

Academic Regulations
Program structure & Detailed Syllabus

For

Under Graduate Programme (B.Tech)

CIVIL ENGINEERING

(Applicable For Batches Admitted From 2020 – 2021)



VIGNAN'S INSTITUTE OF INFORMATION TECHNOLOGY
(AUTONOMOUS)

DUVVADA - VISAKHAPATNAM – 530 049

(An Autonomous Institute, Accredited by NAAC, Affiliated to JNTUK,
Kakinada, AP)

VIGNAN'S INSTITUTE OF INFORMATION TECHNOLOGY

(AUTONOMOUS)

INDEX

S.NO.	LIST OF ITEMS	PAGE NO.
1	Program Structure	3
2	Detailed Syllabus	
	I Year- I Semester	4-22
	I Year- II Semester	23-45

**VIGNAN'S INSTITUTE OF INFORMATION TECHNOLOGY
(AUTONOMOUS)
DEPARTMENT OF CIVIL ENGINEERING
PROGRAM STRUCTURE – VR-20**

I Year

I Semester

S. No.	Course Code	Course Title	L	T	P	C
1.	1000201100	Mathematics-1				3
2.	1003201100	Engineering Mechanics				3
3.	1005201100	Problem Solving and Programming using C				3
4.	1000201101	Engineering Physics				3
5.	1000201102	Technical English Communication				2
6.	1000201110	Technical English Communication Lab				1.5
7.	1005201110	Problem Solving and Programming using C Lab				1.5
8.	1000201111	Engineering Physics Lab				1.5
9.	1000201120	Game, Sports & Yoga				0
Total Credits						19.5

S. No.	Course Code	Course Title	L	T	P	C
2	1000201200	Engineering Chemistry				3
4	1001201200	Surveying				3
5	1003201101	Engineering Drawing				3
3	1000201201	Transforms & Vector Calculus				3
1	1000201104	Mathematics-II				3
6	1002201210	Basics of Electrical and Electronics Engineering Lab				1.5
7	1000201210	Engineering Chemistry Lab				1.5
8	1001201210	Surveying Lab				1.5
9	1000201160	Engineering Exploration				1
10	1000201121	Constitution of India				0
Total Credits						20.5

I YEAR - I SEMESTER

**VIGNAN'S INSTITUTE OF INFORMATION TECHNOLOGY
(AUTONOMOUS)
DEPARTMENT OF CIVIL ENGINEERING
PROGRAM STRUCTURE – VR-20**

I Year

I Semester

S. No.	Course Code	Course Title	L	T	P	C
1.	1000201100	Mathematics-1				3
2.	1003201100	Engineering Mechanics				3
3.	1005201100	Problem Solving and Programming using C				3
4.	1000201101	Engineering Physics				3
5.	1000201102	Technical English Communication				2
6.	1000201110	Technical English Communication Lab				1.5
7.	1005201110	Problem Solving and Programming using C Lab				1.5
8.	1000201111	Engineering Physics Lab				1.5
9.	1000201120	Game, Sports & Yoga				0
Total Credits						19.5

Course Code	MATHEMATICS -1	L	T	P	C
1000201100		3	1	0	3

COURSE OBJECTIVES:

Course Objectives:

1. Utilize mean value theorems to find the characteristics of the function and acquire the knowledge maxima and minima of functions of two variables.
2. To discuss higher order differential equations.
3. To discuss Laplace Transform and its properties.
4. To apply Inverse Laplace transform to different types of functions and to solving initial value problems.
5. To construct partial differential equations by eliminating arbitrary constants and functions and to solve first order partial differential equations.

COURSE OUTCOMES:

COs	At the end of the course, the student will have the ability to:	POs Mapped	Strength of mapping
CO1	Understand the mean value theorems and evaluate maxima and minima of functions of two variables without constraints.	1 2	2 4
CO2	Understand different analytical methods to solve higher order linear differential equations	1 2	2 3
CO3	Understand Laplace transform technique to solve initial and boundary value problems arising in engineering stream.	1 2	2 3
CO4	Understand solution of first order linear partial differential equations	1 2	2 3

UNIT-1

[10 HOURS]

Mean Value Theorems: Rolle's Theorem – Lagrange's Mean Value Theorem – Cauchy's Mean value Theorem. Functions of several variables – Partial derivatives – Total derivatives – Chain rule-Jacobian – Functional dependence – Maxima and Minima of functions of two variables without constraints.

UNIT-11

[8 HOURS]

Linear Differential Equations of Higher Order: Non-homogeneous linear differential equations of second and higher order with constant coefficients with non-homogeneous terms of the type e^{ax} , $\sin ax$, $\cos ax$, x^k , method of variation of parameters.

UNIT- III [10 HOURS]

Laplace Transforms: Introduction - Laplace transforms of standard functions – Shifting Theorems - Transforms of derivatives and integrals - multiplication by t^n - division by t – Unit step/Heaviside's function - Dirac's Delta Function (or Unit Impulse Function) - Laplace Transform of Periodic Function.

UNIT- IV [10 HOURS]

Inverse Laplace Transforms –Introduction - Properties – Inverse Laplace by using partial fractions and Convolution theorem - solving initial and boundary value problems by using Laplace Transform.

UNIT- V [10 HOURS]

Partial Differential Equations of first order: Introduction -Solutions of first order linear (Lagrange) equation and nonlinear (standard type $f(p, q) = 0$, $f(z, p, q) = 0$, $f(x, p) = g(y, q)$ & Clairaut's) equations

Text Books:

1. Higher Engineering Mathematics by H.K. Dass, S. Chand Publications.
2. Higher Engineering Mathematics 2e, B. V. Ramana, Tata McGraw Hill Publishing Co. Ltd.

REFERENCE BOOKS

1. Engineering Mathematics, Greenburg, 2nd Ed, Pearson education.
2. Higher Engineering Mathematics – 43rd Edition by Dr. B. S. Grewal, Khanna Publishers, New Delhi.
3. A Text book of Engineering Mathematics, N.P. Bali, Laxmi Publications (P) Ltd.
4. Advanced Engineering Mathematics, Erwin Kreszig, 8thEd, Wiley Student Edition.

Course Code	ENGINEERING MECHANICS	L	T	P	C
1003201100		3	1*	0	3

COURSE OBJECTIVES:

- Learn how to resolve forces and understand the conditions of equilibrium.
- To Understand and Analyze the Concept of Friction.
- To identify the concepts of Centroid and Centre of Gravity and evaluate moment of inertia.
- To understand the dynamics where the bodies subjected to motion are analyzed.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:	POs Mapped	Strength of mapping
CO1	Study the force systems for equilibrium conditions and able to draw Free Body Diagram and Solve related problems	1	3
		2	2
		3	1
		9	2
		12	1
CO2	Evaluate the frictional forces between contact surfaces.	1	3
		2	2
		3	1
		9	2
		12	1
CO3	Able to differentiate between centroid and centre of gravity and determine Centroid, centre of gravity and second moment of area for composite sections.	1	3
		2	2
		3	1
		9	2
		12	1
CO4	Analyse the motion and calculate trajectory characteristics.	1	3
		2	2
		3	1
		9	2
		12	1

UNIT- I

SYSTEMS OF FORCES

[13 Hours]

Introduction to Engg. Mechanics – Basic Concepts. Systems of Forces: Coplanar Concurrent Forces – Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems, Graphical method for the equilibrium of coplanar forces. Free Body Diagrams, Equations of Equilibrium of Coplanar Systems, Lami’s Theorem.

