice.

**Syllabus**

**UNIT –I**

**Blood Relations, Directions, Clocks & Calendars.**

Blood relations -family tree, types of problems on blood relations- first person narrating type-coded relation-puzzle relation, direction-distance-direction and distance problems, angle between hands -correct or incorrect time, day of a date-repeated calendars.

**UNIT –II**

**Ranks & Position, Puzzles.**

Ranks-based on positions, counting, comparisons, puzzles-table based, selection based, seating based, graph and network Based.



**UNIT –III**

**Coding & Decoding, Series.**

Coding and decoding-letter coding, number coding, symbol coding, substitution and mixed type, Symbols and notations, series-number, letter and word type, missing term.

**UNIT –IV**

**Critical Reasoning-I.**

Syllogisms, logical consistency, inference & degree of truth, assertion & reason.

**UNIT –V**

**Critical Reasoning-II**

Statement & assumption, statement & conclusion, cause & effect, decision making.

**UNIT –VI**

**Non-Verbal Reasoning**

Series, odd-man out, analogies, mirror & water images, paper cutting & folding, figure formation, cubes & dice.

**Text Books:**

1. Dr. R.S. Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning Sultan Chand Publications, 2018.

**References:**

1. B.S.Sijwali and Indu Sijwali, A New Approach to Reasoning Verbal & Non-Verbal, Arihant Publishers, 2016.
2. M.K. Pandey, Analytical Reasoning, Bsc Publishing Co. Pvt. Ltd 2009.

**Course Outcomes:**

After completing this course, the students will be able to

1. Identify the relation between given persons, find the direction and distance from starting point, find angle between hands at given time and vice-versa, find day of given date and vice-versa.
2. Find the position and rank of a person/object in an arrangement, arranging in order using



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given data.

3. Decode the given code pattern and code given word in terms of alphabet, numbers, symbols and mixed, identify missing term in the pattern/series.
4. Draw a valid conclusion from the statements, consistency of inference drawn, valid reason from given assertions.
5. Identify the cause for the assumed effect, take decision logically from the given data.
6. Identify the odd one in the given series/group, number opposite any face of dice, figure completion from a folded figure.

**Course Structure – R19**  
**(With effect from 2019-2020)**

**III Year - I Semester**

S.No	Category	Course code	Course Title	L	T	P	C	IM	EM	TM
1	PC	19CE5T01	Design & Drawing of Reinforced Concrete Structures	4	-	2	3	40	60	100
2	PC	19CE5T02	Strength of Materials-II	3	-	-	3	40	60	100
3	PC	19CE5T03	Geo-Technical Engineering	3	-	-	3	40	60	100
4	PE	19CE5T04 19CE5T05 19CE5T06 19CE5T07	<b>Professional Elective-I</b> 1. Remote sensing & Geographical Information Systems 2. Solid Waste Management 3. Advanced surveying 4. Green Building Technologies	3	-	-	3	40	60	100
5	PC	19CE5T08	Hydraulics & Hydraulic Machinery	3	-	-	3	40	60	100
6	OE	19OE5T11	<b>Open Elective-I</b> 1. MAT LAB and Simulink for Engineers 2. Data Structures 3. Principles of Electronic Communication Systems 4. AI Tools, Techniques and Applications	3	-	-	3	40	60	100
7	PC	19CE5P01	Geo-Technical Engineering Lab	-	-	3	1.5	40	60	100
8	HS	19BS5P01	Advanced English Communication Skills Lab	-	-	3	1.5	40	60	100
9	BS	19BS5A01	Quantitative Aptitude-II	3	-	-	-	-	-	-
<b>Total</b>				<b>22</b>	<b>-</b>	<b>8</b>	<b>21</b>	<b>320</b>	<b>480</b>	<b>800</b>

Subject	DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES				
Year / Semester	III B.Tech/I Sem	L	T	P	C
Regulation Year	2021-22	4	0	2	3

**Course Learning Objectives:** The objective of this course is:

1. Familiarize Students with different types of design philosophies
2. Equip student with concepts of design of flexural members
3. Understand Concepts of shear, bond and torsion
4. Familiarize students with different types of compressions members and Design
5. Understand different types of footings and their design

### SYLLABUS:

#### UNIT – I

**Introduction:** a) **Working stress method:** Design codes and handbooks, loading standards – Dead, live, wind and earthquake loads, Elastic theory: design constants, modular ratio, neutral axis depth and moment of resistance for balanced, under-reinforced and over-reinforced sections. Design of singly and doubly reinforced beams.

b) **Limit State Design:** Concepts of limit state design – Basic statistical principles – Characteristic loads – Characteristic strength – Partial load and safety factors – representative stress-strain curves for cold worked deformed bars and mild steel bars. Assumptions in limit state design – stress - block parameters – limiting moment of Resistance.

**All units i.e., from Unit II to Unit VI are to be taught in Limit State Design.**

#### UNIT – II

**Design for Flexure:** Limit state analysis and design of singly reinforced sections effective depth- Moment of Resistance- Design of Doubly reinforced and T section - Minimum depth for a given capacity- Limiting Percentage of Steel- Minimum Tension Reinforcement-Maximum Flexural Steel- Design of Flanged Sections (T)- Effective width of flange –Behavior- Analysis and Design.

#### UNIT – III

**Design for Shear, Torsion and Bond:** 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 beams.

**Limit state design for serviceability:** Deflection, cracking and code provision.

#### UNIT – IV

**Slabs:** Classification of slabs, design of one - way slabs, one-way continuous slab using IS Coefficients (Conventional) –Design of two - way slabs-simply supported and various edge conditions using IS Coefficients.

#### UNIT – V

**Design of Compression members:** Effective length of a column, Design of short and long columns – under axial loads, uniaxial bending and biaxial bending -IS Code

provisions.

#### **UNIT –VI**

**Footings:** Different types of footings – Design of Isolated footings – pedestal, square, rectangular and circular footings subjected to axial loads, uni-axial and bi-axial bending moments.

#### **NOTE:**

All the designs to be taught in Limit State Method

Following plates should be prepared by the students.

1. Reinforcement detailing of T-beams and continuous beams.
2. Reinforcement detailing of columns and isolated footings.
3. Detailing of one-way, two-way and continuous slabs

#### **INTERNAL EXAMINATION PATTERN:**

The total internal marks (40) are distributed in two components as follows:

- Descriptive (subjective type) examination: 20 marks
- Day to Day work 20 marks

#### **FINAL EXAMINATION PATTERN:**

The end semester examination is conducted for 60 marks. The pattern will consist of 2 parts (part –A and part-B), where in part-A, 2 questions will be given with each question carrying 24 marks, out of which the student has to answer one question and part-B consists of 6 questions with each question carrying 12 marks each, out of which the students has answer 3 questions.

#### **IS Codes:**

1. IS -456-2000 Code of practice for Reinforced Concrete Structures (Permitted to use in examination hall)
2. IS – 875.
3. SP-16.

#### **Text Books:**

1. Limit State Design, A. K. Jain.
2. Design of Reinforced concrete Structures, N. Subrahmanyian.
3. Reinforced Concrete Structures, S. Unni krishna Pillai & Devdas Menon, Tata Mc.GrawHill, New Delhi.



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**References:**

1. R C C Design, B.C Punmia, A. K. Jain and A. K Jain. Lakshmi Publications.
2. Reinforced Concrete Structures, N. Krishna Raju & R. N. Pranesh, New Age Publications.

**Course Outcomes:**

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

1. Work on different types of design philosophies.
2. Carryout analysis and design of flexural members and detailing.
3. Design structures subjected to shear, bond and torsion.
4. Design different type of compression members and footings.

Subject	STRENGTH OF MATERIALS – II				
Year / Semester	III B.Tech / I Sem	L	T	P	C
Regulation Year	2021-22	3	0	0	3

**Course Learning Objectives:**

1. To give concepts of Principal stresses and strains developed in cross section of the beams on the cross section and stresses on any inclined plane. To impart concepts of failures in the material considering different theories.
2. To give concepts of torsion and governing torsion equation, and there by calculate the power transmitted by shafts and springs and design the cross section when subjected to loading using different theories of failures.
3. To classify columns and calculation of load carrying capacity and to assess stresses due to axial and lateral loads for different edge conditions and to calculate combined effect of direct and bending stresses on different engineering structures.
4. Introduce the concept of unsymmetrical bending in beams location of neutral axis deflection of beams under unsymmetrical bending.
5. Impart concepts for determination of forces in members of plane pin-jointed perfect trusses by different methods.

**SYLLABUS:**

**UNIT- I**

**Principal Stresses and Strains:** Introduction – Stresses on an inclined section of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear – Mohr’s circle of stresses – Principal stresses and strains – Analytical and graphical solutions.

**UNIT – II**

**Torsion of Circular Shafts and Springs:** Theory of pure torsion – Derivation of Torsion equations:  $T/J = q/r = N\phi/L$  – Assumptions made in the theory of pure torsion – Torsional moment of resistance – Polar section modulus – Power transmitted by shafts – Combined bending and torsion and end thrust – Design of shafts according to theories of failure.

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

**UNIT – III**

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

Perry's formula. Laterally loaded struts – subjected to uniformly distributed and concentrated loads – Maximum B.M. and stress due to transverse and lateral loading.

#### UNIT – IV

**Direct and Bending Stresses:** Stresses under the combined action of direct loading and B.M. Core of a section – determination of stresses in the case of retaining walls and dams – conditions for stability – stresses due to direct loading and B.M. about both axes.

#### UNIT – V

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

#### UNIT – VI

**Analysis of Pin-Jointed Plane Frames:** Determination of Forces in members of V plane pin-jointed perfect trusses by (i) method of joints and (ii) method of sections. Analysis of various types of cantilevers and simply supported trusses by method of joints, method of sections.

#### Text Books:

1. Mechanics of Materials by B.C Punmia, Jain and Jain.
2. Strength of materials by R. K. Bansal, Lakshmi Publications.

#### References:

1. Mechanics of Materials- by R. C. Hibbler.
2. Strength of materials by R. K Rajput, S. Chand and Co.
3. Strength of Materials by R. Subramanian, Oxford Publications.

#### Course Outcomes:

Upon successful completion of this course,

1. The student will be able to understand the basic concepts of Principal stresses developed in a member when it is subjected to stresses along different axes and design the sections.
2. The student can assess stresses in different engineering applications like shafts, springs, columns and struts subjected to different loading conditions.
3. The student will be able to assess forces in different types of trusses used in construction.



Subject	GEO-TECHNICAL ENGINEERING				
Year / Semester	III B.Tech / I Sem	L	T	P	C
<b>Regulation Year</b>	<b>2021-22</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Learning Objectives:** The objective of this course is:

1. To enable the student to find out the index properties of the soil and classify it.
2. To impart the concept of seepage of water through soils and determine the seepage discharge.
3. To enable the students to differentiate between compaction and consolidation of soils and to determine the magnitude and the rate of consolidation settlement.
4. To enable the student to understand the concept of shear strength of soils, assessment of the shear parameters of sands and clays and the areas of their application.

**SYLLABUS:**

**UNIT – I**

**Introduction:** Soil formation – soil structure and clay mineralogy – Adsorbed water – Mass- volume relationship –Relative density, Mechanism of compaction – factors affecting – effects of compaction on soil properties - compaction control.

**UNIT – II**

**Index Properties of Soils:** Grain size analysis – Sieve and Hydrometer methods – consistency limits and indices – Various Types of soil Classifications – Unified soil classification and I.S. Soil classification.

**UNIT –III**

**Permeability:** Soil water – capillary rise – One dimensioned 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 – 2-D flow and Laplace’s equation - Seepage through soils – Flow nets: Characteristics and Uses.

**UNIT – IV**

**Stress Distribution in Soils:** Stresses induced by applied loads - Boussinesq’s and Westergaard’s theories for point loads and areas of different shapes– Newmark’s influence chart – 2:1 stress distribution method.

**UNIT – V**

**Consolidation:** Compressibility of soils – e-p and e-log p curves – Stress history – Concept of consolidation - Spring Analogy - Terzaghi’s theory of one-dimensional Consolidation – Time rate of consolidation and degree of consolidation – Determination of coefficient of consolidation (cv) - Over consolidated and normally consolidated clays.

**UNIT – VI**

**Shear Strength of Soils:** Basic mechanism of shear strength - Mohr – Coulomb Failure theories – Stress-Strain behavior of Sands - Critical Void Ratio – Stress-Strain behavior of clays – Shear Strength determination- various drainage conditions.

**Text Books:**

1. Basic and Applied Soil Mechanics, Gopal Ranjan and A. S. R. Rao, New Age International Publishers.
2. International Publishers.
3. Soil Mechanics and Foundation Engineering, V. N. S. Murthy, CBS publishers.

**References:**

1. Fundamentals of Soil Mechanics, D. W. Taylor, Wiley.
2. An introduction to Geotechnical Engineering, Holtz and Kovacs; Prentice Hall.
3. Fundamentals of Geotechnical Engineering, B M Das, Cengage Learning, New Delhi.

**Course Outcomes:** Upon the successful completion of this course

1. The student must know the definition of the various parameters related to soil mechanics and establish their inter-relationships.
2. The student should be able to know the methods of determination of the various index properties of the soils and classify the soils.
3. The student should be able to know the importance of the different engineering properties of the soil such as compaction, permeability, consolidation and shear strength and determine them in the laboratory.
4. The student should be able to apply the above concepts in day-to-day civil engineering practice.

Subject	[PE-1] REMOTE SENSING & GEOGRAPHICAL INFORMATION SYSTEMS				
Year / Semester	III B.Tech/I Sem	L	T	P	C
Regulation Year	2021-22	3	0	0	3

**Course Learning Objectives:**

1. To introduce the basic principles of Remote Sensing and GIS techniques.
2. To learn various types of satellite sensors and platforms.
3. To learn concepts of visual and digital image analyses.
4. To understand the principles of spatial analysis.
5. To appreciate application of RS and GIS to Civil engineering.

**SYLLABUS:**

**UNIT – I**

**Introduction to remote sensing:** Basic concepts of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere, energy interaction with the earth surfaces, Characteristics of remote sensing systems

**Sensors and platforms:** Introduction, types of sensors, airborne remote sensing, spaceborne remote sensing, image data characteristics, digital image data formats-band interleaved by pixel, band interleaved by line, band sequential, IRS, LANDSAT, SPOT, MODIS, ASTER, RISAT and CARTOSAT

**UNIT – II**

**Image analysis:** Introduction, elements of visual interpretations, digital image processing-image preprocessing, image enhancement, image classification, supervised classification, unsupervised classification.

**UNIT – III**

**Geographic Information System:** Introduction, key components, application areas of GIS, map projections.

**Data entry and preparation:** spatial data input, raster data models, vector data models.

**UNIT –IV**

**Spatial data analysis:** Introduction, overlay function-vector overlay operations, raster overlay operations, arithmetic operators, comparison and logical operators, conditional expressions, overlay using a decision table, network analysis-optimal path finding, network allocation, network tracing and buffer analysis.