UNIT- II

FRICITION

[13 Hours]

Introduction to Friction - limiting friction and impending motion, coulomb’s laws of dry friction, coefficient of friction, cone of friction. Applications – Ladder friction and wedge friction

UNIT- III

CENTROID & CENTRE OF GRAVITY

[13 Hours]

Centroid : Centroids of simple figures (from basic principles) – Centroids of Composite Figures

Centre of Gravity: Centre of gravity of simple body (from basic principles), centre of gravity of composite bodies, pappus theorem.

UNIT- IV

MOMENT OF INERTIA

[13 Hours]

Area moments of Inertia : Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures.

Mass Moment of Inertia: Moment of Inertia of Masses, mass moment of inertia of composite bodies.

UNIT- V

DYNAMICS

[13 Hours]

Kinematics: Rectilinear motion – Velocity and Acceleration – Motion of Rigid Body

Kinetics : Analysis as a Particle and Analysis as a Rigid Body in Translation.

Work – Energy Method: Equations for Translation, Work-Energy Applications to Particle Motion, Connected System.

Impulse momentum method.

Text Books:

1. Engineering Mechanics: Statics and Dynamics, N H Dubey, McGraw Hill publications.
2. Engineering Mechanics - S. Timoshenko & D. H. Young., 4th Edn , McGraw Hill publications.
3. Engineering Mechanics” , Bhattacharya , Oxford Press.

Reference Books:

1. Engineering Mechanics, Tayal. Umesh Publications.
2. A Text Book of Engineering Mechanics R S Khurmi.
3. A Text Book of Engineering Mechanics Dr. R.k. Bansal and Sanjay Bansal
4. Engineering Mechanics statics and dynamics – R. C. Hibbeler, 11th Edn – Pearson Publ.
5. J. L. Meriam and L. G. Kraige, Engineering Mechanics, Vol I – Statics, Vol II – Dynamics, 6th Ed, John Wiley, 2008.

E-Books: (Specify links)

[engineering-mechanics-khurmi-hm-booksformech-blogspot-com-pdf](#)

[engineering-mechanics-by-s-s-bhavikatti-book-pdf.html](#)

NPTEL/MOOC: (Specify Links)

<https://nptel.ac.in/courses/112/106/112106286/>

<https://nptel.ac.in/courses/122/104/122104015/>

<https://nptel.ac.in/courses/112/103/112103109/>

<https://www.coursera.org/learn/engineering-mechanics-statics>

Course Code	PROBLEM SOLVING AND PROGRAMMING USING C	L	T	P	C
1005201100		3	0	0	3

COURSE OBJECTIVES:

1. To understand computer programming and its roles in problem solving.
2. To understand and develop well-structured programs using C language.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:	POs Mapped	Strength of mapping
CO1	Write compile and debug Programs in C language	PO1 PO2 PO3	1 1 2
CO2	Use operators, data types and write programs	PO1 PO2	3 3
CO3	Select the best loop construct for a given problem	PO3	2
CO4	Design and implement C programs	PO1 PO2 PO3	2 3 2

UNIT- I

Introduction to computers: Computer systems, computer Languages, computer number systems.

Introduction to C programming: Background and characteristics of C, Flow Charts, algorithms and pseudo code. Structure of a C Program, Input/output Statements in C, writing C programs, compiling and executing C programs. **[6 Hours]**

UNIT- II

Programming Style: Tokens of C, Keywords, Variables, Constants and rules to form variables and constants, Data Types, Declaration of Variables and initialization, Operators, Operator precedence and associativity. Type conversions

Flow of Control: Selection: Two way selection, multi-way selection

Repetition and Unconditional Control Statements: concept of loop ,pre test and post test loops, initialization and updating loops ,while statement, do-while statement, for statements, nested loops, break ,continue, goto. **[10 Hours]**

UNIT- III

Arrays and Strings:

Arrays: One-Dimensional Arrays, Declaration, Array Initialization, Input and Output of Array Values, Two-Dimensional Arrays.

Strings: String Fundamentals, String Input and Output, String manipulation functions.
[8 Hours]

UNIT- IV

Modular Programming:

Function and Parameter Declarations: Function definition, types of functions, declaration and definition of user defined functions, its prototypes and parameters, calling a function. Arrays as Function Arguments, Variable Scope, storage class, recursive functions. .
[7Hours]

UNIT- V

Pointers, Structures, Unions and files:

Pointers: Concept of a Pointer, Initialization of pointer variables, pointers as function arguments, address arithmetic, pointers to pointers, Pointers and arrays, Array of Pointers, parameter passing techniques. Dynamic memory allocation.

Structures and Unions: Structures declaration, Initialization of structures, accessing structures, unions.

Files: Declaring, Opening and closing file streams, Reading from and writing to text files.
[10 Hours]

Text Books:

1. Programming in C, ReemaThareja, and Oxford.
2. The C programming Language, Brain W.kernighan, Dennis Ritchie,2e,pearson
3. C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage. Pub. Programming with C, Bichkar, Universities Press.

Reference Books:

1. ANSIC Programming garyJ.Bronson. Cengage learning.
2. Let us 'C' by yashwantkanethkar, BPB Publications, 16 edition.

Course Code	ENGINEERING PHYSICS	L	T	P	C
1000201101		3	0	0	3

COURSE OBJECTIVES:

To introduce the basic concepts of magnetic, superconducting, dielectric and nanomaterials. Understanding of the concepts in semiconductor physics provide an insight into fiber optic sensors.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:	POs Mapped	Strength of mapping
CO1	Describe the properties and production techniques of nanomaterials.	1	2
		2	2
		9	1
		12	1
CO2	Make use of the concepts of pumping and total internal reflection to set up lasers and optical fiber sensors.	1	2
		2	2
		3	1
		9	1
12	1		
CO3	Identify the various planes in crystal and discuss the structural determination of crystal using X-ray diffraction.	1	2
		2	2
		9	1
		12	1
CO4	Apply the knowledge of acoustics and ultrasonics for characterization of acoustics design and non-destructive testing.	1	3
		2	2
		9	1
		12	1

UNIT- I

CRYSTAL STRUCTURES

[8 Hours]

Introduction to solids -Fundamental terms of crystal structures - Unit cell- coordination number- Lattice parameters - Seven crystal systems - Bravais lattices - Packing factor for Simple cubic, Body centered cubic and Face centered cubic.

UNIT- II

CRYSTAL PLANES AND X-RAY DIFFRACTION

[10 Hours]

Introduction— Important features and significance of Miller indices - Crystal planes - Separation between successive (h k l) planes - Bragg's law- Experimental technique for X-ray diffraction: Laue method (single crystal)

UNIT- III

OSCILLATIONS AND VIBRATIONS

[10 Hours]

Introduction - Simple Harmonic Motion- Damped Simple Harmonic Motion- Forced oscillations

ACOUSTICS AND ULTRASONICS

Introduction - Reverberation time - Sabine's formula – Acoustics of concert-hall, ultrasonics production (Magnetostriction and piezoelectric method) – Applications of Ultrasonics

UNIT- IV

LASERS AND FIBER OPTICS

[12 Hours]

Characteristics of laser light – stimulated absorption, spontaneous and stimulated emission of radiation – population inversion (2-level, 3-level and 4-level schemes) - Einstein coefficients – basic components of laser - Ruby laser – He - Ne laser and applications of lasers
Construction of an optical fiber, Basic principle of an optical fiber: concept of total internal reflection - critical angle-Acceptance angle - Numerical aperture- Applications

UNIT- V

NANOMATERIALS

[10 Hours]

Introduction to Nanomaterials – Zero dimensional, One- dimensional and Two-dimensional nanomaterials, Important factors: Increase in Surface area to volume ratio and quantum confinement effect -Methods of preparation - Top- down approach: Ball milling, and Bottom-up approach: Sol-gel method, Applications of nanomaterials.

Text Books:

1. B. Rogers, J. Adams, S. Pennathur, Nanotechnology: Understanding small systems, CRC press, Taylor & Francis group,(2015)
2. F. T. S. Yu, S. Yin, Fiber Optic Sensors, Marcel dekker Inc., (2002)
3. A. J. Dekker, Solid State Physics, Macmillan India Pvt. Ltd., (2011)
4. C. Kittel, Introduction to Solid State Physics, Wiley indiaPvt. Ltd, (2012)
5. M. A. Wahab, Solid State Physics: Structure and Properties of Materials, Narosa Publishing House Pvt. Ltd. (2005)
6. William T. Silfvast, Laser Fundamentals, 2nd edn, Cambridge University press, New York (2004)

Reference Books:

1. J. David N. Cheeke, Fundamentals and Applications of Ultrasonic Waves, CRC Press LLC (2002).
2. Dr. M. N. Avadhanulu and Dr. P. G. KshiraSagar, A Text Book of Engineering Physics, S.Chand& Company Ltd., (2014).
3. Resnick , Halliday, Krane,PhysicsVol 1& 2 (5ed), Wiley; Fifth edition (2007)
4. A.K. Sharma, Semiconductor Electronics, New Age International (P) Limited Publisher, New Delhi. (2011)

E-Books: (Specify links)

NPTEL/MOOC: (Specify Links)

Course Code	TECHNICAL ENGLISH COMMUNICATION	L	T	P	C
1000201102		3	0	0	2

COURSE OBJECTIVES:

- To introduce students to the specific use of English for Technical Communication.
- To develop the overall English proficiency of students and enable them to function effectively in different professional contexts.
- To strengthen student skills in the areas of reading, writing, listening and speaking and enable them to function effectively in their professional sphere

COURSE OUTCOMES:

CO	At the end of the course, the student will have the ability to:	POs Mapped	Strength of mapping
CO1	Read, understand and interpret material on Environment, Science and Technology, tourism, Energy Sources, Social Awareness	PO7,PO10, PO6,PO12	
CO2	Analyze the functions of language and grammar in spoken and written forms.	PO10,PO12 ,PO5	
CO3	Write effectively on various domains.	PO10,PO12	
CO4	Prepare and exhibit oral presentation skills by using ICT.(Individual/Team)	PO10,PO12 ,PO9,PO5	

**Strength of mapping (Intensity Scale) – 1(Lightly mapped), 2(Moderately mapped), 3(Heavily mapped)

UNIT- I

No. of lecture hours: 10

Reading: 1) How to Regain Green Cover 2) Solution to Plastic Pollution

Writing: Functional grammar [articles, prepositions of time, place, direction and movement, verb-tense, subject-verb agreement]

Listening: TED Talk on Water Harvesting (LC) –Answering comprehension-based Qs ~ Listening to improve pronunciation

Speaking: Functional English(LC) ~ Introducing oneself

Activities: Reading Comprehension- Note making while reading 1&2,Letter Writing

UNIT-II

No. of lecture hours:10

Reading Texts: 1) The Hubble Telescope 2) Genesis of ISRO

Writing: Writing formal letters ~ Functional grammar ~Modals - Paraphrasing

Listening: Listening to a debate on “ Colonizing the Moon” (LC) ~ Note Taking

Speaking: (LC) Making mini presentations on general topics

Activities:

- Reading Comprehension
- Letter Writing-Formal

Unit-III:

No.of lecture hours: : 10

Reading Texts: 1) Southern Splendour 2) Tourism in India: Role in Conflict and Peace

Writing: Paragraph writing ~ Functional grammar [relative pronouns, comparative adjectives, adverbs]

Listening: (LC) Listening comprehension ~ Listening for global meaning ~ Listening for getting at the nuances and the mood of the speaker

Speaking: (LC) Telephonic Skills ~ participating in an interactive video and teleconferencing

Activities:

Reading Comprehension
Paragraph writing
Essay writing

Unit-IV:

No. of lecture hours: 10

Reading Texts: 1) Wind Energy 2) How pertinent is the nuclear option

Writing: Writing a formal E-mail

Speaking: Group Discussion (LC)

Listening: Listening to an Interview (LC) related to the text ~ listening critically for understanding the attitude/tone of the speaker

Activities: Reading Comprehension ,Email Writing

Unit-V:

No. of lecture hours: 10

Reading Texts: 1) The Evolution of Media 2) The Top Ten Developments in Journalism in the 2000s

Writing: Interpret graphic tools [tables, pie & bar charts ~ writing an abstract ~ Leveraging ICT for communication ~ Preparing a PPT(LC)

Speaking: Making short presentations [individual/team] with the aid of PPT

Listening: Listening to Situation/Scene ~ Sub skills: Listening to understand one's viewpoint ~Listening to understand speaker's intention ~Listening for local understanding.

Activity:

Information Transfer

Suggested Books:

- Elango, K et.al 2014. *Mindsapes: English for Technologists and Engineers*, Orient Blackswan, Hyderabad.

Reference Books:

- Balasubramanian M. 1985. *Business Communication*. Vani Educational Books, New Delhi
- Balasubramanian T. 1989. *A Text book of Phonetics for Indian Students*. Orient Longman, New Delhi.

- Krishnaswamy, N and Sriraman, T. 1995. *Current English for Colleges*. Macmillan India Ltd. Madras.
- Mohan Krishna and Meera Banerjee. 1990. *Developing Communication Skills*. Macmillan India Ltd. New Delhi.
- Narayanaswamy V R. 1979. *Strengthen your Writing*. Orient Longman, New Delhi.
- Naterop, Jean, B. and Rod Revell. 1997. *Telephoning in English*. Cambridge University Press, Cambridge.

Course Code	TECHNICAL ENGLISH COMMUNICATION LAB	L	T	P	C
1000201110		0	0	3	1.5

COURSE OBJECTIVES:

- To introduce students to the specific use of English for Technical Communication.
- To develop the overall English proficiency of students and enable them to function effectively in different professional contexts.
- To strengthen student skills in the areas of reading, writing, listening and speaking and enable them to function effectively in their professional sphere.