**UNIT – V**

**RS and GIS applications General:** Land cover and land use, agriculture, forestry, geology, geomorphology, urban applications.

**UNIT – VI**

**Applications of Hydrology, Water Resources and Disaster Management:**

Flood zoning and mapping, groundwater prospects and potential recharge zones, watershed management and disaster management with case studies.



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**TEXT BOOKS:**

1. Remote sensing and GIS, Bhatta B (2008), Oxford University Press.
2. Remote Sensing and Image Interpretation, Lillesand, T.M, R.W. Kiefer and J.W. Chipman (2013), Wiley India Pvt. Ltd., New Delhi.
3. Fundamentals of Geographic Information Systems, Demers, M.N, Wiley India Pvt. Ltd, 2013.

**REFERENCES:**

1. Fundamentals of Remote Sensing, George Joseph, Universities Press, 2013.
2. Concepts and Techniques of Geographical Information System, Chor Pang Lo and A K W Yeung, Prentice Hall (India), 2006.
3. Remote Sensing and its Applications, Narayan LRA, Universities Press, 2012.
4. Introduction to Geographic Information Systems, Kand Tsung Chang, McGraw Hill Higher Education, 2009.
5. Basics of Remote sensing & GIS, Kumar S, Laxmi Publications, New Delhi, 2005.
6. Principals of Geographical Information Systems, Burrough P A and R.A. McDonnell, Oxford University Press, 1998.
7. Remote Sensing, Schowenger, R. A (2006), Elsevier publishers.

**Course Outcomes:**

1. The student will be familiar with ground, air and satellite-based sensor platforms.
2. The students will be able to interpret the aerial photographs and satellite imageries.
3. The students will be able to create and input spatial data for GIS application.
4. The students will be able to apply RS and GIS concepts in water resources engineering.
5. The student will be familiar with applications of various satellite data.

Subject	[PE-1] ADVANCED SURVEYING				
Year / Semester	III B.Tech/I Sem	L	T	P	C
Regulation Year	2021-22	3	0	0	3

**COURSE OBJECTIVES:** The objective of this course is to enable the students to,

1. Understand the basics of Geodetic Surveying and triangulation systems.
2. Understand the hydrographic surveying and prediction of tides.
3. Understand the Photogrammetric Surveying and Astronomical Surveying.
4. Understand the importance and applications of total stations and GPS.

#### UNIT I

**Geodetic Surveying:** Definition, importance, triangulation system, order of triangulation, size and shape of triangulation, strength of figure criterion, triangulation fieldwork, base line measurement- tape corrections, problems in baseline measurement, measurement of angles.

#### UNIT II

**Hydrographic Surveying:** Tides-lunar tides, solar tides, spring and neap tides, measurement of tides- shore lines, soundings, sounding equipment, locating soundings by cross rope method and range and time intervals-mean sea level-prediction of tides.

#### UNIT III

**Photogrammetric Surveying:** Basic principles, photo theodolite, horizontal and vertical angles from terrestrial photographs, elevation of a point by photographic measurement, determination of focal length of the lens, Aerial camera- scale of vertical photograph, scale of tilted photograph, combined effects of tilt and relief, stereoscopic vision, mosaics.

#### UNIT IV

**Astronomical Surveying:** Spherical Trigonometry, latitude and longitude, solar system, astronomical teams, coordinate systems-altitude, azimuth system, declination, hour angle system, time and astronomical work-sidereal time, apparent solar time, mean solar time, standard time, standard time, application of astronomy in surveying, corrections to astronomical observations.

#### UNIT V

**Total stations:** Importance, measurement of horizontal angles, vertical angles, horizontal distance, slope distance, height of object-remote elevation measurement (REM), remote distance measurement (RDM)-radial and continuous distances for measuring the lengths and sides of the closed circuits, areas and perimeters calculations.

#### UNIT VI

**Global Positioning System:** Principles of GPS, components of GPS, types of GPS and accuracy,



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applications of GPS, sources of error GPS and limitations.

**TEXT BOOKS:**

1. 'Surveying and Levelling' by R. Subramanian, Oxford University Press, New Delhi.
2. A text book of Surveying' by C. Venkatramaiah, University Press, New Delhi.
3. 'Surveying Vol. II and Vol. III (Higher Surveying)' by Dr. B. C. Punmia, Ashok K. Jain and Arun K. Jain, Laxmi Publications Pvt. Ltd., New Delhi.
4. 'Advanced Surveying' by Satheesh Gopi, R. Sathikumar and N. Madhu, Pearson, New Delhi.

**REFERENCES:**

1. 'Remote Sensing and its Applications' by L A R Narayan, Universities Press, New Delhi.
2. 'Geographical Information Science' by Narayan Panigrahi, Universities Press, New Delhi.
3. 'Basics of Remote Sensing and GIS' by Dr. S. Kumar, University Science Press, New Delhi.

**COURSE OUTCOMES:** Upon successful completion of this course, the students will be able to:

1. The student should be able to conduct different types of surveys for obtaining better results.
2. The student should be able to utilize the total stations for getting the required information.
3. The student should be capable of using the GPS instrument to obtain appropriate information of the objects and their positions.

Subject	[PE-I] GREEN BUILDING TECHNOLOGIES				
Year / Semester	III B.Tech/I Sem	L	T	P	C
Regulation Year	2021-22	3	0	0	3

**COURSE OBJECTIVES:**

The objective of this course is to enable the students to,

1. Learn the principles of planning and orientation of buildings.
2. Acquire knowledge on various aspects of green buildings

**UNIT I**

**Green Buildings:** Definition of Green Buildings, typical features of green buildings, benefits of Green Buildings- Sustainable site selection and planning of buildings to maximize comfort, day lighting, ventilation, planning for storm water drainage.

**UNIT II**

**Environmentally friendly building materials and technologies:** Natural Materials like bamboo, timber, rammed earth, stabilized mud blocks, hollow blocks, lime & lime-pozzolana cements, materials from agro and industrial waste, ferro-cement and ferro-concrete, alternative roofing systems, various paints reducing the heat gain of the building, etc.

**UNIT III**

**Energy and resource conservation:** Need for energy conservation, various forms of energy used in buildings, embodied energy of materials, energy used in transportation and construction processes- water conservation systems in buildings-water harvesting in buildings – waste to energy management in residential complexes or gated communities.

**UNIT IV**

**Use of renewable energy resources:** Wind and Solar Energy Harvesting, potential of solar energy in India and world, construction and operation of various solar appliances, success case studies of fully solar energy-based buildings in India.

**UNIT V**

**Climate Design:** Local climatic conditions – temperature, humidity, wind speed and direction -impact of climate change on built environment - comforts: the desirable conditions – Principles of thermal design - means of thermal –light and lighting-building acoustics-energy efficient lighting, Ventilation and air quality requirement, various techniques for passive cooling, garden roofs, case studies for passive cooling and thermal comfort.



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**UNIT VI**

**Green Building Rating Systems:** Introduction to Leadership in Energy and Environment Design (LEED), Green Rating systems for Integrated Habitat Assessment - Modular wastewater treatment systems for built environment - Building automation and building management systems.

**TEXT BOOKS:**

1. 'Alternative building materials and technologies' by K.S. Jagadish, B.V. Venkatarama Reddy and K.S. Nanjunda Rao.
2. 'Non-Conventional Energy Resources' by G. D. Rai, Khanna Publishers.

**REFERENCES:**

1. Mili Majumdar, "Energy-efficient buildings in India" Tata Energy Research Institute, 2002.
2. TERI "Sustainable Building Design Manual- Volume I & II" Tata Energy Research Institute, 2009.

**COURSE OUTCOMES:**

Upon successful completion of this course, the students will be able to:

1. Explain the principles of building planning, its bylaws and provide facilities for rainwater harvesting.
2. Understand the concepts of green buildings.



Subject	[PE-I] SOLID WASTE MANAGEMENT				
Year / Semester	III B.Tech/I Sem	L	T	P	C
Regulation Year	2021-22	3	0	0	3

**COURSE OBJECTIVES:**

1. To impart the knowledge of the methods of collection and optimization of collection routing of municipal solid waste.
2. To acquire the principles of treatment of municipal solid waste.
3. To know the impact of solid waste on the health of the living beings.
4. To learn the criterion for selection of landfill and its design.
5. To plan the methods of processing such as composting the municipal organic waste.

**UNIT I**

**Introduction to Solid Waste Management:** Goals and objectives of solid waste management, Classification of Solid Waste - Factors Influencing generation of solid waste - sampling and characterization – Future changes in waste composition, major legislation, monitoring responsibilities, Terms related to ISWM like WTE, ULB, TLV etc... Measurement of NPK and Calorific value.

**UNIT II**

**Basic Elements in Solid Waste Management:** Elements and their inter relationship – principles of solid waste management- onsite handling, storage and processing of solid waste.

**Collection of Solid Waste:** Type and methods of waste collection systems, analysis of collection system - optimization of collection routes– alternative techniques for collection system.

**UNIT III**

**Transfer, Transport and Transformation of Waste:** Need for transfer operation, compaction of solid waste - transport means and methods, transfer station types and design requirements. Unit operations used for separation and transformation: shredding materials separation and recovery, source reduction and waste minimization.

**UNIT IV**

**Processing and Treatment:** Processing of solid waste - Waste transformation through combustion and composting. Market yard wastes and warming composting and vermin composting, anaerobic methods for materials recovery and treatment – Energy recovery – biogas generation and cleaning– Incinerators.

**UNIT V**



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**Disposal of Solid Waste:** Methods of Disposal, Landfills: Site selection, design and operation, drainage and leachate collection systems –designated waste landfill remediation. Case studies.

**UNIT VI**

**Hazardous Waste Management-** sources, collection, transport, treatment and disposal methods; Biomedical waste Management; Electronic waste Management; Environmental law related to waste Management; Case studies.

**TEXT BOOKS:**

1. Integrated Solid Waste Management, George Tchobanoglous, McGraw Hill Publication, 1993.

**REFERENCES:**

1. Solid Waste Engineering, Vesilind, P.A., Worrell, W., Reinhart, D., Cengage learning, New Delhi, 2004.
2. Hazardous Waste Management, Charles A. Wentz, McGraw Hill Publication, 1995.
3. Solid and Hazardous Waste Management PM Cherry, CBS Publishers and Distributors. New Delhi, 2016.
4. Solid Waste Engineering, William A Worrell, P Aarue Vesilind, Cengage Learning, New Delhi 2016.

**COURSE OUTCOMES:** Upon successful completion of this course, the students will be able to:

1. Design the collection systems of solid waste of a town.
2. Design treatment of municipal solid waste and landfill.
3. Know the criteria for selection of landfill.
4. Characterize the solid waste and design a composting facility.
5. Know the Method of treatment and disposal of Hazardous wastes.

<b>Subject</b>	<b>HYDRAULICS AND HYDRAULIC MACHINERY</b>				
<b>Year / Semester</b>	<b>III B.Tech / I Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2021-22</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Learning Objectives:**

1. To study about uniform and non-uniform flows in open channel and also to learn about the characteristics of hydraulic jump.
2. To introduce dimensional analysis for fluid flow problems.
3. To understand the working principles of various types of hydraulic machines and Pumps.

**Syllabus:**

**UNIT – I**

**UNIFORM FLOW IN OPEN CHANNELS:**

Types of channels –Types of flows - Velocity distribution – Energy and momentum correction factors – Chezy’s, and Manning’s formulae for uniform flow – Most Economical sections, Critical flow: Specific energy-critical depth.

**UNIT II**

**NON-UNIFORM FLOW IN OPEN CHANNELS:** Steady Gradually Varied Flow-Dynamic equation, Mild, Critical, Steep, horizontal and adverse slopes-surface profiles direct step method- Rapidly varied flow, hydraulic jump.

**UNIT – III**

**HYDRAULIC SIMILITUDE:** Dimensional analysis-Rayleigh’s method and Buckingham’s pi theorem-study of Hydraulic models – Geometric, kinematic and dynamic similarities-dimensionless numbers – model and prototype relations.

**UNIT – IV**

**BASICS OF TURBO MACHINERY:** Hydrodynamic force of jets on stationary and moving flat, jet striking centrally.

**UNIT – V**

**HYDRAULIC TURBINES – I:** Layout of a typical Hydropower installation – Heads and efficiencies - classification of turbines. Pelton wheel - Francis turbine – Kaplan turbine - working, working proportions, velocity diagram, work done and efficiency, hydraulic design, draft tube – theory and efficiency. Governing of turbines-surge tanks and selection of turbines.

**UNIT – VI**

**CENTRIFUGAL-PUMPS:** Pump installation details-classification-work done-Manometric head-minimum starting speed-losses and efficiencies-specific speed, multistage pumps-pumps in parallel and series - performance of pumps.

**RECIPROCATING PUMPS:** Introduction, classification, components, working, discharge, indicator diagram, work done and slip.

**Text Books:**

1. Open Channel flow, K. Subramanya, Tata McGraw Hill Publishers.
2. A text of Fluid mechanics and hydraulic machines, R. K. Bansal, Laxmi Publications New Delhi.
3. Fluid Mechanics, Modi and Seth, Standard book house.

**References:**

1. Fluid Flow in Pipes and Channels, G.L. Asawa, CBS
2. Fluid Mechanics and Machinery, C.S.P. OJHA, R. BERNDTSSON and P.N.Chandramouli, Oxford Higher Education.
3. Fluid Mechanics and Machinery, Md. Kaleem Khan, Oxford Higher Education.

**Course Outcomes:** Upon successful completion of this course the students will be able to:

1. Solve uniform and non-uniform open channel flow problems.
2. Apply the principals of dimensional analysis and similitude in hydraulic model testing.
3. Understand the working principles of various hydraulic machineries and pumps.



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Subject	DATA STRUCTURES				
Year / Semester	III B.Tech / I Sem	L	T	P	C
Regulation Year	2021-22	3	0	0	3

**Course Objectives:**

The objective of the course is to

- Introduce the fundamental concept of data structures and abstract data types
- Emphasize the importance of data structures in developing and implementing efficient algorithms
- Describe how arrays, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms.

**Course Outcomes:**

After completing this course, a student will be able to:

- Summarize the properties, interfaces, and behaviors of basic abstract data types
- Discuss the computational efficiency of the principal algorithms for sorting & searching
- Use arrays, records, linked structures, stacks, queues, trees, and Graphs in writing programs
- Demonstrate different methods for traversing trees

**UNIT I**

**Data Structures:** Definition, Classification of Data Structures, Operations on Data Structures, Abstract Data Type (ADT), Preliminaries of algorithms. Time and Space complexity. Searching - Linear search, Binary search. Sorting- Insertion sort, Selection sort, Exchange (Bubble sort, quick sort), distribution (radix sort), merging (Merge sort) algorithms.