COURSE OUTCOMES:

COs	At the end of the course, the student will have the ability to:	POs Mapped	Strength of mapping
CO1	Analyze the functions of language and grammar in spoken and written forms.	PO10,PO12,PO5	3
CO2	Write effectively on various domains.	PO10,PO12	3
CO3	Prepare and exhibit oral presentation skills by using ICT.(Individual/Team)	PO10,PO12,PO9,PO5	3

**Strength of mapping (Intensity Scale) – 1(Lightly mapped), 2(Moderately mapped), 3(Heavily mapped)

LIST OF EXPERIMENTS

S.No.	Name of the experiment	Skill
1	Just A Minute –Tell about oneself	Speaking
2	Note Taking	Listening & Writing
3	Interactions	Listening &Speaking
4	Mini Presentation	Speaking
5	Letters and Sounds- Some pronouncing Patterns	Speaking
6	Telephonic Skills	Speaking & Listening
7	Group Discussion	Team work, leadership Speaking
8	Mock-Interview	Speaking
9	Impromptu individual presentations	Speaking
10	Information Transfer	Writing

Text Books:Speak Well-Maruthi Publications

Reference Books:Interact –Orient Blackswan

Course Code	PROBLEM SOLVING AND PROGRAMMING USING C LAB	L	T	P	C
1005201110		0	0	3	1.5

COURSE OBJECTIVES:

1. To understand computer programming and its roles in problem solving.
2. To understand and develop well-structured programs using C language.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:	POs Mapped	Strength of mapping
CO1	Write compile and debug Programs in C language	PO1 PO2 PO3	1 1 2
CO2	Use operators, data types and write programs	PO1 PO2	3 3
CO3	Select the best loop construct for a given problem	PO3	2
CO4	Design and implement C programs	PO1 PO2 PO3	2 3 2

LIST OF EXPERIMENTS

S.No.	Name of the experiment	Skill
1.	Exercise – 1 a) Write a C program to compute perimeter and area of rectangle b) Write a C program to calculate distance between points c) Write a C Program to Simulate 3 Laws of Motion	Input/Output
2.	Exercise – 2 a) Write a C Program to convert Celsius to Fahrenheit and vice versa b) Write a C program to find maximum of three numbers using conditional operator.	Input/Output
3.	Exercise – 3 a) Write a C Program to find Whether the Given Year is a Leap Year or not. b) Write a C Program to find grade of student. c) Write a menu driven program to compute area of different geometrical shapes	Control Statements
4.	Exercises –4 a) Write a C Program to Find Whether the Given Number is i)Strong number ii)perfect number b) Write a C Program to print the following between 1 to n i)Prime Number ii) Armstrong Number	Loops and Control Statements

5.	<p>Exercise -5 Demonstration of arrays& Strings</p> <p>a) Write a C program to perform Linear Search</p> <p>b) Write a C program to perform transpose of two matrices</p> <p>c) Write a C program to perform multiplication of two matrices</p> <p>d) Implementation of string manipulation operations with and without library function.</p> <p style="padding-left: 20px;">i)copy ii) concatenate iii)length iv)compare</p>	Arrays and Strings
6.	<p>Exercise -6</p> <p>a) Write a C program to find cube of any number using function.</p> <p>b) Write a c program to find area and volume of geometric shapes using functions.</p> <p>c) Write a C program to check whether a number is even or odd using functions.</p>	Functions
7.	<p>Exercise -7</p> <p>a) Write a C Program illustrating Fibonacci, Factorial using recursion</p> <p>b) Write a C program to find power of any number using recursion.</p> <p>c) Write a C program to find GCD and LCM using recursion</p>	Recursive Functions
8.	<p>Exercise -8</p> <p>a) Write a C Program to Access Elements of an Array Using Pointer</p> <p>b) Write a C Program to find the sum of numbers with arrays and pointers.</p> <p>c) Write a c program to illustrate parameter passing techniques</p>	Pointers
9.	<p>Exercise -9</p> <p>a) Write a C Program to Store Information of a student Using Structures</p> <p>b) Write a C program to create memory for int, char and float variable at run time.</p>	Structures
10.	<p>Exercise -10</p> <p>a) Write a program in C to copy a file in another name</p> <p>b) Write a C program to append multiple lines at the end of file</p>	Files

Text Books:

1. Programming in C, ReemaThareja, and Oxford.
2. The C programming Language, Brain W.kernighan, Dennis Ritchie,2e,pearson
3. C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage. Pub. Programming with C, Bichkar, Universities Press.

Reference Books:

1. ANSIC Programming garyJ.Bronson. Cengage learning.
2. Let us 'C' by yashwantkanethkar, BPB Publications, 16 edition.

Course Code 1000201111	ENGINEERING PHYSICS LABORATORY	L	T	P	C
		0	0	3	1.5

COURSE OBJECTIVES:

To study the laws of vibrations in stretched string and characteristics of laser, optical fiber and ultrasonics. Apply the analytical techniques and graphical analysis to the experimental data.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:	POs Mapped	Strength of mapping
CO1	Demonstrate the photoelectric effect and determination of Planck constant and lattice constant	1	3
		2	3
		5	1
		9	1
CO2	Analyze the anode current in ultrasonic interferometer and estimate velocity of ultrasonic waves in liquid	12	1
		1	3
		2	3
		5	1
CO3	Study the characteristics of optical fibers and Lasers.	9	1
		1	3
		2	3
		5	1
CO4	Identify the type of waves and verify the laws of stretched string.	9	1
		1	3
		2	3
		5	1

LIST OF EXPERIMENTS

S.No.	Name of the experiment	Skill
1	Compound Pendulum	Determination of acceleration due to gravity
2	Melde's	Determination of frequency of stretched string
3	Numerical aperture of optical fiber experiment	Determination of numerical Aperture of optical fiber
4	Bending losses of Optical fibers	Determination of bending losses of optical fiber
5	Sonometer	Verification of laws of stretched string
6	Lattice constant	Determination of lattice constant of given crystal using diffraction pattern
7	Laser light diffraction by grating	Determination of wavelength of laser light
8	Laser beam divergence experiment	Determination of laser beam divergence and spot size
9	Ultrasonic interferometer	Determination of velocity of ultrasonic waves in liquid medium
10	Planck constant	Determination of Planck constant determination

Text Books:

1. C.L. Arora, Practical physics, S. Chand Publication
2. B.L. Worsnop and H. T. Flint, Advanced Practical Physics, Asia Publishing House

Reference Books:

1. P.K. Mittal, N. H. Ayachit, Engineering Physics: With Laboratory Manual, Wiley India.

I YEAR - II SEMESTER

**VIGNAN'S INSTITUTE OF INFORMATION TECHNOLOGY
(AUTONOMOUS)
DEPARTMENT OF CIVIL ENGINEERING
PROGRAM STRUCTURE – VR-20**

I Year

II Semester

S. No.	Course Code	Course Title	L	T	P	C
2	1000201200	Engineering Chemistry				3
4	1001201200	Surveying				3
5	1003201101	Engineering Drawing				3
3	1000201201	Transforms & Vector Calculus				3
1	1000201104	Mathematics-II				3
6	1002201210	Basics of Electrical and Electronics Engineering Lab				1.5
7	1000201210	Engineering Chemistry Lab				1.5
8	1001201210	Surveying Lab				1.5
9	1000201160	Engineering Exploration				1
10	1000201121	Constitution of India				0
Total Credits						20.5