**UNIT II**

**Stacks:** Introduction to Stacks, Array Representation of Stacks, Operations on Stacks, Linked list Representation of Stacks, Operations on Linked Stack, Applications-Reversing list, Infix to Postfix Conversion, Evaluating Postfix Expressions.

**UNIT III**

**Queues:** Introduction to Queues, Representation of Queues-using Arrays and using Linked list, Implementation of Queues-using Arrays and using Linked list, Application of Queues-Circular Queues, Dequeues.

**UNIT IV**



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**Linked List:** Introduction, Single linked list, Representation of Linked list in memory, Operations on Single Linked List-Insertion, Deletion, Search and Traversal, Reversing Single Linked list, Applications and Advantages and Disadvantages of Single Linked list, Double Linked List-Insertion, Deletion, Circular Linked list-Insertion, Deletion.

**UNIT V**

**Trees:** Basic Terminology in Trees, Binary Trees-Properties, Representation of Binary Trees using Arrays and Linked lists. Binary Search Trees- Basic Concepts, BST Operations: Insertion, Deletion, Tree Traversals, Applications.

**UNIT VI**

**Graphs:** Basic Concepts, Representations of Graphs-Adjacency Matrix and using Linked list, Graph Traversals (BFT & DFT), Applications- Minimum Spanning Tree Using Prim's & Kruskal's Algorithm, Dijkstra's shortest path.

**Text Books:**

- 1) Data Structures Using C. 2nd Edition. Reema Thareja, Oxford.
- 2) Data Structures and algorithm analysis in C, 2nd ed, Mark Allen Weiss.

**Reference Books:**

- 1) Fundamentals of Data Structures in C, 2nd Edition, Horowitz, Sahni, Universities Press.
- 2) Data Structures: A Pseudo Code Approach, 2/e, Richard F. Gilberg, Behrouz A. Forouzan, Cengage.
- 3) Data Structures with C, Seymour Lipschutz TMH

<b>Subject</b>	<b>GEO-TECHNICAL ENGINEERING LAB</b>				
<b>Year / Semester</b>	<b>III B.Tech / I Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2021-22</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**Course Learning Objectives:** The objective of this course is:

1. To impart knowledge of determination of index properties required for classification of soils.
2. To teach how to determine compaction characteristics and consolidation behavior from relevant lab tests.
3. To determine permeability of soils.
4. To teach how to determine shear parameters of soil through different laboratory tests.

#### **LIST OF EXPERIMENTS**

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

At least **Ten** experiments shall be conducted.

**LIST OF EQUIPMENT:**

1. Casagrande's liquid limit apparatus.
2. Apparatus for plastic and shrinkage limits
3. Field density apparatus for
  - a. Core cutter method
  - b. Sand replacement method
4. Set of sieves: 4.75mm, 2mm, 1mm, 0.6mm, 0.42mm, 0.3mm, 0.15mm and 0.075mm.
5. Hydrometer
6. Permeability apparatus for
  - a. Constant head test
  - b. Variable head test
7. Universal auto compactor for I.S light and heavy compaction tests.
8. Shaking table, funnel for sand raining technique.
9. Apparatus for CBR test
10. 10 tons loading frame with proving rings of 0.5 tons and 5 tons capacity
11. One dimensional consolidation test apparatus with all accessories.
12. Triaxial cell with provision for accommodating 38 mm dia specimens.
13. Box shear test apparatus
14. Laboratory vane shear apparatus.
15. Hot air ovens (range of temperature 500 - 1500C)

**Reference:**

1. Determination of Soil Properties, J. E. Bowles.
2. IS Code 2720 – relevant parts.

**Course Outcomes:** Upon successful completion of this course, student will be able to

1. Determine index properties of soil and classify them.
2. Determine permeability of soils.
3. Determine Compaction, Consolidation and shear strength.



<b>Subject</b>	<b>ADVANCED ENGLISH COMMUNICATION SKILLS LAB</b>				
<b>Year / Semester</b>	<b>III B.Tech / I Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2021-22</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**COURSE OBJECTIVES:**

- To expose students to different contexts through right vocabulary
- To inculcate the habit of reading and understanding any text
- To enable students to acquire the ability of writing for business purposes
- To enable students to acquire interview skills and group discussion dynamics

**COURSE OUTCOMES:** Upon the completion of the course, the student will be able to:

**CO1:** Choose vocabulary contextually.

**CO2:** Comprehend, analyze and interpret the text in a definite time frame.

**CO3:** Write resumes cohesively and coherently.

**CO4:** Construct and elaborate on a given topic.

**CO5:** Comprehend and practice the dynamics of group discussion.

**CO6:** Comprehend the concept and process of interview; answering through mock interviews.

**UNIT – I**

Selected High GRE Words, Idioms & Phrases – Discourse Skills – using visuals – Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, analogy, idioms and phrases, collocations. **(2 sessions)**

**UNIT – II**

Reading Comprehension – General Vs Local Comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning. **(2 sessions)**

**UNIT – III**

Writing Skills – Structure of Resume writing —Short Report Writing (Business/Technical)- **(2 sessions)**

**UNIT – IV**

Presentations (Technical)

**UNIT – V**

Group Discussion – Dynamics of Group Discussion, Intervention, summarizing,



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modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation. **(2 sessions)**

**UNIT – VI**

Interview Skills – Concept and process – pre-interview planning, opening strategies, answering strategies, interview through teleconference & video-conference and mock interviews. **(3 sessions)**

**SUGGESTED SOFTWARE:**

1. K-Van solutions Software with CD
2. Oxford advanced learner's compass, 7th Edition

**SUGGESTED READING:**

1. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
2. Business and Professional Communication: Kelly M.Quintanilla, Shawn T. Wahl. Sage South Asia Edition. Sage Publications, 2011.
3. English Vocabulary in Use Series, Cambridge University Press 2008.
4. Communication Skills by Leena Sen, PHI Learning Pvt. Ltd., New Delhi, 2009.
5. A Course Book of Advanced Communication Skills Lab published by University Press, Hyderabad.

<b>Subject</b>	<b>QUANTITATIVE APTITUDE-II</b>				
<b>Year/Semester</b>	<b>III B.Tech / I Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation Year</b>	<b>2021-22</b>	<b>3</b>	<b>-</b>	<b>-</b>	<b>-</b>

**Course Objectives:** Enable the students to

1. Know the concepts of partnership and their profit sharing at the end.
2. Understand the concept of sets and relation between sets and Venn diagrams.
3. Apply the concepts of measures of central tendency and dispersion.
4. Know the concepts of Permutations & Combinations and their application in probability.
5. Calculate ages of persons in a family using the given data.
6. Understand the given data and interpret the required values.

### **Syllabus**

#### **UNIT –I: Business & Partnership**

Partnership in business- Working and Sleeping Partners -Division of Shares - Partnership Involved Time and Work problems.

#### **UNIT- II: Set Theory & Venn Diagrams**

Basic Concepts of Sets-Operations on Sets – Venn Diagrams- Problems.

#### **UNIT –III: Statistics:**

Basics of Statistics -Range -Mean- Median-Mode -Standard Deviation-Problems.

#### **UNIT –IV: Permutations & Combinations and Probability**

Basic concepts of Permutations & Combinations - Selection with and without repetition- Circular Arrangements.

Concepts of Probability- Various Events of Probability- Related Problems.

#### **UNIT –V: Ages**

Ratio Based - Proportion Based - Equation Based – Average Based - Age Problems.

#### **UNIT – VI: Data Interpretation**

Line & Bar Graphs- Pie Charts/Graphs-Table–Based Problems.



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**Text Books:**

1. Dr. R.S.Aggarwal ,Quantitative Aptitude for competitive Examinations, Sultan Chand Publications, 2017.

**References:**

1. Arun Sharma, How to Prepare for Quantitative Aptitude for the CAT, Tata McGraw Hill Publishing Company, 2016.
2. Dinesh Khattar, The Pearson Guide to Quantitative Aptitude for Competitive Examinations, Pearson India, 2016.

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

1. Calculate the profit or remuneration received at the end using the ratio of investments or workmen ship.
2. Evaluate number of persons/objects belonging to a specified category using the concept of Venn diagram.
3. Measure the range, mean, median and mode of the given data, identify the extent of dispersion and interpret the data.
4. Compute various ways of selection or arrangement of persons /objects and predict the probability of doing so.
5. Deduce the ratios/ equations corresponding to ages of persons of a family and calculate the corresponding ages.
6. Analyze the given chart / table and interpret the results from the given data.

**Course Structure – R19**  
**(With effect from 2019-2020)**

**III Year - II Semester**

S.No	Category	Course Code	Course Title	L	T	P	C	IM	EM	TM
1	PC	19CE6T01	Design & Drawing of Steel Structures	4	-	2	3	40	60	100
2	PC	19CE6T02	Foundation Engineering	3	-	-	3	40	60	100
3	PC	19CE6T03	Transportation Engineering	3	-	-	3	40	60	100
4	PE	19CE6T04 19CE6T05 19CE6T06 19CE6T07	<b>Professional Elective-II</b> 1. Building planning and drawing 2. Railway and Airport Engineering 3. Construction Management 4. Infrastructure Planning and Design	3	-	-	3	40	60	100
5	ES	19OE6T05	Oops Through Java	3	-	-	3	40	60	100
6	OE	19OE6T01 19OE6T02 19OE6T03 19OE6T04	<b>Open Elective-II</b> 1. Solar Energy Systems 2. Management Science 3. Internet of Things 4. Industrial Robotics	3	-	-	3	40	60	100
7	ES	19CE6P01	Building planning and drawing through AutoCAD	-	-	3	1.5	40	60	100
8	PC	19CE6P02	Transportation Engineering Lab	-	-	3	1.5	40	60	100
9		19CE6J01	Socially relevant project	-	-	2	1	20	30	50
<b>Total</b>				<b>19</b>	<b>-</b>	<b>10</b>	<b>22</b>	<b>340</b>	<b>510</b>	<b>850</b>

Subject	DESIGN AND DRAWING OF STEEL STRUCTURES				
Year/semester	III B.Tech/II Sem	L	T	P	C
Regulation year	2021-2022	4	2	0	3

**Course Learning Objectives:** The objective of this course is to:

1. Familiarize Students with different types of Connections and relevant IS codes.
2. Equip student with concepts of design of flexural members.
3. Understand Design Concepts of tension and compression members in trusses.
4. Familiarize students with different types of Columns and column bases and their Design.
5. Familiarize students with Plate girder and Gantry Girder and their Design.

**Course Outcomes**

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

1. Work with relevant IS codes.
2. Carryout analysis and design of flexural members and detailing.
3. Design compression members of different types with connection detailing.
4. Design Plate Girder and Gantry Girder with connection detailing.
5. Produce the drawings pertaining to different components of steel structures.

**SYLLABUS**

**UNIT – I: Connections: Riveted connections** – definition, rivet strength and capacity, Welded connections: Introduction, Advantages and disadvantages of welding- Strength of welds-Butt and fillet welds: Permissible stresses – IS Code requirements. Design of fillet weld subjected to moment acting in the plane and at right angles to the plane of the joints.

**UNIT – II: Beams:** Allowable stresses, design requirements as per IS Code-Design of simple and compound beams-Curtailment of flange plates, Beam to beam connection, check for deflection, shear, buckling, check for bearing, laterally unsupported beams.

**UNIT –III: Tension Members and compression members:** General Design of members subjected to direct tension and bending –effective length of columns. Slenderness ratio – permissible stresses. Design of compression members, struts etc. **Roof Trusses:** Different types of trusses – Design loads – Load combinations as per IS Code recommendations, structural details.

**UNIT – IV: Design of Columns:** Built up compression members – Design of lacings and battens. Design Principles of Eccentrically loaded columns, Splicing of columns.

**UNIT – V: Design of Column Foundations: Design** of slab base and gusseted base. Column bases subjected moment.

**UNIT – VI: Design of Plate Girder:** Design consideration – I S Code recommendations Design of plate girder-Welded – Curtailment of flange plates, stiffeners – splicing and connections. Design of Gantry Girder: impact factors – longitudinal forces, Design of Gantry girders.

**NOTE: Welding connections should be used in Units II – VI.**

The students should prepare the following plates.

- Plate 1 Detailing of simple beams
- Plate 2 Detailing of Compound beams including curtailment of flange plates.
- Plate 3 Detailing of Column including lacing and battens.
- Plate 4 Detailing of Column bases – slab base and gusseted base
- Plate 5 Detailing of steel roof trusses including joint details.
- Plate 6 Detailing of Plate girder including curtailment, splicing and stiffeners.

**INTERNAL EXAMINATION PATTERN:**

The total internal marks (40) are distributed in two components as follows:

- Descriptive (subjective type) examination: 20 marks
- Day to Day work 20 marks

**FINAL EXAMINATION PATTERN:**

The end semester examination is conducted for 60 marks. The pattern will consist of 2 parts (part -A and part-B), where in part-A, 2 questions will be given with each question carrying 24 marks, out of which the student has to answer one question and part-B consists of 6 questions with each question carrying 12 marks each, out of which the students has answer 3 questions.

**IS Codes**

- IS -800 – 2007.
- IS – 875.
- Steel Tables.

**These codes and steel tables are permitted to use in the examinations.**

**TEXT BOOKS**

- ‘Steel Structures Design and Practice’ by N.Subramanian, Oxford University Press.
- ‘Design of Steel Structures’ by Ramachandra, Vol – 1, Universities Press.
- ‘Design of steel structures’ by S.K. Duggal, Tata Mcgraw Hill, and New Delhi.

**REFERENCES**

1. 'Structural Design in Steel' by Sarwar Alam Raz, New Age International Publishers, New Delhi.
2. 'Design of Steel Structures' by P. Dayaratnam; S. Chand Publishers.
3. 'Design of Steel Structures' by M. Raghupathi, Tata Mc. Graw-Hill.
4. 'Structural Design and Drawing' by N. Krishna Raju; University Press.

<b>Subject</b>	<b>FOUNDATION ENGINEERING</b>				
<b>Year/semester</b>	<b>III B.Tech/II Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation year</b>	<b>2021-2022</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**COURSE OBJECTIVES:**

1. To impart to the student knowledge of types of shallow foundations and theories required for the determination of their bearing capacity.
2. To enable the student to compute immediate and consolidation settlements of shallow foundations.
3. To impart the principles of important field tests such as SPT and Plate bearing test.
4. To enable the student to imbibe the concepts of pile foundations and determine their load carrying capacity.

**UNIT – I**

**Soil Exploration:** Need – Methods of soil exploration – Boring and Sampling methods – Field tests – Penetration Tests – Pressure meter – planning of Programme and preparation of soil investigation report.

**UNIT-II**

**Stability of Slopes:** Infinite and finite earth slopes in sand and clay – types of failures – factor of safety of infinite slopes – stability analysis by Swedish arc method, standard method of slices – Taylor's Stability Number-Stability of slopes of dams and embankments - different conditions.