Course Code	ENGINEERING CHEMISTRY	L	T	P	C
1000201200		3	1	0	3

COURSE OBJECTIVES:

To provide basic understanding of softening methods of water, knowledge in the concepts of refining of petroleum, knocking and to develop alternate fuels, train the students on the applications of Polymers and to acquire knowledge on binding materials and various properties of lubricants.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:	POs Mapped	Strength of mapping
CO1	Measure of water quality parameters.	1	2
		2	2
		9	1
CO2	Analyze different forms of energy sources	1	3
		2	2
CO3	Inspect corrosive environments and protection of precious metal.	1	3
		2	2
		10	1
CO4	Identify different polymers and their functionalities, acquire knowledge on various Engineering materials	1	3
		2	2
		10	1

UNIT- I

WATER TECHNOLOGY

[8 Hours]

Introduction –Soft water and hard water, Estimation of hardness by EDTA Method - Boiler troubles - scales and sludges, Boiler corrosion; potable water – specifications, water treatment - ion-exchange process, desalination of brackish water, reverse osmosis (RO) and electro dialysis.

UNIT- II

FUEL CHEMISTRY

[10 Hours]

Introduction of Fuels – Types of fuels, calorific value and Bomb Calorimeter; Solid fuels Analysis of coal (proximate & ultimate analysis) Liquid fuels - refining of petroleum; Cracking – knocking; anti - knocking agents. Bio diesel preparation.

UNIT- III

CORROSION

[10 Hours]

Introduction to corrosion, dry corrosion with mechanism, electrochemical theory of corrosion with mechanism, Factors influencing rate of Corrosion, Types of wet corrosion (differential aeration corrosion, galvanic corrosion, pitting corrosion & stress corrosion), protection – cathodic protection, corrosion inhibitors, Cathodic & Anodic coatings, Galvanizing and Tinning.

UNIT- IV

POLYMER CHEMISTRY

[10 Hours]

Introduction to polymers, Classification of polymers, Types of polymerization (Addition, Condensation & copolymerization) with examples, properties of polymers (physical and mechanical).

Plastics - Thermoplastics & Thermosetting plastics, compounding of plastics, Moulding Techniques (Compression & Blow moulding) - Preparation, properties and applications of – PVC, and Bakelite.

UNIT- V

CHEMISTRY OF ENGINEERING MATERIALS

[12 Hours]

Cement: Introduction to building materials – Portland cement, constituents, manufacturing process of Portland cement (wet process), setting & hardening of cement with chemical equations, decay of cement concrete.

Lubricants: Classification, Mechanism and Properties (Viscosity, Flash and Fire points)

Green Chemistry: 12 Principles of Green Chemistry

Composites - Fiber reinforced materials – CFRP & GFRP

Text 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 of Wiley India Pvt. Ltd., Vairam and others, 2014 edition (second).
2. Engineering Chemistry by Prasanth Rath, Cengage Learning, 2015 edition.
3. A text book of engineering Chemistry by S. S. Dara; S. Chand & Co Ltd., Latest Edition.
4. Engineering Chemistry by H.D. Gesser, Springer Publishers.

E-Books: (Specify links)

NPTEL/MOOC: (Specify Links)

Course Code	SURVEYING	L	T	P	C
1001201200		3	0	0	3

COURSE OBJECTIVES:

In this course student gets knowledge and can perform the operation of chain surveying, compass surveying, plane table surveying, levelling, theodolite survey, tacheomatic surveying, curve setting, areas from filed notes and total station survey.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:	POs Mapped	Strength of mapping
CO1	Use various types of surveying instruments along with understanding of basic concepts of surveying	1	2
		2	2
		4	1
CO2	Decide the suitable method of levelling and find the elevations followed by contour mapping	1	3
		2	2
		3	1
		4	2
CO3	Calculate the heights, elevations of the far object and also calculate the areas and volumes of any irregular areas.	1	3
		2	2
		4	2
CO4	Setting out of a simple and compound curve with various methods and uses total station and GIS	1	3
		2	2
		4	2
		5	3

UNIT- I

PLANE SURVEYING

[10 Hours]

Overview of plane surveying (chain, compass and plane table), Objectives, Principles and classifications

Distances and Direction: Distance measurement conventions and methods; use of chain and tape, Electronic distance measurements, Meridians, Azimuths and Bearings, declination, Linear and Angular measurements, Errors in surveying measurements.

UNIT- II

LEVELING AND CONTOURING

[8 Hours]

Concept and Terminology, Temporary and permanent adjustments- method of leveling.

Characteristics and Uses of contours- methods of conducting contour surveys and their plotting.

UNIT- III

COMPUTATION OF AREAS AND VOLUMES

[10 Hours]

Area from field notes, computation of areas along irregular boundaries and area consisting of regular boundaries. Embankments and cutting for a level section and two-level sections with and without transverse slopes, determination of the capacity of reservoir, volume of barrow pits.

UNIT- IV

THEODOLITE

[12 Hours]

Theodolite, description, uses and adjustments – temporary and permanent - measurement of horizontal and vertical angles. Principles of Electronic Theodolite. Trigonometrical leveling, Traversing.

Tacheometric Surveying: Stadia and tangential methods of Tacheometry. Distance and Elevation formulae for Staff vertical position

UNIT- V

Curves

[12 Hours]

Types of curves, design and setting out – simple and compound curves.

Introduction to geodetic surveying, Total Station- working principle and Global positioning system, Introduction to Geographic information system (GIS).

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. Duggal S K, “Surveying (Vol – 1, 2 & 3), Tata McGraw Hill Publishing Co. Ltd. New Delhi.

Reference Books:

1. Surveying and levelling by R. Subramanian, Oxford university press, New Delhi
2. Arora, K R “Surveying Vol 1, 2 & 3), Standard Book House, Delhi, 2004
3. Chandra A M, “Higher Surveying”, New Age International Pvt. Ltd., New Delhi.

E-Books: <https://nptel.ac.in/courses/105/107/105107122/>

<https://www.freebookcentre.net/civil-books-download/Introduction-to-Surveying.html>

NPTEL/MOOC: <https://nptel.ac.in/courses/105/104/105104101/>

Course Code	ENGINEERING DRAWING	L	T	P	C
1003201101		3	0	0	3

COURSE OBJECTIVES:

To introduce the use and the application of drawing instruments and to make the students construct the polygons and curves. To introduce orthographic projections and to project the points and lines parallel to one plane and inclined to other. To make the students draw the projections of the plane and solids inclined to one planes. To make the students draw isometric views of simple objects

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:	POs Mapped	Strength of mapping
CO1	Understand the use of drawing instruments to construct the polygons and curves	1	2
		2	2
		3	1
CO2	Learn the principle of orthographic projections. Draw Orthographic projections of points, lines.	1	2
		2	2
		3	1
		12	1
CO3	Draw the various types of planes and solids its views in different Positions	1	2
		2	2
		3	1
		12	1
CO4	Draw isometric views of simple objects	1	2
		2	2
		3	1
		12	2

UNIT- I

INTRODUCTION TO ENGINEERING DRAWING

[13 Hours]

Polygons– Construction of regular polygons
 Curves used in Engineering Practice– Ellipse (General method and oblong Method only), Parabola & Hyperbola (General method only)
 Introduction to Scales– Vernier & Diagonal Scales.

UNIT- II

ORTHOGRAPHIC PROJECTIONS

[13 Hours]

Projections of points– Projections of straight line– Line parallel to one plane and perpendicular to other plane– parallel to both the planes.
 Projections of straight lines– parallel to one plane and inclined to the other plane.
 Straight lines inclined to both the planes.

UNIT- III

PROJECTIONS OF PLANES

[13 Hours]

Regular planes perpendicular/parallel to one plane and inclined to the other reference
Plane inclined to both the reference planes.

UNIT- IV

PROJECTIONS OF SOLIDS

[13 Hours]

Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the plane only

UNIT- V

ISOMETRIC PROJECTIONS

[13 Hours]

Conversion of Isometric Views to Orthographic Views
Conversion of Orthographic Views to Isometric Views.

Text Books:

1. Engineering Drawing, N. D. Bhatt, Chariot Publications.
2. Engineering Drawing, K. L. Narayana & P. Kannaiah, Scitech Publishers
3. Engineering Drawing and Graphics by K Venugopal, New Age international publications .

Reference Books:

1. Engineering Drawing, Agarwal & Agarwal, Tata McGraw Hill Publishers.
2. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age.

Course Code	TRANSFORMS AND VECTOR CALCULUS	L	T	P	C
1000201201		3	0	0	3

COURSE OBJECTIVES:

1. Know that any periodic function can be expressed as a Fourier series and determine the Fourier coefficients in the Fourier series of a given function
2. Analyze the characteristics and properties of Fourier transforms.
3. Familiarize with 2-dimensional and 3-dimensional coordinate systems.
4. Generalize calculus to vector functions and to compute line, surface and volume integrals.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:	POs Mapped	Strength of mapping
CO1	<i>Formulate</i> any periodic function in terms of sine and cosine	1	1
		2	2
		12	3
CO2	<i>Simplify</i> a non-periodic function as integral representation	1	2
		2	2
		3	3
CO3	<i>Apply</i> Multiple integration techniques in evaluating areas and volume bounded by region.	1	1
		2	2
		3	3
		4	3
CO4	<i>Explain</i> Gradient, divergence and curl operations in vector and scalar fields and <i>Apply</i> Green's, Gauss and Stoke's theorem as the generalization of fundamental theorem of integral calculus.	1	1
		2	2
		3	3

UNIT- I

Fourier series:

[10 Hours]

Determination of Fourier coefficients in interval $(c, c + 2l)$ – Even and odd functions
 $(-l, l)$ - Half- range Fourier sine and cosine expansion in the interval $(0, l)$.

UNIT- II

Fourier transforms: [10 Hours]

Fourier integral theorem – Fourier sine and cosine integrals. Fourier transform – Fourier sine and cosine transforms – properties – Finite Fourier sine and cosine transforms.

UNIT- III

Multiple integrals: [10 Hours]

Double and triple integrals – change of variables (Polar, Spherical, Cylindrical) - change of order of integration - Areas and Volumes (Cartesian coordinates).

UNIT- IV

Vector Differentiation: [8 Hours]

Scalar point function – vector point function – Vector differential operator – Gradient – directional derivative, angle between two surfaces- Divergence - Solenoidal Function - Curl - Irrotational Field - scalar potential.

UNIT- V

Vector Integration: [10 Hours]

Line integral - Work done, Circulation, Conservative field – Surface and Volume integrals, Green's, Stoke's and Gauss Divergence theorems (without proofs).

TEXT BOOKS

1. Higher Engineering Mathematics by H.K. Dass, S. Chand Publications.
2. Higher Engineering Mathematics 2e, B. V. Ramana, Tata McGraw Hill Publishing Co. Ltd.

REFERENCE BOOKS

1. Engineering Mathematics, Greenburg, 2nd Ed, Pearson education.
2. 1. Higher Engineering Mathematics – 43rd Edition by Dr. B. S. Grewal, Khanna Publishers, New Delhi.
3. A Text book of Engineering Mathematics, N.P. Bali, Laxmi Publications (P) Ltd.
4. Advanced Engineering Mathematics, Erwin Kreszig, 8thEd, Wiley Student Edition.

Course Code	MATHEMATICS - II	L	T	P	C
1000201104		3	0	0	3

COURSE OBJECTIVES:

1. To familiarize the students with numerical methods of solving the non-linear equations, Interpolation, Numerical differentiation and integration.
2. Course will illuminate the student in the standard concepts of Linear algebra.
3. Methods to solving system of linear equations and compute Eigen values & Eigen vectors of a real matrix.
4. To apply mathematical statements, ideas and results, with the correct use of mathematical definitions.

COURSE OUTCOMES:

COs	At the end of the course, the student will have the ability to:	POs Mapped	Strength of mapping
CO1	<i>Compute</i> approximate roots of an equation by using different numerical methods.	1	1
		2	2
CO2	<i>Explain</i> difference operators and find the relation among operators and apply forward and backward formulas for compute interpolating polynomial.	1	2
		2	2
		3	3
CO3	<i>Apply</i> different numerical methods to solve integrations and ordinary differential equations.	1	1
		2	2
		3	3
CO4	<i>Understand</i> to solve the system of Linear equations by direct and iteration methods, and compute eigen values and eigen vectors of a matrix and study the nature of Quadratic form.	1	1
		2	2
		3	3

UNIT- I

Numerical Solution of Algebraic and Transcendental Equations:

[8 Hours]

Introduction – The Bisection Method – The Method of False Position – The Iteration Method – Newton-Raphson Method.

UNIT- II

Interpolation:

[8 Hours]

Introduction– Forward Difference, Backward difference, Central difference operators – Newton’s formulae for interpolation – Gauss’ Central Difference Formulae –Interpolation with unevenly spaced points-Lagrange’s Interpolation formula.

UNIT- III

Numerical Integrations &Differential Equations:

[8 Hours]

Numerical Integration: – Trapezoidal rule – Simpson’s $1/3^{\text{rd}}$ Rule –Simpson’s $3/8^{\text{th}}$ Rule.

Numerical solution of Ordinary Differential equations: Solution by Taylor’s series method - Euler’s method - Modified Euler’s method- Runge-Kutta Method of 4^{th} order.

UNIT- IV

Linear system of equations:

[8 Hours]

Introduction-Rank-Echelon Form- Normal Form - System of Linear equations - Homogeneous and Non-Homogeneous , Consistency of system of Linear equations - Gauss elimination - Gauss Seidel method.

UNIT- V

Eigen values, Eigen vectors:

[10 Hours]

Introduction - Eigen values - Eigen vectors - Properties - Cayley Hamilton theorem (without proof) - Inverse and power of a matrix by using Cayley Hamilton theorem, Reduction of Quadratic form to canonical form by using orthogonal reduction – Rank, index, signature and Nature of quadratic form.