**UNIT – III**

**Earth Retaining Structures:** Rankine's & Coulomb's theory of earth pressure – Culmann's graphical method - earth pressures in layered soils.

**UNIT-IV**





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**Shallow Foundations – Bearing Capacity Criteria:** Types of foundations and factors to be considered in their location - Bearing capacity – criteria for determination of bearing capacity – factors influencing bearing capacity – analytical methods to determine bearing capacity – Terzaghi’s theory - IS Methods.

**UNIT-V**

**Pile Foundations:** 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.

**UNIT – VI**

**Well Foundations:** Types – Different shapes of well – Components of well – functions – forces acting on well foundations - Design Criteria – Determination of steining thickness and plug - construction and sinking of wells – Tilt and shift.

**COURSE OUTCOMES:**

1. The student must be able to understand the various types of shallow foundations and decide on their location based on soil characteristics.
2. The student must be able to compute the magnitude of foundation settlement to decide the size of the foundation.
3. The student must be able to use the field test data and arrive at the bearing capacity.
4. The student must be able to design Piles based on the principles of bearing capacity.

**TEXT BOOKS:**

TB1: Principles of Foundation Engineering, Das, B.M., (2011), 6th edition Cengage learning.

TB2: Basic and Applied Soil Mechanics, Gopal Ranjan & A.S.R. Rao, New Age International Pvt. Ltd, (2004).

**REFERENCES:**

R1: Foundation Analysis and Design, Bowles, J.E., (1988), 4th Edition, McGraw-Hill Publishing Company, New York.



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R2: Analysis and Design of Substructures by Swami Saran, Sarita Prakashan, Meerut.

Subject	TRANSPORTATION ENGINEERING				
Year/semester	III B.Tech/II Sem	L	T	P	C
Regulation year	2021-2022	3	0	0	3

**COURSE OBJECTIVES:**

1. To impart different concepts in the field of Highway Engineering.
2. To acquire design principles of Highway Geometrics and Pavements.
3. To acquire design principles of Intersections.

**UNIT – I**

**Highway Planning and Alignment:** Highway development in India; Classification of Roads; Road Network Patterns; Necessity for Highway Planning; Different Road Development Plans– First, second, third road development plans, road development vision 2021, Rural Road Development Plan – Vision 2025; Planning Surveys; Highway Alignment- Factors affecting Alignment Engineering Surveys – Drawings and Reports.

**UNIT-II**

**Highway Geometric Design:** 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:** Basic Parameters of Traffic- Volume, Speed and Density- Traffic Volume Studies; Speed studies – spot speed and speed & delay studies; Parking Studies; Road Accidents- Causes and Preventive measures - Condition Diagram and Collision Diagrams; PCU Factors, Capacity of Highways – Factors Affecting; LOS Concepts; Road Traffic Signs; Road markings;



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Types of Intersections; At-Grade Intersections – Design of Plain, Flared, Rotary and Channelized Intersections; Design of Traffic Signals – Webster Method – IRC Method.

**UNIT-IV**

**Highway Materials:** Subgrade soil: classification – Group Index – Subgrade soil strength – California Bearing Ratio – Modulus of Subgrade Reaction. Stone aggregates: Desirable properties – Tests for Road Aggregates – Bituminous Materials: Types – Desirable properties – Tests on Bitumen – Bituminous paving mixes: Requirements – Marshall Method of Mix Design.

**UNIT-V**

**Analysis & Design of Pavements:** Types of pavements; Functions and requirements of different components of pavements; Design Factors

Flexible Pavements: Design factors – Flexible Pavement Design Methods – CBR method – IRC method – Burmister method – Mechanistic method – IRC Method for Low volume Flexible pavements.

**UNIT – VI**

**Rigid Pavements:** Design Considerations – wheel load stresses – Temperature stresses – Frictional stresses – Combination of stresses – Design of slabs – Design of Joints – IRC method – Rigid pavements for low volume roads – Continuously Reinforced Cement Concrete Pavements – Roller Compacted Concrete Pavements

**COURSE OUTCOMES:**

1. Plan highway network for a given area.
2. Determine Highway alignment and design highway geometrics.
3. Design Intersections and prepare traffic management plans.
4. Judge suitability of pavement materials and design flexible and rigid pavements.

**TEXT BOOKS:**

TB1: Highway Engineering, Khanna S. K., Justo C. E. G and Veeraragavan A, Nem Chand Bros., Roorkee.

TB 2: Traffic Engineering and Transportation Planning, Kadiyali L. R, Khanna Publishers, New Delhi.

**REFERENCES:**

R1: Principles of Highway Engineering, Kadiyali L. R, Khanna Publishers, New Delhi.

R2: Principles of Transportation Engineering, Partha Chakroborthy and Animesh Das, PHI Learning Private Limited, Delhi.

<b>Subject</b>	<b>[PE-II] BUILDING PLANNING AND DRAWING</b>				
<b>Year/semester</b>	<b>III B.Tech/II Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation year</b>	<b>2021-2022</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**COURSE OBJECTIVES:**

1. Initiating the student to different building bye-laws and regulations.
2. Imparting the planning aspects of residential buildings and public buildings.
3. Giving training exercises on various signs and bonds and different building units.
4. Imparting the skills and methods of planning of various buildings.

**UNIT – I**

**Building Byelaws and Regulations:**

Introduction- terminology- objectives of building byelaws- floor area ratio- floor space index- principles under laying building bye laws- classification of buildings- open space requirements – built up area limitations height of buildings- wall thickness – lightening and ventilation requirements

**UNIT-II**

**Residential Buildings:** Minimum standards for various parts of buildings requirements of different rooms and their grouping- characteristics of various types of residential buildings and relationship between plan, elevation and forms and functions

**UNIT – III**

**Public Buildings:** Planning of educational institutions, hospitals, dispensaries, office buildings, banks, industrial buildings, hotels and motels, buildings for recreation, Landscaping requirements.

**UNIT-IV**



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**Sign Conventions and Bonds:** Brick, stone, plaster, sand filling, concrete, glass, steel, cast iron, copper alloys, aluminium alloys etc., lead, zinc, tin etc., earth, rock, timber and marbles. English bond and Flemish bond - odd and even courses for one, one and half, two and two and half brick walls in thickness at the junction of a corner.

**UNIT-V**

**Doors, Windows, Ventilators and Roofs:** Panelled door, panelled and glazed door, glazed windows, panelled windows, swing ventilators, fixed ventilators, coupled roof, collar roofs. King Post truss, Queen Post truss Sloped and flat roof and buildings: drawing plans, Elevations and Cross Sections of given sloped and flat roof buildings.

**UNIT – VI**

**Planning And Designing of Buildings:** Draw the Plan, Elevation and Sections of a Residential and Public buildings from the given line diagram.

**COURSE OUTCOMES:**

1. Student should be able to plan various buildings as per the building by-laws.
2. The student should be able to distinguish the relation between the plan, elevation and cross section and identify the form and functions among the buildings.
3. The student is expected to learn the skills of drawing building elements and plan the buildings as per requirements.

**TEXT BOOKS:**

TB1: Planning, designing and Scheduling, Gurucharan Singh and Jagadish Singh

TB2: Building planning and drawing by M. Chakravarthi.

**REFERENCES:**

R1: Building drawing, M G Shah, C M Kale and S Y Patki, Tata McGraw Hill, New Delhi.

R2: Principles of Building Drawing, M G Shah and C M Kale, Trinity Publications, New Delhi.



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R3: Civil Engineering drawing and House planning, B. P. Verma, Khanna publishers, New Delhi.

R4: Civil Engineering Building practice, Suraj Singh: CBS Publications, New Delhi, and Chennai.

R5: Building Materials and Construction, G. C Saha and Joy Gopal Jana, Mcgraw Hill Education (P) India Ltd. New Delhi

Subject	[PE-II] RAILWAY AND AIRPORT ENGINEERING				
Year/semester	III B.Tech/II Sem	L	T	P	C
Regulation year	2021-2022	3	0	0	3

**COURSE OBJECTIVES:**

1. To know various components and their functions in a railway track
2. To acquire design principles of geometrics in a railway track
3. To know various techniques for the effective movement of trains
4. To acquire design principles of airport geometrics and pavements.

**UNIT – I**

**Components of Railway Engineering:** Permanent way components – Railway Track Gauge - Cross Section of Permanent Way - Functions of various Components like Rails, Sleepers and Ballast –Rail Fastenings – Creep of Rails- Theories related to creep – Adzing of Sleepers- Sleeper density – Rail joints.

**UNIT-II**

**Geometric Design of Railway Track:** Alignment – Engineering Surveys - Gradients- Grade Compensation- Cant and Negative Super elevation- Cant Deficiency – Degree of Curve – safe speed on curves – Transition curve – Compound curves – Reverse curves – Extra clearance on curves – widening of gauge on curves – vertical curves – cheek rails on curves.

**UNIT – III**



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**Turnouts & Controllers:** Track layouts – Switches – Design of Tongue Rails – Crossings – Turnouts – Layout of Turnout – Double Turnout – Diamond crossing – Scissors crossing. Signal Objectives – Classification – Fixed signals – Stop signals – Signalling systems – Mechanical signalling system – Electrical signalling system – System for Controlling Train Movement – Interlocking – Modern signalling Installations.

**UNIT-IV**

**Airport Planning & Design:** Airport Master plan – Airport site selection – Air craft characteristics – Zoning laws – Airport classification – Runway orientation – Wind rose diagram – Runway length – Taxiway design – Terminal area and Airport layout – Visual aids and Air traffic control

**UNIT-V**

**Runway Design:** Various Design factors – Design methods for Flexible pavements – Design methods for Rigid pavements – LCN system of Pavement Design.

**UNIT – VI**

**Airfield Pavement:** Airfield Pavement Failures – Maintenance and Rehabilitation of Airfield pavements – Evaluation & Strengthening of Airfield pavements – Airport Drainage – Design of surface and subsurface drainage

**COURSE OUTCOMES:**

1. Design geometrics in a railway track.
2. Design airport geometrics and airfield pavements

**TEXT BOOKS:**

TB1: Railway Engineering by Satish Chandra and Agarwal M.M., Oxford University Press, New Delhi

TB2: Airport Engineering, Khanna & Arora - Nemchand Bros, New Delhi

**REFERENCES:**

R1: 'Highway, Railway, Airport and Harbour Engineering' by Subramanian KP, Scitech Publications (India) Pvt Limited, Chennai

R2: A Text book of Transportation Engineering by S.P.Chandola, S. Chand & Company pvt. Ltd., New Delhi.

<b>Subject</b>	<b>[PE-II] CONSTRUCTION MANAGEMENT</b>				
<b>Year/semester</b>	<b>III B.Tech/II Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation year</b>	<b>2021-2022</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**COURSE OBJECTIVES:**

1. To introduce to the student the concept of project management including network drawing and monitoring
2. To introduce various equipment like earth moving equipment, trucks and handling equipment, aggregate production and construction equipment and machinery, related to construction.
3. To introduce the importance of safety in construction projects.

**UNIT – I**

Construction project management and its relevance – qualities of a project manager – project planning – coordination –scheduling - monitoring – bar charts – milestone charts – critical Path Method – Applications

**UNIT-II**

Project Evaluation and Review Technique – cost analysis - updating – crashing for optimum cost – crashing for optimum resources – allocation of resources

**UNIT – III**

Construction equipment – economical considerations – earthwork equipment – Trucks and handling equipment – rear dump trucks – capacities of trucks and handling equipment – calculation of truck production – compaction equipment – types of compaction rollers





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**UNIT-IV**

Hoisting and earthwork equipment – hoists – cranes – tractors - bulldozers – graders – scrapers– draglines - clamshell buckets

**UNIT-V**

Concreting equipment – crushers – jaw crushers – gyratory crushers – impact crushers – selection of crushing equipment - screening of aggregate – concrete mixers – mixing and placing of concrete – consolidating and finishing

**UNIT – VI**

Construction methods – earthwork – piling – placing of concrete – form work – fabrication and erection – quality control and safety engineering

**COURSE OUTCOMES:**

1. Appreciate the importance of construction planning
2. Understand the functioning of various earth moving equipment
3. Know the methods of production of aggregate products and concreting and usage of machinery required for the works.
4. Apply the gained knowledge to project management and construction techniques

**TEXT BOOKS:**

TB1: Construction Planning Equipment and Methods, Peurifoy and Schexnayder, Shapira, Tata Mcgraw hill

TB2: Construction Project Management Theory and Practice, Kumar Neeraj Jha (2011), Pearson.

TB3: Construction Technology, Subir K. Sarkar and Subhajt Saraswati, Oxford University press.

TB4: Project Planning and Control with PERT and CPM, B. C. Punmia and K K Khandelwal, Laxmi Publications Pvt Ltd. Hyderabad.

**REFERENCES:**

R1: Construction Project Management - An Integrated Approach, Peter Fewings, Taylor and Francis

R2: Construction Management Emerging Trends and Technologies, Trefor Williams, Cengage learning.

R3: Hand Book of Construction Management, P. K. Joy, Trinity Press Chennai, New Delhi.

Subject	[PE-II] INFRASTRUCTURE PLANNING AND DESIGN				
Year/semester	III B.Tech/II Sem	L	T	P	C
Regulation year	2021-2022	3	0	0	3

**COURSE OBJECTIVES:**

1. Understanding role of infrastructure in economic development.
2. To learn principles of infrastructure planning.
3. To study principles of Infrastructure Management.
4. Understanding strategic planning for infrastructure.
5. Understand the rural & urban infrastructure planning.
6. Understand the Emerging trends in infrastructure.

**UNIT – I**

**INTRODUCTION:** Definition of basic terminologies, role of infrastructure in economic development, types of infrastructure, measurement of infrastructure capacity, bases for quantification of demand and supply of various types of infrastructure, Indian scenario in respect of adequacy and quality

**UNIT-II**

**INFRASTRUCTURE PLANNING:** Goals and course objective of infrastructure planning; Identification and quantification of the casual factors influencing the demand for infrastructure; review and application of techniques to estimate supply and demand for infrastructure; use of econometric, social and land use indicators and models to forecast the demand and level of service of infrastructure and its impact on land use; critical review of the relevant forecasting techniques.

**UNIT – III**



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**INFRASTRUCTURE MANAGEMENT:** Concepts, Common aspects of urban and rural infrastructure management systems; pavement and bridge management systems, integrated infrastructure management Sector

**UNIT-IV**

**STRATEGIC PLANNING:** Infrastructure planning to identify and prioritize preferred areas for development; Integration of strategic planning for infrastructure at urban, regional and national levels; case studies in infrastructure planning.

**UNIT-V**

**EMERGING TRENDS IN INFRASTRUCTURE:** Overview of Public-Private Sector Participation in infrastructure projects, Understanding stakeholders' concerns, regulatory framework, risk management in infrastructure projects, public policy for infrastructure.

**UNIT – VI**

**OVERVIEW:** Highways, railways, waterways, airports, urban and rural infrastructure: roads, housing, water supply, sanitation – case study examples

**COURSE OUTCOMES:**

1. Achieve Knowledge Infrastructure Planning.
2. Comprehend the Infrastructure Management.
3. Get familiar with the Public-Private Sector Participation in infrastructure projects.
4. Awareness on the public policy for infrastructure.
5. Attain Knowledge of the Highways, railways, waterways, airports, urban and rural infrastructure
6. Achieve the knowledge about rural urban infrastructure planning.

**TEXT BOOKS:**

TB1: Infrastructure Planning, Engineering and Economics” by Alvin S Goodman and Makarand Hastak

TB2: Infrastructure Planning Handbook: Planning, Engineering, and Economics” by Alvin S Goodman and Makarand Hastak.

**REFERENCES:**

R1: Mega Transport Infrastructure Planning: European Corridors in Local-Regional Perspective” by Sandro Fabbro

R2: Public Investment Management in the New EU Member States: Strengthening Planning and Implementation of Transport Infrastructure Investments (World Bank Working Paper)” by Thomas Laursen and Bernard Myers



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R3: Engineering Geology for Infrastructure Planning in Europe: A European Perspective (Lecture

Notes in Earth Sciences)” by Robert Charlier and Robert Hack

R4: Building California’s Future: Current Conditions in California’s Infrastructure Planning, Budgeting and Financing” by Michael Neuman and Jan Whittington.

R5: Infrastructure Planning” by James V Parkin and Deepak Sharma.

<b>Subject</b>	<b>OOPS THROUGH JAVA</b>				
<b>Year/semester</b>	<b>III B.Tech/II Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation year</b>	<b>2021-2022</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

1. Implementing programs for user interface and application development using core java principles.
2. Focus on object-oriented concepts and java program structure and its installation.
3. Comprehension of java programming constructs, control structures in Java Programming Constructs.
4. Implementing Object oriented constructs such as various class hierarchies, interfaces and exception handling.
5. Understanding of Thread concepts and I/O in Java.
6. Understanding of Various Components of Java Swing and write Code Snippets using them.

**Course Outcomes:** After completion of the course the student will be

1. Able to understand and solve real world problems using OOP techniques.
2. Able to understand the use of abstract classes, Inheritance and Interface.
3. Able to solve problems using java I/o classes.
4. Able to handle textual information using Strings
5. Able to develop multithreaded applications with synchronization.
6. Able to use swings for various applications.



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**UNIT I:**

**Introduction to OOP**

Introduction, Need of Object-Oriented Programming, Principles of Object-Oriented Languages, Procedural languages Vs OOP, Applications of OOP, History of JAVA, Java Virtual Machine, Java Features, Program Structures

**Variables, Primitive Data types, Identifiers-** Naming Conventions, Keywords, Literals, Operators- Binary, Unary and Ternary, Expressions, Precedence rules and Associativity, Primitive Type Conversion and Casting, Flow of Control-Branching, Conditional Loops.

**UNIT II:**

**Classes and Objects-** Classes, Objects, Creating Objects, Methods, Constructors-Constructor Overloading, Cleaning up Unused Objects-Garbage Collector, Class Variable and Methods, Static Keyword, this keyword.

**UNIT III:**

**Inheritance:** Types of Inheritance, Deriving Classes using Extends Keyword, Method Overloading, Super Keyword, Final Keyword, Abstract Class.

**Interfaces, Packages:** Interface-Extending Interface, Interface Vs Abstract Classes, Packages-Creating Packages, Using Packages, Access Protection, java.lang Package.

**UNIT IV:**

**Exceptions:** Introduction, Exception Handling Techniques-try...catch, throw, throws, finally block, User Defined Exception.

**Multi-Threading:** java.lang.Thread, The main Thread, Creation of New Threads, Thread Priority, Multithreading- Using isAlive() and join(), Synchronization, Suspending and Resuming Threads, Communication between Threads.

**Unit V:**

**Input/Output:** File I/O: Reading data from files and writing data to files, accessing data from CSV and Excel files.

**String Handling:** String Handling in Java: Introduction, Interface Char Sequence, Class String, Methods for Extracting Characters from Strings, Methods for Comparison of Strings, Methods for Modifying Strings, Methods for Searching Strings, Data Conversion and Miscellaneous Methods, Class String Buffer, Class String Builder.

**Unit VI:**



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**Event Handling:** Event Delegation Model, Sources of Event, Event Listeners, Adapter Classes, Inner Classes.

**Swings:** Introduction, JFrame, JApplet, JPanel, Components in Swings, Layout Managers, List and JScroll Pane, SplitPane, JTabbedPane, JTree, DialogBox, Pluggable Look and Feel.

**Text Books:**

1. The Complete Reference Java, 11<sup>th</sup> edition, Herbert Schildt, TMH.
2. Programming in JAVA, Sachin Malhotra, Saurabh Choudhary, and Oxford.

**References:**

1. JAVA Programming, K.Rajkumar, Pearson.
2. Core JAVA, Black Book, Nageswara Rao, Wiley, DreamTech.
3. Core JAVA for Beginners, Rashmi Kanta Das, Vikas.
4. Object Oriented Programming through JAVA, P Radha Krishna, University Press.
5. Object oriented programming with JAVA, Essentials and Applications, Raj Kumar Bhuyya, Selvi, ChuTMH.
6. Introduction to Java Programming, 7th ed, Y Daniel Liang, Pearson.

<b>Subject</b>	<b>[OE-II] MANAGEMENT SCIENCE</b>				
<b>Year/semester</b>	<b>III B.Tech/II Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation year</b>	<b>2021-2022</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

1. To familiarize with the process of management and to provide basic insight into contemporary management practices.
2. To provide conceptual knowledge on functional management and strategic management.

**Course Outcomes:**

1. After completion of the Course the student will acquire the knowledge on management functions, global leadership and organizational behavior.
2. Will familiarize with the concepts of functional management project management and strategic management.

**UNIT I**



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Introduction to Management: Concept –nature and importance of Management – Functions of Management – Henry Fayol’s 14 principles of management- Theories of Motivation – Decision making process— Types of Organizational structure.

**UNIT II**

Operations Management: Work study- Statistical Quality Control- Control charts (P-chart, R-chart, and C-chart) Simple problems- Material Management: Need for Inventory control- EOQ, ABC analysis (simple problems) and Types of ABC analysis (HML, SDE, VED, and FSN analysis).

**UNIT III**

Functional Management: Functions of HR Manager- Wage payment plans (Simple Problems) – Job Evaluation and Merit Rating - Marketing Management- Marketing strategies based on product Life Cycle, Channels of distributions.

**UNIT IV**

Project Management: (PERT/CPM): Development of Network – Difference between PERT and CPM Identifying Critical Path- Probability- Project Crashing (Simple Problems)

**UNIT V**

Strategic Management: Vision, Mission, Goals, Strategy – Elements of Corporate Planning Process – Environmental Scanning – SWOT analysis- Steps in Strategy Formulation and Implementation, Generic Strategy Alternatives.

**UNIT VI**

Contemporary Management Practice: Basic concepts of MRP, Total Quality Management (TQM), Six sigma, Business process Re-engineering and Bench Marking, Balanced Score Card.

**References:**

1. Dr. P. Vijaya Kumar & Dr. N. Appa Rao, 'Management Science' Cengage, Delhi, 2012.
2. Dr. A. R. Aryasri, 'Management Science' TMH 2011.
3. Koontz & Weihrich: 'Essentials of management' TMH 2011
4. Seth & Rastogi: 'Global Management Systems', Cengage learning, Delhi, 2011
5. Robbins: 'Organizational Behaviour', Pearson publications, 2011
6. 4. Kanishka Bedi: 'Production & Operations Management', Oxford Publications, 2011
7. Philip Kotler & Armstrong: 'Principles of Marketing', Pearson publications
8. Biswajit Patnaik: 'Human Resource Management', PHI, 2011
9. Hitt and Vijaya Kumar: 'Strategic Management', Cengage learning
10. Prem Chadha: 'Performance Management', Trinity Press (An imprint of Laxmi Publications Pvt. Ltd.) Delhi 2015.
11. Anil Bhat & Arya Kumar: 'Principles of Management', Oxford University Press, New Delhi, 2015.

<b>Subject</b>	<b>BUILDING PLANNING AND DRAWING THROUGH AUTOCAD</b>				
<b>Year/semester</b>	<b>III B.Tech/II Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation year</b>	<b>2021-2022</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**COURSE OBJECTIVES:**

1. Learn to sketch and take field dimensions
2. Learn basic Auto Cad skills
3. Learn basic engineering drawing formats

**List of experiments:**

1. Introduction to computer aided drafting
2. Principles of Planning
3. Software for CAD – Introduction to different software
4. Practice exercises on CAD software
5. Drawing of plans of buildings using software
  - a) Single storied buildings
  - b) Multi storied buildings
  - c) Sanitation and electrical layout
6. Developing sections and elevations for





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- a) Single storied buildings
- b) multi storied buildings
- 7. Detailing of building components like Doors, Windows, Roof Trusses etc. using CAD software
- 8. Exercises on development of working of buildings.
- 9. Executing a spiral stair case in 3D.

**COURSE OUTCOMES:**

- 1. Principles of building planning
- 2. Know Auto Cad commands
- 3. Draw the plan, section and elevation of a building.
- 4. Draw the sanitation and electrical layout
- 5. Create, analyze and produce 2D drawings of buildings
- 6. Detailing building plans

**TEXT BOOKS:**

TB1: Gurcharan Singh, Building Planning, Designing and Scheduling

**REFERENCES:**

- R1: Rangwala, S.C., Town Planning, Charotar Publishing House, Anand.58
- R2: National Building Code of India, Indian Standard Institution (ISI), 2005, New Delhi.
- R3: BIS and IS Code.

<b>Subject</b>	<b>TRANSPORTATION ENGINEERING LAB</b>				
<b>Year/semester</b>	<b>III B.Tech/II Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation year</b>	<b>2021-2022</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**COURSE OBJECTIVES:**

1. To test crushing value, impact resistance, specific gravity and water absorption, percentage attrition, percentage abrasion, flakiness index and elongation index for the given road aggregates.
2. To know penetration value, ductility value, softening point, flash and fire point for the given bitumen grade.
3. To test the stability for the given bitumen mix
4. To carry out surveys for traffic volume and parking.

**SYLLABUS:**

**I. ROAD AGGREGATES:**

1. Aggregate Crushing value
2. Aggregate Impact Test
3. Specific Gravity and Water Absorption
4. Attrition Test



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5. Abrasion Test
6. Shape tests

**II. BITUMINOUS MATERIALS:**

1. Penetration Test
2. Ductility Test
3. Softening Point Test
4. Flash and fire point tests

**III. BITUMINOUS MIX:**

1. Marshall Stability test

**IV. TRAFFIC SURVEYS:**

1. Traffic volume study at mid blocks
2. Traffic Volume Studies (Turning Movements) at intersection
3. Parking study

**LIST OF EQUIPMENT:**

1. Apparatus for aggregate crushing test
2. Aggregate Impact testing machine
3. Pycnometers
4. Los angles Abrasion test machine
5. Deval's Attrition test machine
6. Length and elongation gauges
7. Bitumen penetration test setup
8. Bitumen Ductility test setup
9. Ring and ball apparatus
10. Marshal Mix design apparatus

**COURSE OUTCOMES:**

1. Ability to test aggregates and judge the suitability of materials for the road construction
2. Ability to test the given bitumen samples and judge their suitability for the road construction
3. Ability to obtain the optimum bitumen content for the mix design
4. Ability to determine the traffic volume, speed and parking characteristics.

**TEXT BOOKS:**



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TB1: Highway Material Testing Manual, S. K. Khanna, C. E. G Justo and A. Veera Raghavan, Nem Chand Brothers New Chand Publications, New Delhi.

**REFERENCES:**

R1: I R C Codes of Practice

R2: Asphalt Institute of America Manuals

R3: Code of Practice of B.I.S.

**Course Structure – R19**  
**(With effect from 2019-2020)**

**IV Year - I Semester**

S.No	Category	Course Code	Course Title	L	T	P	C	IM	EM	TM
1	PC	19CE7T01	Estimation & Costing	3	-	-	3	40	60	100
2	PC	19CE7T02	Environmental Engineering	3	-	-	3	40	60	100
3	PC	19CE7T03	Prestressed Concrete	3	-	-	3	40	60	100
4	PC	19CE7T04	Water Resources Engineering	3	-	-	3	40	60	100
5	PE	19CE7T05 19CE7T06 19CE7T07 19CE7T08	<b>Professional Elective –III</b> 1. Traffic Engineering and Management 2. Geosynthetics and Applications 3. Pavement Analysis and Design 4. Urban Transportation planning	3	-	-	3	40	60	100
6	PE	19CE7T09 19CE7T10 19CE7T11 19CE7T12	<b>Professional Elective –IV</b> 1. Finite Element methods 2. Bridge Engineering 3. Elements of earthquake Engineering 4. Repair and Rehabilitation of structures	3	-	-	3	40	60	100
7	PC	19CE7P01	Environmental Engineering Lab	-	-	3	1.5	40	60	100
8	ES	19CE7P02	GIS and CAD Lab	-	-	3	1.5	40	60	100
9	PR	19CE7J01	Major Project Phase-I	-	-	4	2	20	30	50
10	PR	19CE7I01	Survey Camp Industrial Training / Internship/Research Projects in National Laboratories/Academic Institute	-	-	3	2	20	30	50
<b>Total</b>				<b>18</b>	<b>-</b>	<b>12</b>	<b>25</b>	<b>360</b>	<b>540</b>	<b>900</b>

<b>Subject</b>	<b>ESTIMATION &amp; COSTING</b>				
<b>Year/semester</b>	<b>IV B.Tech/I Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation year</b>	<b>2022-2023</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Learning Objectives:**

The objective of this course is to enable the students to:

1. Understand the quantity calculations of different components of the buildings.
2. Understand the rate analysis of different quantities of the buildings components.
3. Learn various specifications and components of the buildings.

**SYLLABUS:**

**UNIT – I**

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

**UNIT – II**

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

**UNIT-III**

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

**UNIT – IV**

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

**UNIT-V**

Detailed Estimation of Buildings using individual wall method.



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**UNIT –VI**

Detailed Estimation of Buildings using centre line method.

**Course Outcomes:**

Upon the successful completion of this course:

1. The student should be able to determine the quantities of different components of buildings.
2. The student should be in a position to find the cost of various building components.
3. The student should be capable of finalizing the value of structures.

**Text Books:**

1. Estimating and Costing, B.N. Dutta, UBS publishers, 2000.
2. Civil Engineering Contracts and Estimates, B. S. Patil, Universities Press (India) Pvt. Ltd., Hyd.
3. Construction Planning and Technology, Rajiv Gupta, CBS Publishers & Distributors Pvt. Ltd. New Delhi.
4. Estimating and Costing, G.S. Birdie.

**References:**

1. Standard Schedule of rates and standard data book, public works department.
2. IS 1200 (Parts I to XXV-1974/ Method of Measurement of Building & Civil Engg Works – B.I.S.
3. Estimation, Costing and Specifications, M. Chakraborti; Laxmi publications.
4. National Building Code

<b>Subject</b>	<b>ENVIRONMENTAL ENGINEERING</b>				
<b>Year/semester</b>	<b>IV B.Tech/I Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation year</b>	<b>2022-2023</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

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

1. Outline planning and the design of water supply systems for a community/town/city and selection of source based on quality and quantity
2. Design of water treatment plant for a village/city
3. Impart knowledge on design of water distribution network
4. Design of sewers and plumbing system for buildings
5. Design of Sewage Treatment Plant

**UNIT-I**

**Introduction:** Importance and Necessity of Protected Water Supply systems, Water borne diseases, Flow chart of public water supply system, Role of Environmental Engineer.

**Water Demand and Quantity Estimation:** Estimation of water demand for a town or city, Per capita Demand and factors influencing it - factors affecting water demand, Design Period, Population forecasting.

**Sources of Water:** Lakes, Rivers, Comparison of sources with reference to quality, quantity and other considerations- Ground water sources: springs, Wells and Infiltration galleries, Characteristics of water- Physical, Chemical and Biological characteristics and WHO guidelines for drinking water - IS 10500 2012 - Water quality standards for Agriculture, Industries and Construction.

**UNIT-II**

**Treatment of Water:** Treatment methods: Theory and Design of Sedimentation, Coagulation, Filtration. **Disinfection:** Theory of disinfection-Chlorination and other Disinfection methods. Removal of colour and odours- Removal of Iron and Manganese - Adsorption- Fluoridation and defluoridation-Reverse Osmosis- Freezing.

**UNIT-III**

**Collection and Conveyance of Water:** Factors governing the selection of the intake structure, Conveyance of Water: Gravity and Pressure conduits, Types of Pipes, Pipe Materials, Pipe joints, Design aspects of pipe lines. Laying and testing of pipe lines- Capacity of storage reservoirs, Mass curve analysis.



**Distribution of Water:** Methods of Distribution system, Layouts of Distribution networks, Water main appurtenances - Sluice valves, Pressure relief valves, air valves, check valves, hydrants, and water meters–Ideal water supply system. Case studies.

#### **UNIT – IV**

**Sewerage:** Estimation of sewage flow and storm water drainage – fluctuations – types of sewers - design of sewers.

**Sewer appurtenances** – cleaning and ventilation of sewers.

**House Plumbing:** Systems of plumbing-sanitary fittings and other accessories– one pipe and two pipe systems – Design of drainage in Gated communities, Apartments and Hotels.

Septic Tank - working Principles and Design.

#### **UNIT – V**

**Sewage characteristics** –Characteristics of sewage - BOD equations. ThOD, COD and BOD.

**Treatment of Sewage:** Primary treatment. **Secondary treatment:** Activated Sludge Process, principles, designs, and operational problems. Oxidation ponds, Trickling Filters – classification – design, operation and maintenance problems. RBCs. Fluidized bed reactors –Anaerobic digestion of sludge, Sludge Drying Beds.

**Ultimate Disposal of sewage:** Methods of disposal – disposal into water bodies-Oxygen Sag Curve- Disposal into sea, disposal on land, Sewage sickness. Effluent standards.

#### **Course Outcomes:**

Course will enable the student to:

1. Select a source based on quality and quantity and Estimate design population and water demand
2. Design a water treatment plant for a village/city
3. Design a sewer by estimating DWF and Storm water flow and plumbing system for buildings
4. Design a Sewage Treatment Plant for a town/city.

#### **Text Books**

1. Environmental Engineering – Howard S. Peavy, Donald R. Rowe, Teorge George Tchobanoglus  
– Mc-Graw-Hill Book Company, New Delhi, 1985.
2. Rural Municipal and Industrial water management, KVSG Murali Karishna, Environmental Protection Society, Kakinada, 2021.
3. Industrial Water and Wastewater Management, K.V.S.G. Murali Krishna, Paramount Publications, Visakhapatnam, 2018.
4. Elements of Environmental Engineering – K. N. Duggal, S. Chand & Company Ltd., New Delhi, 2012.

#### **References**

1. Water Supply Engineering – P. N. Modi.
2. Water Supply Engineering – B. C. Punmia
3. Water Supply and Sanitary Engineering – G. S. Birdie and J. S. Birdie
4. Environmental Engineering (Vol.1) Water Supply Engineering - Santosh Kumar Garg, Khanna Publishers.
5. Sewage Disposal and Air Pollution Engineering by S.K. Garg, Khanna Publishers.
6. Waste Water Engineering by BC Punmia, Lakshmi publications Pvt lmtd.

<b>Subject</b>	<b>PRESTRESSED CONCRETE</b>				
<b>Year/semester</b>	<b>IV B.Tech/I Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation year</b>	<b>2022-2023</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Learning Objectives:**

The objective of this course is:

- Familiarize Students with concepts of prestressing
- Equip student with different systems and devices used in prestressing
- Understand the different losses of prestress including short and long-term losses
- Familiarize students with the analysis and design of prestressed concrete members under flexure, shear and torsion

**SYLLABUS:**

**UNIT-I** Basic concepts of Prestressing- Advantages and Applications of Prestressed Concrete, High Strength Concrete- Permissible Stresses, Shrinkage, Creep, Deformation Characteristics, High strength Steel- Types, Strength- Permissible Stresses- Relaxation of Stress, Cover Requirements.

**UNIT-II** Prestressing Systems- Introduction, Tensioning devices, Pre-tensioning Systems, Post tensioning Systems, Basic Assumptions in Analysis of prestress and design, Analysis of prestress, Resultant Stresses at a section- pressure line- Concepts of load balancing- Stresses in Tendons, Cracking moment.

**UNIT-III** Losses of Pre-stressing- Loss of Pre-stress in pre-tensioned and post tensioned members due to various causes -Elastic shortening of concrete, shrinkage of concrete, creep of concrete, Relaxation stress in steel, slip in anchorage, differential shrinkage- bending of members and frictional losses- Total losses allowed for design

**UNIT-IV** Design for Flexural resistance- Types of flexural failure – Code procedures Design of sections for flexure- Control of deflections- Factors influencing Deflection Prediction of short term and long-term deflections.

**UNIT-V** Design for Shear and Torsion- Shear and Principal Stresses- Design of Shear reinforcements- Codal Provisions- Design for Torsion, Design for Combined bending, shear and torsion.



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**UNIT-VI** Transfer of Prestress in pretensioned members- Transmission length- Bond stresses- end zone reinforcement- Codal provisions- Anchorage zone Stresses in Post tensioned members- Stress distribution in end block- Anchorage Zone reinforcement.

**Course Outcomes:**

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

- Understand the different methods of prestressing
- Estimate effective prestress including the short- and long-term losses
- Analyze and design prestressed concrete beams under flexure and shear
- Understand the relevant IS Codal provisions for prestressed concrete

**Text Books**

1. Prestressed Concrete, N. Krishna Raju, Tata McGraw hill
2. Prestressed Concrete, S. Ramamrutham

**References:**

1. Prestressed Concrete, P. Dayaratnam
2. Prestressed Concrete, T. Y. Lin & Burns, Wiley Publications

<b>Subject</b>	<b>WATER RESOURCES ENGINEERING</b>				
<b>Year/semester</b>	<b>IV B.Tech/I Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation year</b>	<b>2022-2023</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **Course Objectives**

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

### **UNIT – I**

**Introduction:** Concepts of Hydrologic cycle, Global Water Budget, Applications in Engineering. Sources of data.

#### **Precipitation**

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

### **UNIT – II**

#### **Abstractions from precipitation**

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

#### **Runoff**

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

### **UNIT – III**

#### **Hydrographs**

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

### **UNIT – IV**

#### **Groundwater Hydrology**

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

### **UNIT – V**

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

### **UNIT – VI**

**Canal Structures:** Falls: Types and location, design principles of Sarada type fall and straight glacis fall. Regulators: Head and cross regulators, design principles Cross Drainage Works: Types, selection, design principles of aqueduct, siphon aqueduct and super passage. Outlets: types, proportionality, sensitivity and flexibility River Training: Objectives and approaches



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**Course Outcomes**

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

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

**Text Books**

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

**Reference Books**

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

<b>Subject</b>	<b>[PE-III] TRAFFIC ENGINEERING AND MANAGEMENT</b>				
<b>Year/semester</b>	<b>IV B.Tech/I Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation year</b>	<b>2022-2023</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Learning Objectives:**

The objective of this course is:

- To know various components and characteristics of traffic.
- To know various traffic control devices and principles of highway safety.
- To understand the detrimental effects of traffic on environment
- To know highway capacity and level of service concepts.
- To learn about intelligent vehicle highway systems.

**SYLLABUS:**

**UNIT- I** Components of The Traffic System: Human-Vehicle–Environment System; characteristics of Road users, Vehicles, Highways and their classification, Traffic Studies: Inventories, Volume studies; Speed, Travel time and Delay studies, Intersection studies, Pedestrian studies; Parking studies; Accident studies.

**UNIT- II** Traffic Characteristics: Microscopic and macroscopic flow characteristics: Time headways; Temporal, spatial and model flow patterns; Interrupted and Un interrupted traffic. Microscopic and macroscopic speed characteristics: Vehicular speed Trajectories; Speed characteristics – Mathematical distribution; Speed and travel time variations; Travel time and delay studies. Microscopic and Macroscopic density characteristics: Distance headway characteristics; Car-following theories; Density measurement techniques; Density contour maps

**UNIT- III** Traffic Control Devices & Highway Safety: Traffic signs & Markings; Signal Warrants; Signal phasing and Development of phase plans; Fixed and Vehicle activated signals; Webster method; ARRB method; Drew’s Method; IRC method; Signal coordination; Area Traffic control. Accident characteristics – Road – Driver – Vehicle; Accident recording and Analysis; Highway Safety Improvement Program; Safety Audit.



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**UNIT-IV** Environmental Considerations: Air pollution: Kinds of pollutants; Air pollution standards; Measures of air quality; modelling and control. Noise pollution: Measurement of sound levels; Acceptable limits, Prediction of noise levels, Traffic noise control.

**UNIT- V** Highway Capacity and Level of Service: Capacity and level of service; Factors affecting Capacity and LOS; Capacity of Rural Highways, Capacity of Urban Roads; HCM and IRC standards.

**UNIT- VI** Intelligent Vehicle – Highway Systems: Traffic surveillance and monitoring; IVHS programs, Role of IVHS, IVHS categories, Benefits and Costs of IVHS

**Course Outcomes:**

At the end of course, Student can

1. Determine traffic speed, volume, travel time and density.
2. Design traffic signals
3. Determine highway capacity

**Text Books**

1. Traffic Engineering: Theory and Practice, Pignataro L.J., Prentice Hall, Inc
2. Traffic and Transport planning, Kadiyali L.R., Khanna Publishers

**References:**

1. Traffic Engineering Hand Book, Institute of Transportation Engineers, 4 Ed., Prentice Hall
2. Traffic Engineering, Mc Shane, WR and RP Roess, Prentice Hall
3. Highway Traffic analysis and design, Salter RJ and NB Hounsell, 3rd ed., Macmillan
4. Traffic Planning and Engineering, Hobbs FD., Pergamon press
5. Traffic flow fundamentals, May, A.D., Prentice Hall



Subject	[PE-III] GEOSYNETHETICS AND APPLICATIONS				
Year/semester	IV B.Tech/I Sem	L	T	P	C
Regulation year	2022-2023	3	0	0	3

**Course Objectives:**

1. To understand the emerging trends of Geosynthetics
2. To evaluate the different properties of including different tests
3. To analyse the functions of geosynthetic and its suitability
4. To design different structures using geosynthetics according to various applications

**Course Outcomes:**

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

1. Identify the type of geosynthetics and their relevance in geotechnical field
2. Understand the mechanism of formation of different geosynthetics
3. Analyse and compute different properties of geosynthetics
4. Apply the knowledge for designing the structures using Geosynthetic materials.

**UNIT- I**

**An Overview of Geosynthetic in Geotechnical Engineering**

Historical development; Types of geosynthetics: geotextiles, geogrids, geonets, geomembranes, geocomposites; Recent use in India.

**UNIT- II**

**Manufacturing: Materials and Process**

Raw materials: polyamide, polyester, polyethylene, polypropylene, poly vinyl chloride.

Different types 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**

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**

Reinforcement; Separation; Filtration; Drainage; Barrier Functions; Confinement.

### **UNIT- V**

#### **Applications of Geosynthetics**

Use of geosynthetics in roads; Use of reinforced soil in Retaining walls; Improvement of bearing capacity; Geosynthetics in environmental control and landfills; Ground Improvement by geodrains; Use of Geosynthetics in lining of canals.

### **UNIT- VI**

#### **Principles and Design of Geosynthetics**

Principles of soil reinforcement; Design and construction of geosynthetic reinforced soil retaining structures - walls and slopes; Codal provisions; Bearing capacity improvement; embankments on soft soils; Indian experiences.

#### **Text Books:**

1. Rao, G.V. (2007). Geo-synthetics – An Introduction. Sai Master Geo-environmental Services Pvt. Ltd., Hyderabad.
2. Engineering with Geosynthetics by G.Venkatappa Rao and G.V.S Suryanarayana Raju – Tata McGraw Hill, New Delhi, 1990.
3. Construction and Geotechnical Methods in Foundation Engineering by Robert M. Koerner – McGraw Hill, New York, 1985.
4. Designing with Geosynthetics 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.

<b>Subject</b>	<b>[PE-III] PAVEMENT ANALYSIS AND DESIGN</b>				
<b>Year/semester</b>	<b>IV B.Tech/I Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation year</b>	<b>2022-2023</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Learning Objectives:**

The objectives of this course are:

- To know various factors affecting pavement design
- To know various concepts for the stresses in pavements.
- To understand material characterisation and mix design concepts.
- To acquire design principles of flexible and rigid pavements.
- To acquire design principles of shoulders, overlays and drainage.

**Course Outcomes:**

At the end of course, Student will be able to

- Determine stresses in pavements
- Design bituminous mixes
- Design flexible pavements using various methods
- Design rigid pavements using various methods
- Design shoulders, overlays and drainage.

**SYLLABUS:**

**UNIT-I** Factors Affecting Pavement Design: Variables Considered in Pavement Design, Types of Pavements, Functions of Individual Layers, Classification of Axle Types of Rigid Chassis and Articulated Commercial Vehicles, Legal Axle and Gross Weights on Single and Multiple Units, Tire Pressure, Contact Pressure, EAL and ESWL Concepts, Traffic Analysis: ADT, AADT,



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Truck Factor, Growth Factor, Lane, Directional Distributions & Vehicle Damage Factors, Effect of Transient & Moving Loads.

**UNIT-II** Stresses In Pavements: Vehicle-Pavement Interaction: Transient, Random & Damping Vibrations, Steady State of Vibration, Experiments on Vibration, Stress Inducing Factors in Flexible and Rigid pavements; Stress in Flexible Pavements: Visco-Elastic Theory and Assumptions, Layered Systems Concepts, Stress Solutions for One, Two and Three Layered Systems, Fundamental Design Concepts; Stresses in Rigid Pavements: Westergaard's Theory and Assumptions, Stresses due to Curling, Stresses and Deflections due to Loading, Frictional Stresses, Stresses in Dowel Bars & Tie Bars, Introduction to DAMA, KENLAYER & KENSLABS Programs

**UNIT-III** Material Characterisation & Mix Design Concepts: CBR and Modulus of Subgrade Reaction of Soil, Mineral aggregates – Blending of aggregates, binders, polymer and rubber modified bitumen, Resilient, Diametral Resilient and Complex (Dynamic) Moduli of Bituminous Mixes, Permanent Deformation Parameters and other Properties, Effects and Methods of Stabilisation and Use of Geo Synthetics; Marshall's and Hveem's Methods of Bituminous Concrete Mix Design, Field Implications of Stability and Flow Values, Introduction to Super Pave Mix Design, IRC Cement Concrete Mix Design

**UNIT-IV** Design of Flexible Pavements: Flexible Pavement Design Concepts, Asphalt Institute's Methods with HMA and other Base Combinations, AASHTO, Road Note No 29 & IRC Methods, Design of Runways & Taxiways, Design of Low Volume Rural Roads

**UNIT-V** Design of Rigid Pavements: Calibrated Mechanistic Design Process, PCA, AASHTO & IRC Specifications, Introduction to Prestressed and Continuously Reinforced Cement Concrete Pavement Design, Rigid Pavement Design for Low Volume Rural Roads.

**UNIT-VI** Design Of Shoulders, Overlays & Drainage: Shoulder Design Considerations, Traffic Prediction, Parking, Regular & Encroaching Traffic, Thickness Design Specifications for Flexible & Rigid Shoulders; Types & Design of Overlays: AI's Principal Component Analysis & IRC Methods of Overlay Design, Importance of Profile Correction Course; Pavement Drainage Concepts, Drainage Related Failures, Inflow-Outflow Concepts, Condition of Continuity, Surface and Sub Surface Drainage Design Specifications

**Text Books:**

1. Pavement Analysis and Design, Yang H. Huang, Pearson Education, Second Edition.
2. Principles of Pavement Design, Yoder. J. & Witczak Mathew, W. John Wiley & Sons Inc
3. Pavement Design, Srinivasa Kumar R, Universities Press, Hyderabad

**References:**

1. Design of Functional Pavements, Nai C. Yang, McGraw Hill Publications
2. Pavement and Surfacing for Highway & Airports, Micheal Sargious, Applied Science Publishers Limited.
3. Principles of Transportation Engineering, Patha Chakroborty and Animesh Das, PHI Learning Private Limited, Delhi
4. Dynamics of Pavement Structures, G. Martineek, Chapmen & Hall Inc
5. Concrete Pavements, A.F. Stock, Elsevier, Applied Science Publishers
6. Pavement Evaluation Maintenance Management System, R Srinivas Kumar, Universities Press, Hyderabad.

<b>Subject</b>	<b>[PE-III] URBAN TRANSPORTATION PLANNING</b>				
<b>Year/semester</b>	<b>IV B.Tech/I Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation year</b>	<b>2022-2023</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Learning Objectives:**

The objective of this course is:

1. To learn various procedures for travel demand estimation.
2. To various data collection techniques for OD data.
3. To know various models and techniques for trip generation, trip distribution, mode choice and traffic assignment.
4. To develop alternative urban transport network plans.

**Course Outcomes:**

At the end of course, Student can

- a. Estimate travel demand for an urban area.
- b. Plan the transportation network for a city.
- c. Identify the corridor and plan for providing good transportation facilities.
- d. Evaluate various alternative transportation proposals.

**SYLLABUS:**

**UNIT -I**

Urban Transportation Problems & Travel Demand: Urban Issues, Travel Characteristics, Evolution of Planning Process, Supply and Demand – Systems approach; Trends, Overall Planning process, long term Vs Short term planning, Demand Function, Independent Variables, Travel Attributes, Assumptions in Demand Estimation, Sequential, and Simultaneous Approaches, Aggregate and Disaggregate Techniques.



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**UNIT -II**

Data Collection and Inventories: Collection of data – Organisation of surveys and Analysis, Study Area, Zoning, Types and Sources of Data, Road Side Interviews, Home Interview Surveys, Commercial Vehicle Surveys, Sampling Techniques, Expansion Factors, Accuracy Checks, Use of Secondary Sources, Economic data – Income – Population – Employment – Vehicle Owner Ship.

**UNIT -III**

Trip Generation & Distribution: UTPS Approach, Trip Generation Analysis: Zonal Models, Category Analysis, Household Models, Trip Attraction models, Commercial Trip Rates; Trip Distribution: Growth Factor Methods, Gravity Models, Opportunity Models, Time Function Iteration Models.

**UNIT -IV**

Mode Choice Analysis: Mode Choice Behaviour, Competing Modes, Mode Split Curves, Aggregate and Disaggregate Approaches; Discrete Choice Analysis, Choice sets, Maximum Utility, Probabilistic Models: Binary Logit, Multinomial Logit Model – IIA property; Aggregation

**UNIT -V**

Traffic Assignment: Diversion Curves; Basic Elements of Transport Networks, Coding, Route Properties, Path Building Criteria, Skimming Tree, All-or-Nothing Assignment, Capacity Restraint Techniques, Reallocation of Assigned Volumes, Equilibrium Assignment.

**UNIT -VI**

Corridor Identification, Plan Preparation & Evaluation: Master plans, Selection of Corridor, Corridor Identification, Corridor deficiency Analysis; Travel Forecasts to Evaluate Alternative Improvements, Impacts of New Development on Transportation Facilities. Pivot Point Analysis, Environmental and Energy Analysis; Case studies

**TEXT BOOKS:**

1. 'Introduction to Urban System Planning' by Hutchinson, B.G., McGraw Hill.
2. 'Transportation Engineering - An Introduction' by Khisty C.J., Prentice Hall.
3. 'Fundamentals of Transportation Planning' by Papacostas, Tata McGraw Hill.

**REFERENCES:**

1. 'Urban Transportation Planning: A decision-oriented Approach' by Mayer M and Miller E, McGraw Hill.

2. 'Introduction to Transportation Planning' by Bruton M.J., Hutchinson of London.
3. 'Metropolitan Transportation Planning' by Dicky, J.W., Tata McGraw Hill.
4. 'Traffic Engineering and Transportation Planning' by Kadiyali.L.R., Khanna Publishers, New Delhi.

<b>Subject</b>	<b>[PE-IV] FINITE ELEMENT METHODS</b>				
<b>Year/semester</b>	<b>IV B.Tech/I Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation year</b>	<b>2022-2023</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Learning Objectives:**

The objective of this course is:

- Equip the students with the fundamentals of Finite Element Analysis
- Enable the students to formulate the design problems into FEA.
- Enable the students to solve Boundary value problems using FEM

**Course Outcomes:**

Upon completion of the course, the student will be able to

- Solve simple boundary value problems using Numerical technique of Finite element method
- Develop finite element formulation of one- and two-dimensional problems and solve them.
- Assemble Stiffness matrices, apply boundary conditions and solve for the displacements
- Compute Stresses and Strains and interpret the result.

**SYLLABUS:**

**UNIT-I** Introduction: Review of stiffness method- Principle of Stationary potential energy  
Potential energy of an elastic body- Rayleigh-Ritz method of functional approximation.



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**UNIT-II** Principles of Elasticity- Equilibrium Equations- Strain Displacement relationships  
Constitutive relationship for plane stress, plane strain and axisymmetric bodies of revolution with axisymmetric loading.

**UNIT-III** Finite Element formulation of truss element: Stiffness matrix- properties of stiffness matrix –Selection of approximate displacement functions- solution of a plane truss  
transformation matrix- Galerkin's method for 1-D truss – Computation of stress in a truss element.

**UNIT-IV** Finite element formulation of Beam elements: Beam stiffness- assemblage of beam stiffness matrix- Examples on Analysis of beams Subjected to Concentrated and Distributed loading.

**UNIT-V** Finite element formulation for plane stress and plane strain problems- Derivation of CST and LST stiffness matrix and equations-treatment of body and surface forces

**UNIT-VI** Iso-parametric Formulation: An isoparametric bar element- plane bilinear isoparametric element – quadratic plane element - shape functions, evaluation of stiffness matrix, consistent nodal load vector - Gauss quadrature for performing numerical integrations.

**Text Books**

1. A first course in the Finite Element Method, Daryl L. Logan, Thomson Publications.
2. Introduction to Finite Elements in Engineering, Tirupati R. Chandrupatla, Ashok D. Belgundu, PHI publications.,
3. Introduction to Finite Element Method, Desai & Abel CBS Publications

**References:**

1. Concepts and applications of Finite Element Analysis, Robert D. Cook, Michael E Plesha, John Wiley & sons Publication.





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<b>Subject</b>	<b>[PE-IV] BRIDGE ENGINEERING</b>				
<b>Year/semester</b>	<b>IV B.Tech/I Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation year</b>	<b>2022-2023</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Learning Objectives:**

The objective of this course is:

- Familiarize Students with different types of Bridges and IRC standards
- Equip student with concepts and design of Slab Bridges, T Beam Bridges, Box Culverts
- Understand concepts of design of Plate Girder Bridges
- Familiarize with different methods of inspection of bridges and maintenance

**Course Outcomes:**

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

- Explain different types of Bridges with diagrams and Loading standards
- Carryout analysis and design of Slab bridges, T Beam bridges, Box culverts and suggest structural detailing
- Carryout analysis and design of Plate girder bridges
- Organize for attending inspections and maintenance of bridges and prepare reports.

**SYLLABUS:**



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**UNIT-I** Introduction- Bridges- Types- Slab bridges, T Beam, Arch bridges, Cable Stayed bridges, prestressed concrete bridges, Truss Bridges, Culverts, - Nomenclature- Selection of Bridge Site- Economical span- Abutments pier and end connections- types of foundations; Open, Pile, Well Foundations, Bearings – Types- Introduction to Loading standards- Railway and IRC Loading

**UNIT-II** Slab bridges- Wheel load on slab- effective width method- slabs supported on two edges- cantilever slabs- dispersion length- Design of interior panel of slab- Guyon's – Massonet Method –Hendry- Jaegar Methods- Courbon's theory- Pigeaud's method

**UNIT-III** T-Beam bridges- Analysis and design of various elements of bridge –Design of deck slab, Longitudinal girders, Secondary beams- Reinforcement detailing

**UNIT-IV** Plate Girder Bridges: Elements of plate girder and their design-web- flange intermediate stiffener- vertical stiffeners- bearing stiffener- Splices, Design problem with detailing

**UNIT-V** Box Culverts: Loading – Analysis and Design- Reinforcement detailing.

**UNIT-VI** Sub Structure-Abutments-Stability analysis of abutments-piers-loads on piers, Analysis of piers-Wing Walls-Design problems.

**Text Book**

1. Essentials of Bridge Engineering, Jhonson Victor D
2. Design of Bridge Structures, T. R. Jagadeesh, M.A. Jayaram, PHI
3. Design of Bridges, N. Krishna Raju, Tata McGraw Hill

**References:**

1. Design of Concrete Bridges, Aswini, Vazirani, Ratwani
2. Design of Steel Structures, B. C. Punmai, Jain & Jain, Lakshmi Publications
3. Design of R C Structures, B. C. Punmai, Jain & Jain, Lakshmi Publications



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<b>Subject</b>	<b>[PE-IV] ELEMENTS OF EARTHQUAKE ENGINEERING</b>				
<b>Year/semester</b>	<b>IV B.Tech/I Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation year</b>	<b>2022-2023</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Learning Objectives:**

The objective of this course is:

1. Familiarize Students with Engineering Seismology
2. Equip student with concepts of Structural Dynamics
3. Understand Concepts of Seismic Design
4. Familiarize with Design philosophies for Seismic loading
5. Familiarize students with various IS codal provisions for ductile design and detailing

**Course Outcomes:**

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

- a) Explain fundamentals of Engineering Seismology
- b) Acquaint with the principles of Structural dynamics
- c) Solve SDOF Systems and suggest ductile design
- d) Compute equivalent lateral seismic loads and carryout a seismic design as per IS codal provisions

**SYLLABUS:**

### **UNIT-I**

Engineering seismology – rebound theory – plate tectonics – seismic waves - Earthquake size and various scales – local site effects – Indian seismicity – seismic zones of India – theory of vibrations – near ground and far ground rotation and their effects.

### **UNIT-II**

Introduction to Structural Dynamics: Fundamental objective of Dynamic analysis – Types of prescribed loadings – Formulation of the Equations of Motion– Elements of a Vibratory system – Degrees of Freedom – Oscillatory motion – Simple Harmonic Motion – Free Vibrations of Single Degree of Freedom (SDOF) systems – Undamped and Damped – Critical damping – Logarithmic decrement – Forced vibrations of SDOF systems – Harmonic excitation – Dynamic magnification factor.

### **UNIT-III**

Seismic design concepts – EQ load on simple building – load path – floor and roof diaphragms – seismic resistant building architecture – plan configuration – vertical configuration – pounding effects – mass and stiffness irregularities – torsion in structural system- Provision of seismic code (IS 1893 & 13920) – Building system – frames – shear wall – braced frames – layout design of Moment Resisting Frames (MRF) – ductility of MRF – Infill wall – Non-structural elements.

### **UNIT-IV**

Calculation of equivalent lateral force- Design Base Shear- Storey Shear, Estimation of Natural period of Structure, Computation of Response acceleration Coefficient- Zone factor- Seismic weight- Response reduction factors- Seismic Coefficient Method.

### **UNIT-V**

Design and ductile detailing of Beams and columns of frames -Concept of strong column weak beams, Ductility criteria for earthquake resistant design, Ductile detailing of flexural members as per IS 13920- Longitudinal reinforcement, Shear reinforcement, Anchorage of reinforcement Development length, Lap Splices.

### **UNIT-VI**

Seismic Analysis and design of simple 2-storied RC Building frame – Equivalent static lateral force method and response spectrum method.

### **TEXT BOOK**

1. ‘Earthquake Resistant Design of Structures’ -Pankaj Agarwal and Manish ShriKhande, Prentice – Hall of India, 2007, New Delhi.
2. ‘Earthquake Resistant Design of Building Structures’ by Vinod Hosur, Wiley India Ltd.
3. ‘Reinforced Concrete Design by A. K. Jain.

**REFERENCES**

1. 'Introduction to the Theory of Seismology' by Bullen K.E., Great Britain at the University Printing houses, Cambridge University Press 1996.
2. Relevant code of practices.

<b>Subject</b>	<b>[PE-IV] REPAIR AND REHABILITATION OF STRUCTURES</b>				
<b>Year/semester</b>	<b>IV B.Tech/I Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation year</b>	<b>2022-2023</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Learning Objectives:**

The objective of this course is:

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

**Course Outcomes:**

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

- a. Explain deterioration of concrete in structures
- b. Carryout analysis using NDT and evaluate structures
- c. Assess failures and causes of failures in structures
- d. Carryout Physical evaluation and submit report on condition of the structure.

**SYLLABUS:**

### **UNIT - I**

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

### **UNIT- II**

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

### **UNIT-III**

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

### **UNIT-IV**

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

### **UNIT: V**

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

### **UNIT: VI**

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

### **TEXT BOOKS:**

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

### **REFERENCES:**



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1. 'Concrete Structures- protection Repair and Rehabilitation' by R. Doodge Woodson, BH Publishers

<b>Subject</b>	<b>ENVIRONMENTAL ENGINEERING LAB</b>				
<b>Year/semester</b>	<b>IV B.Tech/I Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation year</b>	<b>2022-2023</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**Course Learning Objectives:**

The course will address the following:

- Estimation some important characteristics of water and wastewater in the laboratory
- It also gives the significance of the characteristics of the water and wastewater

**Course Outcomes:**

Upon the successful completion of this course, the students will be able to:

- Estimation some important characteristics of water and wastewater in the laboratory
- Draw some conclusion and decide whether the water is potable or not.
- Decide whether the water body is polluted or not with reference to the state parameters in the list of experiments
- Estimation of the strength of the sewage in terms of BOD and COD



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**SYLLABUS:**

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. Determination of N, P, K values in solid waste
9. Physical parameters – Temperature, Colour, Odour, Turbidity, Taste.
10. Determination of C.O.D.
11. Determination of Optimum coagulant dose.
12. Determination of Chlorine demand.
13. Presumptive Coliform test.

NOTE: At least 10 of the above experiments are to be conducted.

**List of Equipments**

- 1) pH meter
- 2) Turbidity meter
- 3) Conductivity meter
- 4) Hot air oven
- 5) Muffle furnace
- 6) Dissolved Oxygen meter
- 7) U–V visible spectrophotometer
- 8) COD Reflux Apparatus
- 9) Jar Test Apparatus
- 10) BOD incubator
- 11) Autoclave
- 12) Laminar flow chamber
- 13) Hazen's Apparatus

**Text Books**

1. Standard Methods for Analysis of Water and Waste Water – APHA





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2. Chemical Analysis of Water and Soil by KVSG Murali Krishna, Reem Publications, New Delhi

**Reference**

1. Relevant IS Codes.
2. Chemistry for Environmental Engineering by Sawyer and Mc. Carty.

<b>Subject</b>	<b>GIS &amp; CAD LAB</b>				
<b>Year/semester</b>	<b>IV B.Tech/I Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation year</b>	<b>2022-2023</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**Course Learning Objectives:**

The course is designed to

- Introduce image processing and GIS software
- familiarize structural analysis software
- understand the process of digitization, creation of thematic map from toposheets and maps
- learn to apply GIS software to simple problems in water resources and transportation engineering
- learn to analyse 2 D and 3D frame steel tubular truss using structural analysis software
- learn to analyse and design retaining wall and simple towers

**Course outcomes**

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



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- work comfortably on GIS software
- digitize and create thematic map and extract important features
- develop digital elevation model
- use structural analysis software to analyze and design 2D and 3D frames
- design and analyze retaining wall and simple towers using CADD software.

**SYLLABUS:**

**GIS:**

**SOFTWARES:**

1. Arc GIS 9.0
2. ERDAS 8.7
3. Mapinfo 6.5

Any one or Equivalent.

**EXERCISES IN GIS:**

1. Digitization of Map/Toposheet
2. Creation of thematic maps.
3. Estimation of features and interpretation
4. Developing Digital Elevation model
5. Simple applications of GIS in water Resources Engineering & Transportation Engineering.

**COMPUTER AIDED DESIGN AND DRAWING:**

**SOFTWARE:**

1. STAAD PRO / Equivalent/
2. STRAAP
3. STUDDS

**EXERCISES:**

1. 2-D Frame Analysis and Design
2. Steel Tabular Truss Analysis and Design
3. 3-D Frame Analysis and Design
4. Retaining Wall Analysis and Design
5. Simple Tower Analysis and Design

**TEXT BOOK:**



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1. 'Concept and Techniques of GIS' by C.P.L.O. Albert, K.W. Yong, Printice Hall Publishers.

**Course Structure – R19**  
**(With effect from 2019-2020)**

**IV Year - II Semester**

S.No	Category	Course Code	Course Title	L	T	P	C	IM	EM	TM
1	OE		<b>Open Elective –III/MOOC*</b> 1. Software Engineering 2. Power Plant Engineering 3. Quality and Reliability Engineering 4. Cyber Security	3	-	-	3	40	60	100
2	PE	19CE8T01 19CE8T02 19CE8T03 19CE8T04	<b>Professional Elective –V/MOOC*</b> 1. Environmental Impact Assessment and life cycle Analysis 2. Air and Noise Pollution 3. Ground Improvement Techniques 4. Irrigation Drawing	3	-	-	3	40	60	100
3	PR	19CE8J01	Major Project Phase -II	-	-	16	7	80	120	200
<b>Total</b>				<b>6</b>	<b>-</b>	<b>16</b>	<b>13</b>	<b>160</b>	<b>240</b>	<b>400</b>

**\*NOTE:** The MOOC Subjects are to be selected from the state of the Art Technical subjects, Identified by BOS, by the time the student reaches IV B.Tech.

<b>Subject</b>	<b>[PE-V] ENVIRONMENTAL IMPACT ASSESSMENT AND LIFE CYCLE ANALYSIS</b>				
<b>Year/semester</b>	<b>IV B.Tech/II Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation year</b>	<b>2022-2023</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Learning Objectives:**

The objective of this course is:

- To impart knowledge on different concepts of Environmental Impact Assessment
- To know procedures of risk assessment
- To learn the EIA methodologies and the criterion for selection of EIA methods
- To pre-requisites for ISO 14001 certification
- To know the procedures for environmental clearances and audit
- To appreciate the importance of stakeholder participation in EIA

**Course Learning Outcomes**

Upon successful completion of this course, the students will be able to:

- Prepare EMP, EIS, and EIA report
- Identify the risks and impacts of a project
- Selection of 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

**SYLLABUS:**

**UNIT – I**

Basic concept of EIA: Elements of EIA-factors affecting EIA-Initial environmental Examination-life cycle analysis preparation of Environmental Base map Classification of environmental parameters – role of stakeholders in the EIA preparation – stages in EIA

**UNIT – II**

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, cost/benefit Analysis – EIS and EMP

**UNIT-III**

Impact of Developmental Activities and Land use: Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of active-application of remote sensing and GIS for EIA.



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**UNIT-IV**

Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures - E I A with reference to surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Generalized approach for assessment of Air pollution Impact.

**UNIT-V**

Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation. Environmental Risk Assessment and Risk management in EIA: Risk assessment and treatment of uncertainty-key stages in performing an Environmental Risk Assessment advantages of Environmental Risk Assessment

**UNIT-VI**

EIA notification by Ministry of Environment and Forest (Govt. of India): Provisions in the EIA notification, procedure for environmental clearance, procedure for conducting environmental impact assessment report- evaluation of EIA report. Environmental legislation objectives, evaluation of Audit data and preparation of Audit report. Post Audit activities, Concept of ISO and ISO 14000. Case studies and preparation of Environmental Impact assessment statement for various Industries.

**Text Books:**

1. Environmental Impact Assessment, Canter Larry W., McGraw-Hill education Edi (1996)
2. Environmental Impact Assessment Methodologies, Y. Anjaneyulu, B. S. Publication, Sultan Bazar, Hyderabad.

**References:**

1. Environmental Science and Engineering, J. Glynn and Gary W. Hein Ke – Prentice Hall Publishers
2. Environmental Science and Engineering, Suresh K. Dhaneja, S. K. , Katania & Sons Publication., New Delhi.
3. Environmental Pollution and Control, H. S. Bhatia, Galgotia Publication (P) Ltd, Delhi.

<b>Subject</b>	<b>[PE-V] AIR AND NOISE POLLUTION</b>				
<b>Year/semester</b>	<b>IV B.Tech/II Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation year</b>	<b>2022-2023</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objective:**

This course provides a comprehensive overview of air and noise quality and the science and technology associated with the monitoring and control.

**Course Outcomes:**

After completion of the course student will be able to:

CO-1: Understand air pollutants and their impacts.

CO-2: Explain air pollution chemistry and meteorological aspects of air pollutants.

CO-3: Demonstrate methods for controlling particulate air pollutants.

CO-4: Demonstrate methods for controlling gaseous air pollutants.

CO-5 Understand automotive emission standards.

CO-6: Apply methods for controlling noise pollution.

**Unit 1**

Air pollution: composition and structure of atmosphere, global implications of air pollution, classification of air pollutants: particulates, hydrocarbon, carbon monoxide, oxides of sulphur, oxides of nitrogen and photochemical oxidants. Indoor air pollution. Effects of air pollutants on humans, animals, property and plants.

**Unit 2**

Air pollution chemistry, meteorological aspects of air pollution dispersion; temperature lapse rate and stability, wind velocity and turbulence, plume behaviour, dispersion of air pollutants, the Gaussian Plume Model, stack height and dispersion.

**Unit 3**

Ambient air quality and standards, air sampling and measurements. Control of particulate air pollutants using gravitational settling chambers, cyclone separators, wet collectors, fabric filters (Bag-house filter), electrostatic precipitators (ESP). [8]



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**Unit 4**

Control of gaseous contaminants: Absorption, Adsorption, Condensation and Combustion, Control of sulphur oxides, nitrogen oxides, carbon monoxide, and hydrocarbons. Automotive emission control, catalytic convertor, Euro-I, Euro-II and Euro-III specifications, Indian specifications.

**Unit 5**

Noise pollution: Basics of acoustics and specification of sound; sound power, sound intensity and sound pressure levels; plane, point and line sources, multiple sources; outdoor and indoor noise propagation; psychoacoustics and noise criteria.

**Unit 6**

Effects of noise on health, annoyance rating schemes; special noise environments: Infrasound, ultrasound, impulsive sound and sonic boom; noise standards and limit values; noise instrumentation and monitoring procedure. Noise indices. Noise control methods.

**Text Books:**

1. Peavy, Rowe and Tchobanoglous: Environmental Engineering.
2. Martin Crawford: Air Pollution Control Theory.
3. Noise Pollution and Control by S. P. Singhal, Narosa Pub House

**References:**

1. Wark and Warner: Air Pollution: Its Origin and Control.
2. Rao and Rao: Air Pollution Control Engineering.
3. C.S. Rao, Air pollution and control
4. Textbook of Noise Pollution and Its Control by S. C. Bhatia, Atlantic; Edition



<b>Subject</b>	<b>[PE-V] GROUND IMPROVEMENT TECHNIQUES</b>				
<b>Year/semester</b>	<b>IV B.Tech/II Sem</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Regulation year</b>	<b>2022-2023</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Learning Objectives:**

The objective of this course is:

- To make the student appreciate the need for different ground improvement methods adopted for improving the properties of remoulded and in-situ soils by adopting different techniques such as in situ densification and dewatering methods.
- To make the student understand how the reinforced earth technology and soil nailing can obviate the problems posed by the conventional retaining walls.
- To enable the students to know how geotextiles and geosynthetics can be used to improve the engineering performance of soils.
- To make the student learn the concepts, purpose and effects of grouting.

**Course Outcomes:**

- By the end of the course, the student should be able to possess the knowledge of various methods of ground improvement and their suitability to different field situations.
- The student should be in a position to design a reinforced earth embankment and check its stability.
- The student should know the various functions of Geosynthetics and their applications in Civil Engineering practice.
- The student should be able to understand the concepts and applications of grouting.

**SYLLABUS:**

**UNIT- I**

In situ densification methods- in situ densification of granular soils- vibration at ground surface and at depth, impact at ground and at depth – in situ densification of cohesive soils – pre loading – vertical drains – sand drains and geo drains – stone columns.

**UNIT –II**

Dewatering – sumps and interceptor ditches – single and multi stage well points – vacuum well points – horizontal wells – criteria for choice of filler material around drains – electro osmosis



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**UNIT- III**

Stabilization of soils – methods of soil stabilization – mechanical – cement – lime– bitumen and polymer stabilization – use of industrial wastes like fly ash and granulated blast furnace slag.

**UNIT- IV**

Reinforce earth – principles – components of reinforced earth – design principles of reinforced earth walls – stability checks – soil nailing.

**UNIT- V**

Geosynthetics – geotextiles – types – functions, properties and applications – geogrids, geomembranes and gabions - properties and applications.

**UNIT-VI**

Grouting – objectives of grouting – grouts and their applications – methods of grouting – stage of grouting – hydraulic fracturing in soils and rocks – post grout tests

**Text Books:**

1. Ground Improvement Techniques, Purushotham Raj, Laxmi Publications, New Delhi.
2. Ground Improvement Techniques, Nihar Ranjan Patro, Vikas Publishing House (p) limited , New Delhi.
3. An introduction to Soil Reinforcement and Geosynthetics, G. L. Siva Kumar Babu, Universities Press.

**Reference:**

1. Ground Improvement, M.P. Moseley, Blackie Academic and Professional, USA.
2. Designing with Geosynthetics, R. M Koerner, Prentice Hall

Subject	[PE-V] IRRIGATION DRAWING				
Year/semester	IV B.Tech/II Sem	L	T	P	C
Regulation year	2022-2023	3	0	0	3

**Course Learning Objectives:**

To understand design principle of various irrigation structures

**Course Outcomes:**

At the end of the course the student will be able to design various irrigation structures.

**SYLLABUS:**

Design and drawing of

1. Surplus weir
2. Tank sluice with a tower head
3. Canal drop-Notch type
4. Canal regulator
5. Under tunnel
6. Syphon aqueduct type III

Final Examination pattern: Any two question of the above six designs may be asked out of which the candidate has to answer one question. The duration of the examination is three hours.

**Text Books:**

1. Water Resources Engineering – Principles and Practice by C. Satyanarayana Murthy, New age International Publishers.

**Reference:**

1. Irrigation Engineering and Hydraulic Structures, S. K. Garg, Standard Book House.
2. Irrigation and Water Power Engineering, B. C Punmia & Lal, Lakshmi Publications Pvt. Ltd., New Delhi.