TEXT BOOKS

1. Higher Engineering Mathematics by H.K. Dass, S. Chand Publications.
2. Higher Engineering Mathematics 2e, B. V. Ramana, Tata McGraw Hill Publishing Co. Ltd.

REFERENCE BOOKS

1. Engineering Mathematics, Greenburg, 2nd Ed, Pearson education.
2. Higher Engineering Mathematics – 43rd Edition by Dr. B. S. Grewal, Khanna Publishers, New Delhi.
3. A Text book of Engineering Mathematics, N.P. Bali, Laxmi Publications (P) Ltd.
4. Advanced Engineering Mathematics, Erwin Kreszig, 8thEd, Wiley Student Edition.

E-Books: (Specify links)

NPTEL/MOOC: (Specify Links)

Course Code	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB	L	T	P	C
1002201210					

COURSE OBJECTIVES:

1. To memorize the basic electrical laws and analysis of circuits.
2. To discuss the principle of operation and construction details of DC machines.
3. To relate the principle of operation and construction details of transformer and AC rotating Machines.
4. To classify the measuring instruments and study the principle of operation.
5. To study the operation of PN junction diode, BJT and half wave, full wave rectifiers.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:	POs Mapped	Strength of mapping
CO1	Apply Ohms Law and Kirchoff's Laws and solve electrical circuits	1,2,9,10	3,3,2,1
CO2	Describe the constructional features of DC machines, select suitable starters for DC motors estimate losses and efficiency of DC motor.	1,2	3,2
CO3	Outline the constructional details and operating principles of AC machines and calculate the efficiency identify the characteristics, losses and efficiency of a three phase induction motor	1,2,10	3,2,2
CO4	Identify the structure, operation and characteristics and applications of measuring instruments and semiconductor devices	1,2,10	3,2,2

**Strength of mapping (Intensity Scale) – 1(Lightly mapped), 2(Moderately mapped), 3(Heavily mapped)

LIST OF EXPERIMENTS

S.No.	Name of the experiment	Skill
1	Perform Swinburne's test on a DC shunt motor?	Understanding, Analysis
2	Perform brake test on a DC shunt motor ?	Understanding, Analysis
3	Perform speed control techniques on DC shunt motor by field control method and Armature control method?	Understanding, Analysis
4	Perform OC & SC test on a single phase transformer and find different parameters ?	Understanding, Analysis

5	Perform brake test on 3 phase slip ring induction motor?	Understanding
6	Regulation of Alternator by synchronus impedance method ?	Understanding
7	Plot the forward bias and reverse bias characteristic of a PN junction diode?	Understanding , Analysis
8	Study the half wave rectifier characteristics with and without filter?	Design, Analysis
9	Study the full wave rectifier characteristics with and without filter?	Design, Analysis
10	Plot input and out put characteristics of a C.E transistor ?	Design, Analysis

Text Books:

1. Basic Electrical Engineering by S.K.BHATTACHARYA, Pearson Publications
2. Fundamentals of Electrical Engineering and Electronics by B.L. TherajaS.Chand Publications Volume I
3. Basic Electrical Engineering by M.S.Naidu and S.Kamakshiah, TMH Publications.
4. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI Publications, 2nd edition

Reference Books:

1. Electronic Devices and Circuits, R.L. Boylestad and Louis Nashelsky, 9th edition, PEI/PHI 200 Electrical Technology by Surinder Pal Bali, Pearson Publications.
2. Electrical Circuit Theory and Technology by John Bird, Routledge Taylor & Francis Group.
3. Industrial Electronics by G.K. Mittal, PHI.
4. Basic Electrical Engineering by Nagsarkar, Sukhija, Oxford Publications, 2nd edition.

Course Code	ENGINEERING CHEMISTRY LABORATORY	L	T	P	C
1000201210		0	0	3	1.5

COURSE OBJECTIVES:

To study about different types of titrations. Apply the analytical techniques to analyze cement, fuels and Lubricants.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:	POs Mapped	Strength of mapping
CO1	Analyze and develop experimental skills	1	3
		2	3
		5	1
		9	1
CO2	Enhance the thinking capabilities pertaining modern trends in Engineering & technology	1	3
		2	3
		5	1
		9	1
CO3	Select and use a suitable Instrumental technique for the quantitative estimation and analyze the data obtained.	1	3
		2	3
		5	1
CO4	Learn safety rules during the practice of laboratory investigation	1	3
		2	3
		5	1

LIST OF EXPERIMENTS

S.No.	Name of the experiment	Skill
1	Acid – Base titration	Determination of alkalinity of Water.
2	Complexometric titration	Determination of Hardness of a groundwater sample by using EDTA.
3	Complexometric titration	Estimation of amount of Copper by using Standard EDTA solution.
4	Analysis of coal	Determination of percentage of Moisture content in a coal sample.
5	Preparation of alternate fuel	Preparation of Biodiesel.
6	Iron dichromate redox titration	Determination of Iron (II) by using standard $K_2Cr_2O_7$ solution.
7	Iron permanganate redox titration	Determination of Iron (II) by using standard $KMnO_4$ solution.
8	Bakelite- A thermosetting Polymer	Preparation of phenol-formaldehyde resin
9	Analysis of viscosity of Lubricant	Determination of viscosity of lubricant oil by using survismeter/redwood viscometer

10	Iron analysis in Cement	Determination of percentage of Iron in Cement sample by colorimetry.
11	Calcium analysis in Cement	Estimation of Calcium in port land Cement.
12	Analysis of properties of fuel	Determination of Flash and Fire points of any fuel

Text Books:

1. Arthur Vogel and G. Svehla, Qualitative Inorganic Analysis, Pearson Education India.
2. Thompson & Atteshli, Advanced Practical Chemistry & Resource Pack, John Murray Publication.

Reference Books:

1. Hill & Holman, Chemistry in Context Laboratory, Nelson Publication.

Course Code	SURVEYING LABORATORY	L	T	P	C
1001201210		0	0	3	1.5

COURSE OBJECTIVES:

In this course student gets knowledge and can perform the operation of chain surveying, compass surveying, plane table surveying, levelling, theodolite survey, tacheomatic surveying, curve setting, areas from filed notes and total station survey.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:	POs Mapped	Strength of mapping
CO1	Use various types of surveying instruments along with understanding of basic concepts of surveying	1	2
		2	2
		4	1
		9	3
CO2	Decide the suitable method of levelling and find the elevations followed by contour mapping	1	3
		2	2
		3	1
		4	2
CO3	Calculate the heights, elevations of the far object and also calculate the areas and volumes of any irregular areas.	9	3
		2	2
		5	3
		9	1
CO4	Setting out of a simple and compound curve with various methods and uses total station and GIS	1	3
		2	2
		4	2
		5	3
		9	3

LIST OF EXPERIMENTS

S.No.	Name of the experiment	Skill
1	Surveying in an area by chain surveying (Closed circuit)	Area determination
2	Chaining across obstacles	On uneven ground distance determination
3	Determination of distance between two inaccessible points by using compass	Inaccessible points distance determination
4	Finding the area of the given boundary using compass (Closed Traverse)	Area determination
5	Finding the area of a given boundary by the method of radiation & method of intersection.	Area determination
6	Height of the instrument method (differential levelling), Rise and fall method, Closed / Open Circuit	Reduced level determination

7	Measurements of horizontal and vertical angles by repetition and reiteration method	Included angle determination
8	Trigonometric leveling- heights and distance problem	Included angle determination
9	Tacheomatic Survey: Heights and distance problems using tacheomatic principles.	Heights and distance determination
10	Setting out a simple curve by means of offsets from long chord	Set out a simple curve
11	Determine distance and area using total station	Distance and Area determination
12	Determination of Remote height using total station	Remote location object height measurement

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. Duggal S K, “Surveying (Vol – 1, 2 & 3), Tata McGraw Hill Publishing Co. Ltd. New Delhi.

Reference Books:

1. Surveying and levelling by R. Subramanian, Oxford university press, New Delhi
2. Arora, K R “Surveying Vol 1, 2 & 3), Standard Book House, Delhi, 2004
3. Chandra A M, “Higher Surveying”, New Age International Pvt. Ltd., New Delh

Virtual Lab: <http://sl-iitr.vlabs.ac.in/sl-iitr/List%20of%20experiments.html?domain=Civil%20Engineering>

I Year – I Semester	ENGINEERING EXPLORATION	L	T	P	C
1000201160		0	0	3	1

COURSE OBJECTIVES:

To understand the importance of multi-disciplinary Engineering knowledge in the current world, for making any project. To learn Engineering design process for creating any new product/system. To learn the fundamental practical knowledge for starting any inter-disciplinary project.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:	POs Mapped	Strength of mapping
CO1	Realize the purpose/Role of Engineer for solving social problems	6	3
		7	3
		8	2
		9	2
CO2	Learn to Design a component/system in an engineering way	1	3
		3	3
		9	2
CO3	Learn to use mechanisms, Arduino, sensors, motors.	1	3
		2	2
		5	3
		9	2
CO4	Integrating different systems (mechanical/Electrical/computer) to work as a unit	1	2
		3	3
		5	3
		9	2

UNIT- I

INTRODUCTION TO ENGINEERING AND ENGINEERING STUDY [6 Hours]

Introduction to Engineering, Difference between science and engineering, scientist and engineer, needs and wants various disciplines of engineering, some misconceptions of engineering, Role of engineers in solving social problems, Graduate Attributes.

Activity theme: Activities aimed to understand Engineering

Activities:

1. Identifying Various Engineering disciplines involved in projects/systems
2. Listing down various social problems in the world & Finding how engineering can solve these social problems.

UNIT- II

ENGINEERING DESIGN

[12 Hours]

Engineering Design Process, Multidisciplinary facet of design, Generation of multiple solution, Introduction to Mechatronics systems, Motor and Battery Sizing concepts, Introduction to PCB design.

Activity theme: Activities based on the designing & making of models

Activities:

1. Making of a Popsicle sticks prototype bridge
2. Conversion of AC to DC using bridge rectifier
3. Creation of Mobile App using MIT App Inventor
4. Creating a Full adder circuit using Logic gates with IC's

UNIT- III

MECHANISMS

[6 Hours]

Basic Components of a Mechanism, Degrees of Freedom (Mobility of a Mechanism), 4 Bar Chain, Crank Rocker Mechanism, Slider Crank Mechanism.

Activity theme: Creating a model which illustrate any mechanism

Activities:

1. Determining the number of Degrees of freedom for a given mechanism
2. Assembly of scissors mechanism

UNIT- IV

PLATFORM BASED DEVELOPMENT

[8 Hours]

Introduction to platform-based development (Arduino) programming and its essentials, Introduction to sensors, transducers and actuators and its interfacing with Arduino.

Activity theme: To Program Arduino to control lights, Motors, Sensors etc.

Activities:

1. Blinking LEDs using Arduino interface
2. Identifying the objects with Infrared sensor
3. Usage of different sensors using Arduino Interface

UNIT- V

DATA ACQUISITION AND ANALYSIS

[8 Hours]

Types of Data, Descriptive Statistics techniques as applicable to different types of data, Types of graphs as applicable to different types of data, Usage of Microsoft Excel tool for descriptive statistics, Data Acquisition using Sensors interfaced with Arduino, exporting acquired data to Microsoft Excel and analysis using visual representation.

Activity theme: Acquiring data from sensors using Arduino

Activities:

1. Data analysis of Ultrasonic sensor with Arduino as interface
2. Data analysis of DHT sensor with Arduino as interface

Course Code	CONSTITUTION OF INDIA (Audit Course)	L	T	P	C
1000201121		2	0	0	0

COURSE OBJECTIVES:

To provide basic information about Indian constitution. To identify individual role and ethical responsibility towards society. Introduction to the Constitution of India, The Making of the Constitution and Salient features of the Constitution. Preamble to the Indian Constitution Fundamental Rights & its limitations.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:	POs Mapped	Strength of mapping
CO1	Understand the importance of constitution, fundamental rights and duties	8	1
CO2	Understand the structure of executive, legislature and judiciary	8	1
CO3	Understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and election commission of India.	8	1
CO4	Understand the central and state relation financial and administrative.	8	1

UNIT- I

Introduction to Indian Constitution: Constitution' meaning of the term, Indian Constitution - constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties

LEARNING OUTCOMES: After completion of this unit student will

- Understand the concept of Indian constitution
- Apply the knowledge on directive principle of state policy
- Analyze the History, features of Indian constitution
- Evaluate Preamble Fundamental Rights and Duties

UNIT- II

.Union Government and its Administration Structure of the Indian Union. President: Role, power and position, PM and Council of ministers, ,Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions;

LEARNING OUTCOMES:-After completion of this unit student will

- Understand the structure of Indian government
- Differentiate between the state and central government
- Explain the role of President and Prime Minister
- Know the Structure of supreme court and High court

UNIT- III

State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

LEARNING OUTCOMES:-After completion of this unit student will

- Understand the structure of state government
- Analyze the role Governor and Chief Minister

- Explain the role of state Secretariat
- Differentiate between structure and functions of state secretariate

UNIT- IV

A.Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role - CEO of Municipal Corporation PachayatiRaj: Functions ZilaPanchayat, CEO ZilaPanchayat

LEARNING OUTCOMES:-After completion of this unit student will

- Understand the local Administration
- Compare and contrast district administration role and importance
- Analyze the role of Myer and elected representatives of Municipalities
- Evaluate Zillapanchayat block level organisation

UNIT- IV

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission:;

LEARNING OUTCOMES:-After completion of this unit student will

- Know the role of Election Commission apply knowledge
- Contrast and compare the role of Chief Election commissioner and Commissionerate
- Analyze role of state election commission

Evaluate various commissions of viz SC/ST/OBC and women

Text Books:

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt.Ltd.. New Delhi
2. SubashKashyap, Indian Constitution, National Book Trust
3. J.A. Siwach, Dynamics of Indian Government & Politics
4. D.C. Gupta, Indian Government and Politics
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
6. J.C. Johari, Indian Government andPolitics Hans
7. J. Raj IndianGovernment and Politics
8. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi
9. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012

E Resources

1. nptel.ac.in/courses/109104074/8
2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution