MATS UNIVERSITY

SCHOOL OF ENGINEERING AND INFORMATION TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

Syllabus

For

(Four-Years Full-Time Degree Programme)

Bachelor of Technology (B.Tech.)

in

Civil Engineering

(2025-2029)

(Semester Based Course)

Metrix

Semester - I								
S.No.	Code	Subject	Total Credits	Periods per week			Scheme of marks	
				L	T	P	ESE	IM
1		Matrices and Calculus	3	3	-	-	70	30
2		Engineering Physics	3	3	-	-	70	30
3		Programming for Logic Building	3	3	-	-	70	30
4		Technical English	2	2	-	-	70	30
5		Environmental Sciences	0	1	-	-	70	30
6		Engineering Physics Laboratory	1	-	-	2	70	30
7		Manufacturing Practices – I Laboratory	1	-	-	2	30	20
8		Engineering Graphics & Design Laboratory	1	-	-	2	30	20
9		Programming and Soft Skill Laboratory (SEC)	1	-	-	2	30	20
10		Communication Skills Laboratory (AEC)	2	-	-	4	30	20
11		VAC/IKS (from bucket)	2	2	-	-	70	30
12		Multidisciplinary Elective Course - I (from bucket)	3	3	-	-	70	30
13		Universal Human Values	1	1	-	-	70	30
Total			**23**	**18**		**12**	**750**	**350**

Semester - II								
S.No.	Code	Subject	Total Credits	Periods per week			Scheme of marks	
				L	T	P	ESE	IM
1		Analytical Mathematics	3	3	-	-	70	30
2		Engineering Chemistry	3	3	-	-	70	30
3		Basic Electrical & Electronics Engineering	3	3	-	-	70	30
4		Constitution of India, Professional Ethics and Human Rights.	0	1	-	-	70	30
5		Fundamental of Mechanical Engineering	3	3	-	-	70	30
6		Engineering Chemistry Laboratory	1	-	-	2	30	20
7		Basic Electrical & Electronics Engineering Laboratory	1	-	-	2	30	20
8		Fundamental of Mechanical Engineering Laboratory	1	-	-	2	30	20
9		Manufacturing Practices - II Laboratory	1	-	-	2	30	20
10		Advanced Programming Laboratory (AEC)	2	-	-	4	30	20
11		Multidisciplinary Elective Course - II (bucket)	3	3	-	-	70	30
12		Problem Solving with Python Programming (SEC)	2	-	-	4	30	20
Total			**23**	**16**	**0**	**16**	**600**	**300**

Semester - III								
S.No.	Code	Subject	Total Credits	Periods per week			Scheme of Marks	
				L	T	P	ESE	IM
1		Numerical Methods and Statistics	4	3	1	-	70	30
2		Multi-Disciplinary Elective Course-III	3	3	-	-	70	30
3		Surveying & Geomatics	4	3	1	-	70	30
4		Fluid Mechanics & Hydraulic Engineering	4	3	1	-	70	30
5		Building Material & Construction	4	3	1	-	70	30
6		Surveying Laboratory (AEC)	1	-	-	2	30	20
7		Fluid Mechanics Laboratory	1	-	-	2	30	20
8		Building Material Laboratory (AEC)	1	-	-	2	30	20
9		Project / Seminar	1	-	-	2	30	20
Total			**23**	**15**	**4**	**8**	**470**	**230**

Semester - IV								
S.No.	Code	Subject	TotalCredit	Periods per week			Scheme ofmarks	
				L	T	P	ESE	IM
1		Structural Analysis-I	3	3	-	-	70	30
2		Geotechnical Engineering	4	3	1	-	70	30
3		Civil Engineering Drawing	3	3	-	-	70	30
4		Professional Elective Course-I	3	3	-	-	70	30
5		Multi-Disciplinary Elective Course-III	3	3	-	-	70	30
6		Geotechnical Engineering-I Laboratory	1	-	-	2	30	20
7		Concrete Technology Laboratory (AEC)	1	-	-	2	30	20
8		Computer Aided Engineering Laboratory	1	-	-	2	30	20
9		Project/ Seminar	1	-	-	1	70	30
10		Internship- I	3	-	-	1	30	20
Total			**23**	**15**	**1**	**8**	**540**	**260**

Semester - V								
S.No.	Code	Subject	Total Credit	Periods per week			Scheme of marks	
				L	T	P	ESE	IM
1		Structural Analysis-II	3	3	-	-	70	30
2		Reinforced Cement Concrete Design	3	3	-	-	70	30
3		Environmental Engineering	3	3	-	-	70	30
4		Highway & Airport Engineering	3	3	-	-	70	30
5		Professional Elective Course-II	3	3	-	-	70	30
6		Structural Analysis Laboratory	1	-	-	2	30	20
7		Transportation Engineering Laboratory	1	-	-	2	30	20
8		Environmental Engineering Laboratory	1	-	-	2	30	20
9		Interdisciplinary Project	1	-	-	1	70	30
10		Internship- II	3	-	-	1	30	20
Total			**22**	**15**	**0**	**08**	**540**	**260**

Minors: Smart Cities								
		Fundamentals of Smart Cities	3	3	-	-	70	30
		Data Analytics for Smart Cities	1	-	-	2	30	20
Total			**26**	**18**	**0**	**12**	**640**	**310**
Minors: Green Technology and Sustainability								
1		Principles of Sustainable Development and Green	3	3	-	-	70	30
2		Sustainable Materials Lab	1	-	-	2	30	20
Total			**26**	**18**	**0**	**12**	**640**	**310**

Semester - VI								
S.No.	Code	Subject	Total Credit	Periods per week			Scheme of marks	
				L	T	P	ESE	IM
1		Design of Steel Structures	3	3	-	-	70	30
2		Geotechnical Engineering-II	3	3	-	-	70	30
3		Railway, Habour & Tunnel Engineering	3	3	-	-	70	30
4		Engineering Hydrology	3	3	-	-	70	30
5		Professional Elective Course-III	3	3	-	-	70	30
6		Design of Steel Structures Laboratory	1	-	-	2	30	20
7		Geotechnical Engineering-II Lab	1	-	-	2	30	20
8		Computer Applications in Civil Engg. Lab	1	-	-	2	30	20
9		Multi-Disciplinary Project/ Case Study	1	-	-	2	70	30
10		Internship-III	3	-	-	1	30	20
Total			**22**	**15**	**0**	**9**	**540**	**260**

Minors: Smart Cities								
1		Smart Mobility and Intelligent Transportation	3	3	-	-	70	30
2		Data Analytics for Smart Cities	1	-	-	2	30	20
Total			**26**	**18**	**0**	**11**	**640**	**310**
Minors: Green Technology and Sustainability								
1		Environmental Impact Assessment and Life Cycle Analysis	3	3	-	-	70	30
2		Software Tools for Sustainability Assessment	1	-	-	2	30	20
Total			**26**	**18**	**0**	**11**	**640**	**310**

Semester - VII								
S.No.	Code	Subject	Total Credit	Periods per week			Scheme of marks	
				L	T	P	ESE	IM
1		Structural Engineering Design	3	3	-	-	70	30
2		Quantity Surveying & Cost Estimation	3	3	-	-	70	30
3		Construction Planning & Management	3	3	-	-	70	30
4		Water Resources Engineering	3	3	-	-	70	30
5		Professional Elective Course-IV	3	3	-	-	70	30
6		Design of Steel Structures Laboratory	1	-	-	2	30	20
7		Water Resources Engineering Lab	1	-	-	2	30	20
8		Project Work Phase-I (Domain Specific)	2	-	-	1	70	30
9		Internship-IV	3	-	-	1	30	20
Total			**22**	**15**	**0**	**6**	**510**	**240**

Minors: Smart Cities								
1		Smart Infrastructure and IoT Applications	3	3	-	-	70	30
2		Smart City Research Project	1	-	-	2	30	20
Total			**26**	**18**	**0**	**8**	**610**	**290**
Minors: Green Technology and Sustainability								
1		Renewable Energy Systems in Civil Engineering	3	3	-	-	70	30
2		Green Technology Research Project	1	-	-	2	30	20
Total			**26**	**18**	**0**	**8**	**610**	**290**

Semester - VIII								
S.No.	Code	Subject	Total Credit	Periods per week			Scheme of marks	
				L	T	P	ESE	IM
1		Professional Elective Course-V	3	3	-	-	70	30
2		Professional Elective Course-VI	3	3	-	-	70	30
3		Professional Elective Course-VII	3	3	-	-	70	30
4		Project Work Phase-II (Domain Specific/Live)	6	-	-	2	120	80
Total			**15**	**9**	**0**	**2**	**330**	**170**

Minors: Smart Cities								
1		Policies, Governance, and Sustainable Urban	3	3	-	-	70	30
Total			**18**	**12**	**0**	**2**	**400**	**200**
Minors: Green Technology and Sustainability								
1		Sustainable Urban Infrastructure and Climate Resilience	3	3	-	-	70	30
Total			**18**	**12**	**0**	**2**	**400**	**200**

Scheme of Teaching and Evaluation

(As per NEP -2020)Choice Based Credit System (CBCS) and Outcome Based Education (OBE)

Semester I

S. No.	Course Sub Category	Course Name	Course Code	Teaching Scheme				Evaluation Scheme		Total Marks
				Hours			Credits			
				Theory	Tutorial	Practical		CIA	ESE	
1	DSCC - BSC	Matrices and Calculus	BTDSCBSC100	3	0	-	3	30	70	100
2	DSCC - BSC	Engineering Physics	BTDSCBSC101	3	0	-	3	30	70	100
3	DSCC - ESC	Programming for Logic Building	BTDSCESC102	3	1	-	4	30	70	100
4	DSCC - HSC	Technical English	BTDSCHSC103	2	0	-	2	30	70	100
5	DSCC - MC	Environmental Sciences	BTDSCMC104	1	0	-	0	30	70	100
6	DSCC - BSC	Engineering Physics Laboratory	BTDSCBSC105	-	-	2	1	20	30	50
7	DSCC - ESC	Manufacturing Practices – I Laboratory	BTDSCESC106	-	-	2	1	20	30	50
8	DSCC - ESC	Engineering Graphics & Design Laboratory	BTDSCESC107	-	-	4	2	20	30	50
9	SEC	Programming and Soft Skill Laboratory	BTSEC108	-	-	2	1	20	30	50
10	AEC	Communication Skills Laboratory	BTAEC109	-	-	2	2	20	30	50
11	VAC	Universal Human Values	BTVAC110	1	-	-	1	30	70	100
12	GEC	Multidisciplinary Elective Course - I	GEA	3	0	0	3	30	70	100
			Total	16	1	12	23	310	640	950

L – Lecture, T – Tutorial, ESE – End Semester Examination, P – Practical, IM – Internal Marks (Include Class Test & Teacher's Assessments)

Note : Theory Internal Marks (CIA) = 30 (CT-I = 05, CT-II=05, Assignment=05, Mid Term=15)

Practical Internal Marks (CIA) = 20 (Attendance = 05, Lab Viva-Voce = 05, Lab Record Work = 10)

Discipline Specific Core Courses (DSCC) Major				AEC (Ability Enhancement Course) (E)	SEC/Internship (Skill Enhancement Course) (F)	Value Added Course (VAC) (G)	GEC (Generic Elective Course) (H)
Basic Sciences Course (A)	Engineering Sciences Course (B)	Humanities Science (C)	Mandatory Course (D) (Zero Credit Course)				
Engineering Mathematics – I	Programming for Logic Building	Technical English	Environmental Sciences	Communication Skills Laboratory	Programming and Soft Skill Laboratory	Universal Human Values	Multidisciplinary Elective Course - I
Engineering Physics	Engineering Graphics & Design						
Engineering Physics Laboratory	Manufacturing Practices – I Laboratory						
	Engineering Graphics & DesignLaboratory						

Credit Definition:

- 1-hour lecture (L) per week per semester = 1Credit
- 1-hour tutorial (T) per week per semester = 1Credit
- 2-hour Practical/Drawing(P) per week per semester = 1 Credit
- Four credit courses are to be designed for 60 hours of Teaching-Learning process.
- Three credit courses are to be designed for 48 hours of Teaching-Learning process.
- Two credit courses are to be designed for 28 hours of Teaching-Learning process.
- One credit courses are to be designed for 15 hours of Teaching Learning process

Semester: I B. Tech **Branch: All Streams of Engineering**
Subject: Matrices and Calculus **Code: BTDSCBSC100**
Total Theory Periods: 48 **Total Tutorial Periods: 00**
Total Credits: 03

OBJECTIVES:

- To develop the use of matrix algebra techniques this is needed by engineers for practical applications.
- To make the student knowledgeable in the area of infinite series and their convergence so that he/ she will be familiar with limitations of using infinite series approximations for solutions arising in mathematical modeling.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To introduce the concepts of improper integrals, Gamma, Beta and Error functions which are needed in engineering applications.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.

UNIT-I

MATRICES

Real vector space, Subspace, Linear span, Linear dependence and linear independence of vectors, Basis, Dimension, Linear transformation, Matrix associated with a linear transformation, Rank and inverse by elementary transformation (Gauss Jordan method), System of linear equations, Eigenvalues and eigenvectors, Cayley-Hamilton theorem, Diagonalization of matrices.

UNIT- II

DIFFERENTIAL CALCULUS

Successive differentiation, Lebnitz theorem, Rolle's Theorem, Taylor's theorem with Lagrange's form of remainder, Expansions of functions in Taylor's and McLaurin's series

UNIT-III

PARTIAL DIFFERENTIATION

Functions of two variables: Limit, continuity and partial derivatives, derivatives of higher order, Euler's theorem on homogeneous functions, Total derivative, Change of variables, Jacobians, Maxima, minima and saddle points of functions of two variables

UNIT-IV

ORDINARY DIFFERENTIAL EQUATION

First order ordinary differential equations: Exact, linear and Bernoulli's equations, Euler's equations, Equations of first order and higher degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

Ordinary differential equations of higher order linear differential equations with constant coefficients & variable coefficients, method of variation of parameters, Cauchy-Euler equation,Legendre polynomials and their properties

UNIT-V

MULTIPLE INTEGRAL

Beta and Gamma functions – elementary properties, Double and triple integrals, change of order of integration, Application to area and volume.

OUTCOMES:

- This course equips students to have basic knowledge and understanding in one fields of materials, integral and differential calculus.

NAME OF TEXT BOOKS:

1. Higher Engineering Mathematics by B.S.Grewal (42th edition)-Khanna Publisher.
2. Advanced Engineering Mathematics by Erwin Kreyszig (8th edition)-John Wiley & Sons.

NAME OF REFERENCE BOOKS:

1. Differential Calculus by Gorakh Prasad-Pothisala Private Limited.
2.Advanced Engineering Mathematics by R.K.Jain and S.R.K. Iyengar-Narosa Publishing House.
3.Applied Mathematics by P.N.Wartikar&J.N.Wartikar Vol-ll –Pune VidyarthiGrihaPrakasan, Pune.
4. Integral Calculus by Gorakh Prasad-Pothisala Private Limited.

Semester: I B.Tech **Branch: All Streams of Engineering**
Subject: Engineering Physics **Code: BTDSCBSC101**
Total Theory Periods: 48 **Total Tutorial Periods: 00**
Total Credits : 03

OBJECTIVES:

- To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

Unit -I

THEORY OF RELATIVITY SPACE

Time and motion, frame of reference, Galilean Transformation Outline of relativity, Michelson-Morley experiment, Special theory of Relativity, transformation of space and time, Time dilation, Doppler effect ,length contraction, addition of velocities, Relativistic mass: variation of mass with velocity, kinetic energy, equivalence of mass and energy, Relation between energy and momentum.

Unit- II

(a) LASERS

Temporal and spatial coherence of light wave Principle of laser, Laser characteristics, components of laser, Principle of Ruby, He-Ne &Nd -YAG lasers, application, basic concepts of Holography (only introductory part, No detail derivation)

(b) FIBRES OPTICS:

Optical fibers: Introduction & advantages, structure & classification, Option of propagation in fiber, attenuation & distortion, acceptance angle and cone, numerical aperture (only introductory part, No detail derivation).

Unit -III

NUCLEAR PHYSICS

Controlled and uncontrolled chain reaction, criteria of critical mass, nuclear reactor and its site selection & numerical ,nuclear forces, Nuclear fusion in stars . Introduction of elementary particles. Electron ballistic: Motion of charged particles in electric and magnetic field. Aston and Bainbridge mass spectrograph.

Unit -IV

WAVE OPTICS

Wedge shaped films, Interferences by division of amplitude: Newton's rings and its applications Interference by division of wave front: Fresnel's bi prism, fringe width, diffraction grating, resolving power of grating,

Unit- V

SOLID STATE DEVICES:

Transistor: Input and Output characteristics in CE mode, Transistor as an amplifier, Hartley Oscillator. FET: Input and output characteristics of J-FETs & MOSFETs, Operational amplifiers (Op-Amp).

OUTCOMES:

The students will have knowledge on the basics of physics related to properties of matter, optics, acoustics etc., and they will apply these fundamental principles to solve practical problems related to materials used for engineering applications.

TEXT BOOKS:

1. Gaur and Gupta “Engineering Physics”
2. Avadhanulu and Kshirsagar “Engineering Physics”.
3. Verma H.C.: Concepts of Physics, Part-1 & Part-2, BharatiBhawan (P&D)
4. A.K. Tayal: Engineering Mechanics (Statics and Dynamics)

REFERENCE BOOKS:

• Jenkins and White: “Optics”, MeGrew-Hill Book Company.

• Singh R.B.: “Physics of Oscillations and Waves”

• Ghatak A.K.: “Optics”

• Mani and Mehta: “Modern Physics”, Affiliated East-West Press Pvt. Ltd, 1998.

• Sanjeev Puri: Modern Physics, narosa Pub. Co.2004.

• Azroff: Solid State Physics, Tata McGraw-Hill, 2004.

• Theraja: B.L., Basic Electronics, S.Chand, 2002.

• Puri: Digital Electronics, Tata McGraw-Hill, 2002.

• Millman, J and Halkias: integrated Electronics, Tata MeGraw-Hill, 2004.

• Tyagrajan and Ghatak: Lasers, Macmillan, 2001. •

Total Credits: 04

Subject Code: BTDSCESC102
Total Tutorial Periods: 12

COURSE OBJECTIVE:

- To distinguish and recognize low-level and high-level programming languages
- To know fundamental concepts of structured programming
- To understand logic development
- To design pseudo logic for various programming problems.
- To understand the basic structure of a program including sequence, decisions and looping.
- To design solutions to real world problems using C language.
- To use C language for problem solving and numerical computations.
- To apply computer-programming concepts to new problems or situations.

UNIT – I

ELEMENTS OF C LANGUAGE

Tools for Problem Solving: Problem Analysis, Flowchart, Algorithm Development. Top-Down Program Design, Structured Design Approach, Origin of C, Features & Characteristic of C, C Compiler, Character Set, Keywords, Identifiers, Constants, Variables, Input/ Output Statements, Basic Data Types, Operators and Expressions, Basic structure of C programs, A simple C Program.

UNIT – II

CONTROL FLOW CONSTRUCTION

Decision making and branching: Simple if statement, if else statement, Nesting of if-else statement, else - if Ladder, Switch statement, Operator, goto statement, Decision making and looping, While statement, Do-While statement, For statement, Jumps in loops, Break and Continue statement.

UNIT – III

DEFINING AND MANIPULATING ARRAYS

One Dimensional Arrays: Declaration of Arrays, Initialization of Arrays, Reading and Writing of integer, real and Character arrays, sorting and Searching in Arrays, Multi-Dimensional Arrays, Handling of Character Strings.

UNIT – IV

USER DEFINED FUNCTIONS

Syntax of Function, Calling functions, Actual & Formal Arguments, Categories of Functions, Function prototype, Scope Rules: Local & Global variables, Recursion, Recursion vs. iteration, Passing Arguments: call by values & call by reference, passing array to function.

Structures: Declaration and initialization of Structure, Array of structures, Array within structure, structure within structure, Structures and functions, Introduction to unions.

UNIT – V

POINTER DATA TYPE AND ITS APPLICATION

Pointer Operator, Pointer Expression, Initialization of pointers, Pointer Arithmetic, Pointer and Function Arguments, Pointer to function, Pointer and Arrays, Pointers and String, Arrays of Pointers, Pointers to Pointers, Dynamic memory allocation.

Files in C: Defining and Opening a file, closing a file, Input/ Output operations on files, Error handling during I/O operations, Random access to files.

COURSE OUTCOME:

After completion of the course study, students are going to be in a position to

1. Analyze issues and style algorithms in pseudo code.
2. Able to implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems
3. Read, perceive and trace the execution of programs written in C language.
4. Develop confidence for self-education and ability for life-long learning needed for Computer language.
5. Write down C program for a given algorithm by means of modular approach.

TEXT BOOKS:

1. The C programming Language, Dennis M Ritchie and Kernighan, PHI.
2. Let us C, YashwantKanetkar, BPB Publication.
3. Programming in C, E. Balaguruswamy, TMH.

REFERENCE BOOKS:

1. Programming in C, Byron Gottfried, Schaum's series outline TMH.
2. Programming in C, Ghosh, PHI.
3. Computer Programming in C, V. Raja Raman, PHI.

Total Credits: 00

Code: BTDSCMC104
Total Tutorial Periods: 00

UNIT-I:

CONCEPTS OF ENVIRONMENTAL SCIENCES AND NATURAL RESOURCES

Environment, Levels of organizations in environment, Structure and functions in an ecosystem; Biosphere, its Origin and distribution on land, in water and in air, Broad nature of chemical composition of plants and animals. Renewable and Non-renewable Resources, Forests, water, minerals, Food and land (with example of one case study); Energy, Growing energy needs, energy sources (conventional and alternative).

UNIT-II:

BIODIVERSITY AND ITS CONSERVATION

Biodiversity at global, national and local levels: India as a mega-diversity nation; Threats to biodiversity (biotic, abiotic stresses), and strategies for conservation.

UNIT-III:

ENVIRONMENTAL POLLUTION

Types of pollution- Air, water (including urban, rural, marine), soil, noise, thermal, nuclear; Pollution prevention; Management of pollution- Rural/Urban/Industrial waste management [with case study of any one type, e.g., power (thermal/nuclear), fertilizer, tannin, leather, chemical, sugar], Solid/Liquid waste management, disaster management.

UNIT-IV:

ENVIRONMENTAL BIOTECHNOLOGY AND ENVIRONMENTAL MONITORING
Biotechnology for environmental protection- Biological indicators, bio-sensors; Remedial measures- Bio-remediation, phyto-remediation, bio-pesticides, bio-fertilizers; Bio-reactors- Design and application. Monitoring- Identification of environmental problem, tools for monitoring (remote sensing, GIS); Sampling strategies- Air, water, soil sampling techniques.

UNIT-V:

SOCIAL ISSUES AND ENVIRONMENT

Problems relating to urban environment- Population pressure, water scarcity, industrialization; remedial measures; Climate change- Reasons, effects (global warming,

ozone layer depletion, acid rain) with one case study; Legal issues- Environmental legislation (Acts and issues involved), Environmental ethics

TEXTBOOKS:

1. Gilbert M. Masters, "Introduction to Environmental Engineering and Science", 2nd Edition, Pearson Education, 2004.

2. Benny Joseph, "Environmental Science and Engineering", Tata McGraw-Hill, New Delhi, 2006.

REFERENCE BOOKS:

1. A. K. Chatterji, "Introduction to Environmental Biotechnology", Prentice Hall of India, New Delhi, 2006.

2. R.K. Trivedi,"Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol. I and II, Enviro Media.

3. Nebel B. J., "Environmental Science", Prentice Hall of India, New Delhi, 1987.

Semester: I B.Tech **Branch: All Streams of Engineering**

Subject: Technical English **Code: BTDSCHSC103**

Total Theory Periods: 28 **Total Tutorial Periods: 00**

Total Credits : 02

OBJECTIVES:

- To enable learners of Engineering and Technology develop their basic communication skills in English.
- To emphasize specially the development of speaking skills amongst learners of Engineering and Technology.
- To ensure that learners use the electronic media such as internet and supplement the learning materials used in the classroom.
- To inculcate the habit of reading and writing leading to effective and efficient communication.

UNIT-I

Technical vocabulary-meaning in context, sequencing words, articles, prepositions, intensive reading and predicting content-reading and interpretation- process description.

UNIT-II

Phrases/structures indicating use/purpose- nonverbal communication- listening- corelating verbal and nonverbal communication-speaking in group discussion- formal letter writing- writing analytical paragraphs.

UNIT III

Cause and effect expressions- different grammatical forms of the same word- speaking stress and intonation- writing using connectives- report writing- types, structures, data collection, content form recommendation.

UNIT –IV

Numerical adjectives- oral instructions- descriptive writings, letter of application-content, format (c.v./biodata)-imperative forms –checklists, yes/no question forms- e mail communication.

UNIT-V

Speaking – discussion of problems and solutions- creative and critical thinking, writing a proposal.

OUTCOMES:

Learners should be able to

- Speak clearly, confidently, comprehensibly, and communicate with one or many listeners using appropriate communicative strategies.
- Write cohesively and coherently and flawlessly avoiding grammatical errors, using a wide vocabulary range, organizing their ideas logically on a topic.
- Read different genres of texts adopting various reading strategies.

Listen/view and comprehend different spoken discourses/excerpts in different accents.

BOOKS AND REFERENCES:

1. P.k. dutta, g. Rajeevan and c.l.n.prakash, ‘a course in communication skills,. Cambridge university press, india2007

2. Krishna mohan and meerabanerjee, ‘developing communication skills’ Macmillan india limited

3. Edger thrope, showickthrope, ‘objective english’ second edition,pearson education,2007

Semester: I B.Tech. **Branch: All Streams of Engineering**

Lab: Engineering Physics Lab **Code: BTDSCBSC105**

Total Practical Periods: 30 **Total Credit: 01**

OBJECTIVES:

- To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics and properties of matter.

OUTCOMES:

- The hands on exercises undergone by the students will help them to apply physics principles of optics and thermal physics to evaluate engineering properties of materials.

LIST OF EXPERIMENTS (Any ten experiments can be performed)

1. To determine the surface tension by Capillary/Jager's method.
2. To determine the wave length of light by Newton's rings method.
3. To determine the wave length of light by Fresnel's Biprism.
4. To determine the focal length of combination of two thin lenses by nodal slide assembly and its verification.
5. To determine specific resistance of a wire by Carry Foster's Bridge.
6. To determine the Hall coefficient of semiconductor.
7. To determine e/m by Thomson's method.
8. Study of Photo – Cell and determination of Planck's constant.
9. Determination of wavelength of a spectral line using diffraction grating.
10. Determination of divergence of LASER beam.
11. Determination of grating element of a diffraction grating using LASER beam.
12. To determine the coefficients of viscosity of a liquid by capillary flow/Stoke's method.
13. To determine the frequency of A.C. mains using sonometer.
14. To determine the moment of inertia of flywheel.
15 To determine the forbidden energy gap of semiconductor diode.
16. To determine the mechanical equivalent of heat (J) by Calender&Barne's method.
17. To determine the numerical aperture (NA) of the given fiber cables.
18. To study the characteristics of LDR.

Semester: I B.Tech. **Branch: All Streams of Engineering**
Lab: Programming & soft skills laboratory **Code: BTSEC108**
Total Practical Periods: 30 **Total Credits: 01**

List of Programs:

1 Write a program to take the radius of a sphere as input and print the volume and surface area of that sphere.
2 Write a program to take a 5-digit number as input and calculate the sum of its digits.
3 Write a program to take three sides of a triangle as input and verify whether the triangle is an isosceles, scalene Oran equilateral triangle.
4 Write a program that will take 3 positive integers as input and verify whether or not they form a Pythagorean triplet or not.
5 Write a program to print all the Prime numbers between a given ranges.
6 Write a program to define a function that will take an integer as argument and return the sum of digits of that integer**.**
7 Write a program to define a macro that can calculate the greater of two of its arguments. Use this macro to calculate the greatest of 4 integers.
8 Write a program to define a recursive function that will print the reverse of its integer argument.
9 Write a program to print the sum of first N even numbers using recursive function.
10 Write a program to sort an array using Bubble sort technique.
11 Write a program that will take the elements of two integer arrays of 5 element each, and insert the common elements of both the array into a third array (Set intersection)
12 Write a program to take 5 names as input and print the longest name.
13 Write a program to check whether two given strings are palindrome or not using user defined function.
14 Write a program to find sum of all array elements by passing array as an argument using user define functions.
15 Write a program to convert decimal number to binary number using the function.
16 Write a program to get the largest and smallest element of an array using the function.
17 Write a program to define a structure Student that will contain the roll number, name and total marks of a student. The program will ask the user to input the details of 5 students and print the details of all the students whose total marks is greater than a given value.

18 Write a program to define a union Contact that will contain the members Mobile no and E-mail id. Now define structure Employee that will contain name, roll number, mode of contact (mob/e-mail) and a variable of type Contact as members. The program will ask the user to give the details of two Employees including mode of contact and the contact num/ E-mail. Print the details of both the Employees.

19 Write a program to count vowels and consonants in a string using pointer.

20 Write a program to swap two numbers using pointers.

21 Write a program to find sum of array elements using Dynamic Memory Allocation.

22 Write a program that will ask the user to input a file name and copy the contents of that file into another file.

23 Write a program that will take any number of integers from the command line as argument and print the sum of all those integers.

24 Write a program to process sequential file for payroll data.

25 Write a program to process random file of library data.

Smart Working with MS-Office

MS-Word

a) Creating, editing, saving and printing text documents
b) Font and paragraph formatting
c) Simple character formatting
d) Inserting tables, smart art, page breaks
e) Using lists and styles
f) Working with images
g) Using Spelling and Grammar check
h) Understanding document properties
i) Mail Merge

MS-Excel

a) Spreadsheet basics
b) Creating, editing, saving and printing spreadsheets
c) Working with functions & formulas
d) Modifying worksheets with color &auto formats
e) Graphically representing data : Charts & Graphs
f) Speeding data entry : Using Data Forms
g) Analyzing data : Data Menu, Subtotal, Filtering Data
h) Formatting worksheets
i) Securing & Protecting spreadsheets

MS-PowerPoint

a) Opening, viewing, creating, and printing slides
b) Applying auto layouts
c) Adding custom animation
d) Using slide transitions
e) Graphically representing data : Charts & Graphs
f) Creating Professional Slide for Presentation.

LIST OF EQUIPMENT'S / MACHINE REQUIRED:

PCs, C-Compiler, C Online Compiler, Microsoft Office (version 2007 or above)

REFERENCES:

1. Programming in ANSI C – E. Balaguruswamy Tata Mc-Gcraw Hill.
2. Let us C, YashwantKanetkar, BPB Publication
3. C: The Complete Reference, Herbert Schildt, McGraw Hill.
4. Office 2007 for Dummies, Wallace Wang, Wiley Publishing
5. MS-Office 2010 Training Guide, Satish Jain/M.Geeta/Kratika, BPB Publications

Semester: I B.Tech **Branch: All Streams of Engineering**

Lab: Engineering Graphics and Design Lab **Code: BTDSCESC107**

Total Practical Periods: 48 **Total Credits: 02**

LIST OF EXPERIMENTS

Component-1

Sheet-1: Projection of Solids (4 problems) + Section and Development of solid surfaces (4 problems) Sheet -2: Orthographic projection without section (4 problems).

Sheet -3: Orthographic projection with section (4 problems). Sheet- 4: Isometric Projections (6 problems).

Component -2

One A-3 size sketch book consisting of:-

1) 6 problems each from Projection of Curves, Lines, Planes and Solids.

2) 6 problems from Section and Development of Solids.

3) 4 problems each from the Orthographic Projections (with Section), Reading of orthographic projections and Isometric projections.

Component - 3

1. An introduction of cad software and its utilities in the engineering software.
2. Study of the basic initial setting and viewing of drafting software interface.
3. Study of various tool bar options and exercises to familiarize all the drawing tools.
4. Use of various modify commands of drafting software.
5. Dimensioning in 2d and 3d entities.
6. Draw different types of 3d modeling entities using viewing commands, to view them (isometric projection).
7. Sectioning of solid primitives and rendering in 3d.
8. Intersection of solid primitives.

Semester: I B.Tech **Branch: All Streams of Engineering**
Lab: Communication Skill Lab **Code: BTAEC109**
Total Practical Periods: 30 **Total Credits: 02**

LIST OF TASKS:

1. Listening comprehension – Achieving ability to comprehend material delivered at relatively fast speed; comprehending spoken material in Standard Indian English, British English, and American English; intelligent listening in situations such as interview in which one is a candidate.

2. Vocabulary building, Creativity, using Advertisements, Case Studies etc.

3. Personality Development: Decision-Making, Problem Solving, Goal Setting, Time Management & Positive Thinking

4. Cross-Cultural Communication: Role-Play/ Non-Verbal Communication.

5. Meetings- making meeting effective, chairing a meeting, decision making, seeking opinions , interrupting and handling interruptions, clarifications, closure- Agenda, Minute writing.

6. Group Discussion – dynamics of group discussion, Lateral thinking, Brainstorming and Negotiation skills

7. Resume writing – CV – structural differences, structure and presentation, planning, defining the career objective

8. Interview Skills – formal & informal interviews, concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele and video-conferencing 9. Writing Skills - Business Communication, Essays for competitive examinations.

10. Technical Report Writing/ Project Proposals – Types of formats and styles, subject matter – organization, clarity, coherence and style, planning, data-collection, tools, analysis.- Feasibility, Progress and Project Reports.

Semester: I B.Tech **Branch: All Streams of Engineering**
Lab:Manufacturing Practices -I Laboratory **Code: BTDSCESC106**
Total Practical Periods: 45 (15 Instructional Periods) **Total Credits: 02**

INSTRUCTIONAL SYLLABUS

Carpentry:
Timber, definition, engineering applications, seasoning and preservation, plywood and ply boards.
Foundry:
Moulding sands, constituents and characteristics. Pattern, definition, materials, types, core prints. Role of gate, runner, riser, core and chaplets. Causes and remedies of some common casting defects like blow holes, cavities, inclusions.
Welding:
Definitions of welding, brazing and soldering processes, and their applications, Oxyacetylene gas welding process, equipment and techniques, type of flames and their applications. Manual met an arc Welding technique and equipment, AC and DC welding, electrodes, constituents and functions of electrode coating, Welding positions. Type of weld joint. Common welding defects such ascracks, undercutting slag inclusion, porosity.

LIST OF EXPERIMENTS

1. T-Lap joint and Bridle joint (Carpentry shop)

2. Mould of any pattern (foundry shop)

3. Casting of any simple pattern (foundry shop)

4. (a) Gas welding practice by students on mild steel flat

(b) Lap joint by Gas welding

5. (a) MMA Welding practice by students

(b) Square butt joint by MMA Welding

6. (a) Lap joint by MMA Welding

(b) Demonstration of brazing

Scheme of Teaching and Evaluation
(As per NEP -2020)
Choice Based Credit System (CBCS) and Outcome Based Education (OBE)
Semester - II

S. No.	Course Sub Category	Course Name	Code	Teaching Scheme				Evaluation Scheme		Total Marks
				Hours			Credits			
				Theory	Tutorial	Practical		CIA	ESE	
1	DSCC	Analytical Mathematics	BTDSCBSC200	3	0	-	3	30	70	100
2	DSCC	Engineering Chemistry	BTDSCBSC201	3	-	-	3	30	70	100
3	DSCC	Basic Electrical & Electronics Engineering	BTDSCESC202	3	0	-	3	30	70	100
4	DSCC	Constitution of India, Professional Ethics and Human Rights.	BTMC203	1	-	-	0	30	70	100
5	DSCC	Fundamental of Mechanical Engineering.	BTDSCESC204	3	0	-	3	30	70	100
6	DSCC	Engineering Chemistry Laboratory	BTDSCESC205	-	-	2	1	20	30	50
7	DSCC	Basic Electrical & Electronics Engineering Laboratory	BTDSCESC206	-	-	2	1	20	30	50
8	DSCC	Fundamental of Mechanical Engineering Laboratory	BTDSCESC207	-	-	2	1	20	30	50
9	DSCC	Manufacturing Practices - II Laboratory	BTDSCESC208	-	-	2	1	20	30	50
10	SEC	Problem Solving with Python Programming	BTSEC209	3	-	0	3	30	70	100
11	AEC	Advanced Programming Laboratory	BTAEC210	-	-	2	1	20	30	50
12	GEC	Multidisciplinary Elective Course - II	GEA	3	0	-	3	30	70	100
			Total	15	0	13	23	310	640	950

Discipline Specific Core Courses (DSCC) Major			AEC (Ability Enhancement Course) (D)	SEC/Internship (Skill Enhancement Course) (E)	Generic Elective Course (GEC) (F)
Basic Sciences (A)	**Engineering Sciences (B)**	**Humanities Science (C)**			
Analytical Mathematics	Basic Electrical & Electronics Engineering	Constitution of India, Professional Ethics and Human Rights.	Advanced Programming Laboratory	Problem Solving with Python Programming	Multidisciplinary Elective Course - II
Engineering Chemistry	Fundamental of Mechanical Engineering.				
	Engineering Chemistry Laboratory				
	Basic Electrical & Electronics Engineering Laboratory				
	Fundamental of Mechanical EngineeringLaboratory				
	Manufacturing Practices - II Laboratory				

Note: 'French Language' is introduced in the even semester as an Add-on Certification Course (Non-credited).

Credit Definition:

- 1-hour lecture (L) per week per semester = 1Credit
- 1-hour tutorial (T) per week per semester = 1Credit
- 2-hour Practical/Drawing(P) per week per semester = 1 Credit
- Four credit courses are to be designed for 60 hours of Teaching-Learning process.
- Three credit courses are to be designed for 48 hours of Teaching-Learning process.
- Two credit courses are to be designed for 28 hours of Teaching-Learning process.
- One credit courses are to be designed for 15 hours of Teaching-Learning process

Semester: 2nd B.Tech **Branch: All Streams of Engineering**

Subject: Analytical Mathematics **Subject Code: BTDSCBSC200**

Total Theory Periods: 48 **Total Credits: 03**

OBJECTIVES:

- To make the scholars perceive the series analysis could be a powerful methodology wherever the formulas square measure integrals and to possess information of increasing periodic functions that explore sort of applications of Fourier series.
- To possess intensive information of PDE those arise in mathematical descriptions of things in engineering. To review a few amount which will take any of a given vary of values that will not be foreseen because it is however can be delineated in terms of their likelihood.
- To acquaint the student with the concepts of vector calculus needed for problems in all engineering disciplines.
- To produce a sound background of advanced analysis to perform an intensive investigation of major theorems of complex analysis and to use these ideas to a large vary of issues that features the analysis of each complex line integrals and real integrals.
- To make the student appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated.

UNIT I

FOURIER SERIES

Fourier series, Even odd function, Half range sine and cosine series, Parseval's theorem, practical harmonic analysis & Fourier Transform

UNIT II

PARTIAL DIFFERENTIAL EQUATION

Formation, Solution by direct integration method, Linear equation of first order, Homogeneous linear equation with constant coefficients, Non-homogeneous linear equations, Method of separation of variables & application of PDE

UNIT III

COMPLEX ANALYSIS

Derivative, Cauchy-Riemann equations, Analytic functions, Harmonic functions, Flow problems, Complex integration, Cauchy theorem, Cauchy integral formula, Taylor & Laurent series, Singularity, Residue

UNIT IV

LAPLACE TRANSFORMATION

Definition, Transform of elementary functions, Properties of Laplace transform, of derivatives & integrals, Multiplication by tn, Division by t, Evaluation of integrals, Inverse Laplace function,

Convolution theorem, Unit step functions, Unit impulse function, periodic function. Application to solution of ordinary differential equations

UNIT V

VECTOR CALCULUS

Directional derivative, Gradient, Divergence and curl, Line, Surface and Volume integrals, Green's, Gauss's &Stoke's theorem (without proof) and applications

OUTCOMES:

The subject helps the students to develop the fundamentals and basic concepts in vector calculus, PDE, Laplace transform and complex functions. Students will be able to solve problems related to engineering applications by using these techniques.

TEXT BOOKS:

1. Higher Engineering Mathematics by B.S.Grewal (40th edition)-Khanna Publisher.
2. Advanced Engineering Mathematics by Erwin Kreyszig (8th edition)-John Wiley & Sons.

REFERENCE BOOKS:

1. Differential Calculus by Gorakh Prasad-Pothisala Private Limited.
2. Advanced Engineering Mathematics by R.K.Jain and S.R.K. Iyengar-Narosa Publishing House.
3. Applied Mathematics by P.N.Wartikar&J.N.Wartikar Vol-ll –Pune VidyarthiGrihaPrakasan, Pune

Semester : II B. Tech **Branch: All Streams of Engineering**
Subject: Engineering Chemistry **Code: BTDSCBSC201**
Total Theory Periods: 48 **Total Tutorial Periods: 00**
Total Credits: 03

OBJECTIVES:

- To make the students conversant with boiler feed water requirements, related problems and water treatment techniques.
- Principles of electrochemical reactions, redox reactions in corrosion of materials and methods for corrosion prevention and protection of materials.
- Principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells.
- Preparation, properties and applications of engineering materials.
- Types of fuels, calorific value calculations, manufacture of solid, liquid and gaseous fuels

OUTCOMES:

- The knowledge gained on engineering materials, fuels, energy sources and water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.

UNIT-I:

(a) ELECTROCHEMISTRY AND BATTERY TECHNOLOGY ELECTROCHEMISTRY: Introduction, Derivation of Nernst equation for electrode potential. Reference electrodes: Introduction, construction, working and applications of calomel and Ag / AgCl electrodes. Measurement of electrode potential using calomel electrode. Ion selective electrode: Introduction; Construction and working of glass electrode, determination of pH using glass electrode. Concentration cells: Electrolyte concentration cells, numerical problems.

(b) BATTERY TECHNOLOGY:

Introduction, classification - primary, secondary and reserve batteries. Characteristics - cell potential, current, capacity, electricity storage density, energy efficiency; cycle 10 hours life and shelf life. Construction, working and applications of Zinc Air, Nickel- metal hydride batteries. Lithium batteries: Introduction, construction, working and applications of Li-MnO_2 and Li-ion batteries.

(c) **FUEL CELLS:**

Introduction, difference between conventional cell and fuel cell, limitations & advantages. Construction, working & applications of methanol-oxygen fuel cell with H_2SO_4 electrolyte.

UNIT-II:

(a) CORROSION AND METAL FINISHING CORROSION:

Introduction, electrochemical theory of corrosion, galvanic series. Factors affecting the rate of corrosion: ratio of anodic to cathodic areas, nature of metal, nature of corrosion product, nature of

medium – pH, conductivity, and temperature. Types of corrosion- Differential metal, differential aeration (Pitting and water line) and stress. Corrosion control: Inorganic coatings Anodizing of Al and phosphating; Metal coatings-Galvanization and Tinning. Cathodic protection (sacrificial anodic and impressed current methods).

(b) **METAL FINISHING:**

Introduction, Technological importance. Electroplating: Introduction, principles governing- Polarization, decomposition potential and overvoltage. Factors influencing the nature of electro deposit-current density, concentration of metal ion & electrolyte; pH, temperature & throwing power of plating bath; additives- brighteners, levelers, structure modifiers & wetting agents. Electroplating of Nickel (Watt's Bath) and Chromium (decorative and hard). Electro less plating: Introduction, distinction between electroplating and electro less plating, electro less plating of copper & manufacture of double sided Printed Circuit Board with copper.

UNIT-III:

(a) FUELS AND SOLAR ENERGY FUELS:

Introduction, classification, calorific value- gross and net calorific values, determination of calorific value of fuel using bomb calorimeter, numerical problems. Cracking: Introduction fluidized catalytic cracking, synthesis of petrol by Fishcher-Tropsch process, reformation of petrol, octane and cetane numbers. Gasoline and diesel knocking and their mechanism, anti-knocking agents, power alcohol & biodiesel.

(b) SOLAR ENERGY:

Introduction, utilization and conversion, photovoltaic cells- construction and working. Design of PV cells: modules, panels & arrays. Advantages & disadvantages of PV cells. Production of solar grade silicon: Union carbide process, purification of silicon (zone refining), doping of silicon-diffusion technique (N&P types).

UNIT-IV:

POLYMERS:

Introduction, types of polymerization: addition and condensation, mechanism of polymerization- free radical mechanism taking vinyl chloride as an example. Molecular weight of polymers: number average and weight average, numerical problems. Glass transition temperature (Tg): Factors influencing Tg-Flexibility, inter molecular forces, molecular mass, branching & cross linking and stereo regularity. Significance of Tg. Structure property relationship: crystallinity, tensile strength, elasticity & chemical resistivity. Synthesis, properties and applications of PMMA (plexi glass), Polyurethane and polycarbonate. Elastomers: Introduction, synthesis, properties and applications of Silicone rubber. Adhesives: Introduction, synthesis, properties and applications of epoxy resin. Polymer Composites: Introduction, synthesis, properties and applications of Kevlar. Conducting polymers: Introduction, mechanism of conduction in Poly aniline and applications of conducting poly aniline.

UNIT-V:

Introduction, boiler troubles with disadvantages & prevention methods-scale and sludge formation, priming and foaming, boiler corrosion (due to dissolved O2, CO2 and MgCl2). Determination of DO, BOD and COD, numerical problems on COD. Sewage treatment: Primary, secondary (activated sludge method) and tertiary methods. Softening of water by ion exchange process. Desalination of seawater by reverse osmosis & electro dialysis (ion selective).

(b)NANO MATERIALS:

Introduction, properties (size dependent). Synthesis-bottom up approach (sol-gel, precipitation, gas condensation & chemical vapour condensation processes). Nano scale materials- carbon nano tubes, nano wires, fullerenes, dendrimers, nano rods, &nano composites.

TEXTBOOKS:

1. B.S.Jai Prakash, R.Venugopal, Sivakumaraiah&PushpaIyengar., "Chemistry for Engineering Students", Subhash Publications, Bangalore.

2. R.V.Gadag&A.Nityananda Shetty., "Engineering Chemistry", I K International Publishing House Private Ltd. New Delhi.

3. P.C.Jain& Monica Jain., "Engineering Chemistry", Dhanpat Rai Publications, New Delhi.

REFERENCE BOOKS:

1. O.G.Palanna,"Engineering Chemistry", Tata McGraw Hill Education Pvt. Ltd. New Delhi, Fourth Reprint.

2. G.A.Ozin& A.C. Arsenault, "Nano chemistry A Chemical Approach to Nanomaterials", RSC publishing, 2005.

3. "Wiley Engineering Chemistry", Wiley India Pvt. Ltd. New Delhi. Second Edition.

4. V.R.Gowariker, N.V.Viswanathan&J.Sreedhar., "Polymer Science", Wiley-Eastern Ltd.

5. M.G.Fontana., "Corrosion Engineering", Tata McGraw Hill Publishing Pvt. Ltd. New Delhi.

Semester: II B.Tech **Branch: All Streams of Engineering**
Subject: Basic Electrical & Electronics Engineering **Code: BTDSCESC202**
Total Theory Periods: 48 **Total Tutorial Periods: 00**
Total Credits: 03

Unit – I

D.C. Networks:

Elementary idea about power generation, transmission and distribution. Node voltage and mesh current method. Superposition, Thevenin's and Norton's theorems. Star- delta and Delta- star conversions.

Unit – II

Single Phase A.C. Circuits:

Single phase EMF generation, Effective & Average values of sinusoids and determination of form-factor, Analysis of simple series R-L, R-C and RLC circuits, power and power factor

Unit – III

(a) Three Phase AC circuits:

Introduction, Generation of Three-phase EMF, Phase sequence, Connection of Three-phase Windings - Delta and Star connection: Line and Phase quantities, phasor diagrams, Power equations in balanced conditions.

(b) Magnetic Circuits:

Introduction, Magneto motive force (MMF), Magnetic field strength, Reluctance, B-H curve, Comparison of the Electric and Magnetic Circuits, Series-Parallel Magnetic Circuit, Leakage flux and fringing, Magnetic Hysteresis, Eddy currents.

Unit – IV

(a) Single phase Transformers:

Introduction, Principles of operation, Constructional details, Ideal Transformer and Practical Transformer, EMF equation, Rating, Phasor diagram on no load, Losses, Efficiency calculations.

(b) Direct current machines:

Basic concepts and elementary idea of AC and DC machines, construction and working principal of DC Generator, emf and torque equation dc machine and types of dc motor.

Unit – V

(a) Semiconductor Devices and Applications

Introduction - Characteristics of PN Junction Diode – Zener Effect - Zener Diode and its Characteristics - Half wave and Full wave Rectifiers - Voltage Regulation. Bipolar Junction Transistor - CB, CE, CC Configurations and Characteristics - Elementary Treatment of Small Signal Amplifier

(b) Digital Electronics

Binary Number System – Boolean algebra theorems, Digital circuits - Introduction to sequential Circuits.

Flip-Flops - Registers and Counters – A/D and D/A Conversion.

TEXT BOOKS:

1. V.N. Mittle and Arvind Mittal, “Basic Electrical Engineering”, Second Edition, Tata McGraw Hill.
2. 2 Del Torro, Vincent “Electrical Engineering Fundamentals”, Second Edition Prentice Hall of India Pvt. Ltd.

REFERENCE BOOKS:

1. Fitzrald and Higgonbothom, “Basic Electrical Engineering”, Fifth Edition, McGraw Hill.
2. D.P. Kothari and I.J. Nagrath, “Theory and Problems of Basic Electrical Engineering”, PHI.
3. I.J. Nagrath and D.P. Kothari, ”Electrical Machines”, Tata McGraw Hill.
4. Ashfaq Hussain, “Fundamentals of Electrical Engineering”, Third Edition, Dhanpat Rai and Co.
5. H. Cotton, ”Advance Electrical Technology,” ISSAC Pitman, London. 6. Parker Smith S. (Ed.Parker Smith N.N.), “Problems in Electrical Engineering”, Tenth edition, Asia publication.

Semester: II B.Tech. **Branch: All Streams of Engineering**
Subject : Problem Solving with Python Programming **Code: BTSEC209**
Total Theory Periods: 45 **Total Tutorial Periods: 00**
Total Credits: 03

COURSE OBJECTIVE:

1. To learn the object-oriented programming concepts using C++.
2. To design and implement C++ programs with the concept of OOP.
3. To understand implementation issues related to object-oriented techniques.
4. To learn how to build good quality software using object-oriented programming technique.

UNIT-I

INTRODUCTION TO OOP AND C++

Concept of Object Oriented Programming, Procedural programming Vs. Object oriented programming (OOP), Features and Benefits of OOPs, Object Oriented Languages, Introduction to C++, C++ Compiler, C++ Standard library, Basics of a typical C++ environment and C++ program, Pre-processors directives, and illustrative simple C++ programs. Header files and namespaces, library files, Data Types, Keywords, Operators and Expressions, Control Structure, Loops, Arrays, Structures, Functions.

UNIT-II

CLASSES & OBJECT, CONSTRUCTORS&DESTRUCTORS

Introduction to class, class object creation, Access of class members, Scope of class and its member, Nested class, Data hiding & encapsulation, Friend function, Array within a class, Array of object as function argument, Function returning object, Static member. Constructor function, Parameterized multiple constructor, Default constructor, Dynamic memory allocation with new and delete, Copy constructor, Constant and class, Data conversion between objects of different classes, Destructor function.

UNIT- III

INHERITANCE, POINTER, VIRTUAL FUNCTIONS & POLYMORPHISM

Fundamentals of operator overloading, restrictions on operators overloading, operator functions as class members vs. as Friend functions, Overloading, <<, >> Overloading unary operators, overloading binary operators. Introduction to inheritance, Base classes and derived classes, protected members, Casting base class pointers to derived class pointers, Using member functions, Overriding base class members in a derived class, public, protected and private inheritance, Using constructors and destructors in derived classes, Implicit derived class object to base class object conversion, Composition Vs. Inheritance. Introduction to virtual functions, Abstract base classes and concrete classes, new classes and dynamic binding, virtual destructors, polymorphism, dynamic binding.

UNIT-IV

FILE I/O, TEMPLATES& EXCEPTION HANDLING

Files and streams, Creating a sequential access file, Reading data from a sequential access file, Updating sequential access files, Random access files, creating a random access file, Writing data randomly to a random access file, reading data sequentially from a random access file. Stream Input/output classes and objects, Stream output, Stream input, Unformatted I/O (with read and write),

Stream manipulators. Function templates, Overloading template functions, Class template, Class templates and non-type parameters, Templates and inheritance, Templates and friends, Templates and static members. Basics of C++ Exception handling: Try Throw, Catch, Throwing an exception, catching an exception, rethrowing an exception, Exception specifications, processing unexpected exceptions.

UNIT-V

OOPS CONCEPTS WITH PYTHON

Python Basics, Python Objects, Standard Types, Other Built-in Types, Internal Types, Standard Type Operators, Standard Type Built-in Functions, Categorizing the Standard Types, Unsupported Types Numbers - Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions, Related Modules Sequences - Strings, Lists, and Tuples, Mapping and Set Types. Creating classes and objects, inheritance in python.

COURSE OUTCOME:

After completion of the course study, students will be able to

1. Explain the basics of Object Oriented Programming concepts.
2. Design and develop a C++ program with concept of Object Oriented Programming.
3. Apply the object initialization and destroy concept using constructors and destructors.
4. Apply the concept of polymorphism to implement compile time polymorphism in programs by using overloading methods and operators.
5. Use the concept of inheritance to reduce the length of code and evaluate the usefulness.
6. Apply the concept of run time polymorphism by using virtual functions, overriding functions and abstract class in programs.
7. Use I/O operations and file streams in programs.
8. Make an application/project using C++.

TEXT BOOKS:

1. Object Oriented Programming in C++, Robert Lafore, CourseSams Publishing.
2. Object Oriented Programming with C++, E. Balagurusamy, McGraw Hill Education.
3. Python 3 Object-Oriented Programming - Third Edition

REFERENCE BOOKS:

1. The Complete Reference C++, Herbert Schildt, McGraw Hill Education.
2. Let Us C++, YashavantKanetkar, BPB Publication.
3. Programming with C++, John R. Hubbard, Schaum's Outlines, McGraw Hill Education.
4. Programming with C++, D. Ravichandran, McGraw Hill Education.
5. Core Python Programming, Wesley J. Chun, Second Edition, Pearson.

Semester:II B.Tech **Branch: All Streams of Engineering**
Subject: Constitution of India, Professional Ethics and Human Rights **Code: BTMC203**
Total Theory Periods: 15 **Total Tutorial Periods: 00**
Total Credits: 00

UNIT-I: CONSTITUTION OF INDIA

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.

UNIT-II: FUNDAMENTAL DUTIES AND UNION EXECUTIVES

Directive Principles of State Policy & Relevance of Directive Principles State Policy Fundamental Duties. Union Executives – President, Prime Minister Parliament Supreme Court of India

UNIT-III: STATE LEGISLATURE AND ELECTORAL PROCESS

State Executives – Governor Chief Minister, State Legislature High Court of State, Electoral Process in India, Amendment Procedures, 42nd, 44th, 74th, 76th, 86th &91st Amendments.

UNIT-IV: HUMAN RIGHTS

Special Provision for SC & ST Special Provision for Women, Children & Backward Classes Emergency Provisions. Human Rights –Meaning and Definitions, Legislation Specific Themes in Human Rights- Working of National Human Rights Commission in India ,Powers and functions of Municipalities, Panchyats and Co - Operative Societies..

UNIT-V: PROFESIONAL ETHICS

Scope & Aims of Engineering Ethics, Responsibility of Engineers Impediments to Responsibility. Risks, Safety and liability of Engineers, Honesty, Integrity & Reliability in Engineering.

TEXTBOOKS:

1. Durga Das Basu: “Introduction to the Constitution on India”, (Students Edn.) Prentice –Hall EEE, 19th / 20th Edn., 2001

2. Charles E. Haries, Michael S Pritchard and Michael J. Robins “Engineering Ethics” Thompson Asia, 2003-08-05.

REFERENCE BOOKS:

1. M.V.Pylee, “An Introduction to Constitution of India”, Vikas Publishing, 2002.

2. M.Govindarajan, S.Natarajan, V.S.Senthilkumar, “Engineering Ethics”, Prentice –Hall of India Pvt. Ltd. New Delhi, 2004

3. Brij Kishore Sharma,“Introduction to the Constitution of India”, PHI Learning Pvt. Ltd., New Delhi, 2011.

Semester : II B.Tech
Subject: Fundamental of Mechanical Engineering **Code: BTDSCESC204**
Total Theory Periods: 48 **Total Tutorial Periods: 00**
Total Credits: 03

OBJECTIVES:

- To develop capacity to predict the effect of force and motion in the course of carrying out the design functions of engineering.

UNIT – I :

RESULTANT AND EQUILIBRIUM ANALYSIS:

Basic concepts and laws of mechanics, system of forces, free body diagram, Resultant and equilibrium of concurrent, parallel and non-concurrent co-planar force system.
General numerical applications.

UNIT – II :

(a) ANALYSIS OF PLANE TRUSSES Perfect truss, basic assumptions for perfect truss, analysis of axial forces in the members by method of joint and method of sections. General numerical applications.

(b) FRICTION Static, dynamic and limiting friction, Law of limiting friction, Angle of friction, Angle of Repose, Cone of Friction, Wedge friction. General numerical applications

UNIT –III :

PROPERTIES OF SURFACES Centre of Gravity, Second moment of area, determination of second moment of area by integration, polar moment of inertia, radius of gyration of area, Parallel axis theorem, Moment of inertia of composite areas, and determination of Product of inertia by integration.

UNIT –IV :

KINETICS OF PARTICLES

(a) D'Alembert's principle applied to bodies having rectilinear motion.

(b) Principle of work and Energy: General numerical applications

(c) Principle of Impulse and momentum: General numerical applications

UNIT – V :

LAWS OF THERMODYNAMICS

(a) Thermodynamic System, properties, process, cycle, thermodynamic equilibrium, Quasi-static Process, Zeroth Law of thermodynamics, Work and Heat transfer, flow work, general numerical application.

(b)First Law of thermodynamics, internal energy, proof of internal energy as a point function, general numerical application of first law to non-flow process and steady flow process.

OUTCOMES:

(a) Ability to explain the differential principles applies to solve engineering problems dealing with force, displacement, velocity and acceleration.
(b) Ability to analyses the forces in any structures.
(c) Ability to solve rigid body subjected to dynamic forces.

TEXT BOOKS:

1. Engineering Mechanics (Statics and Dynamics) ; A. K. Tayal ,Umesh Pub., Delhi .

2. Engineering Mechanics : S. Timoshenko and D.H. Young,TMH

3. Engineering Thermodynamics: P.K.Nag, TMH

4. Engineering Thermodynamics: C.P.Arora, TMH

REFERENCE BOOKS:

1. Engineering Mechanics (Statics and Dynamics): R.C.Hibbeler, Pearson

2. Engineering Mechanics:Meriam and Kreige ,John Wiley and sons

3. Thermodynamics: Cengel and Boles, TMH

4. Essentials of Engg Mechanics: S.Rajasekharan&G.ShankaraSubramaniyam, Vikas Publications

5. Engineering Mechanics: BasudebBhatytacharya , Oxford

Semester: II B.Tech **Branch : All Streams of Engineering**
Subject : Engineering Chemistry Lab **Code: BTDSCESC205**
Total Theory Periods: 30 **Total Tutorial Periods: 00**
Total Credits: 01

COURSE OBJECTIVE:
1. To make the student acquire practical skills in the wet chemical and instrumental methods for quantitative estimation of hardness, alkalinity, metal ion content, corrosion in metals and cement analysis.

LIST OF EXPERIMENTS
1. Acid-base titration (estimation of commercial caustic soda)

2. Redox titration (estimation of iron using permanganometry)

3. Complexometric titration (estimation of hardness of water using EDTA titration).

4. Preparation and analysis of metal complex (for example thiourea/copper sulfate or nickel chloride/ammonia complexes).

5. Chemical kinetics (determination of relative rates of reaction of iodide with H2O2 at room temperature (Clock reaction).

6. Viscosity of solutions (determination of percentage composition of sugar solution from viscosity).

7. Detection of functional groups in organic compounds.

8. Utilization of paper/thin layer/column chromatographic techniques in the separation of organic compounds

9. Conduct metric titration (determination of the strength of a given HCl solution by titration against a standard NaOH solution).

10. Determine the amount of oxalic Acid and sulphuric Acid/Hydrochloric Acid in one liter of solution given standard Sodium Hydroxide and Potassium Permangate.

11. To determine the Carbonate, Bicarbonate and Chloride contents in irrigation water.

12. Determination of dissolved Oxygen in given sample of water.

13. Determination of calorific value of fuel by Bomb Calorimeter.

14. Determination of Flash Point and Fine Point of Lubricant by Abels and Pensky Martin apparatus.

COURSE OUTCOME:
1. The students will be conversant with hands-on knowledge in the quantitative chemical analysis of water quality related parameters, corrosion measurement and cement analysis.

Semester: II B.Tech **Branch: All Streams of Engineering**
Subject: Basic Electrical & Electronics Engineering Lab **Code: BTDSCESC206**
Total Theory Periods: 30 **Total Tutorial Periods: 00**
Total Credits: 01

List of Experiments (To perform minimum 10 experiments)

1. To verify Thevenin's theorem and Norton's theorem.
2. To verify Superposition theorem.
3. To verify Kirchhoff's Current Law and Kirchhoff's Voltage Law.
4. To verify Maximum Power Transfer theorem
5. To determine V– I characteristics of Incandescent lamp.
6. To study B-H curve.
7. To measure current, power, voltage and power factor of series RLC circuit.
8. To measure current, power, voltage of parallel RLC circuit.
9. To measure current, power, voltage of series parallel RLC circuit.
10. To measure R and L of choke coil.
11. To study construction of transformer.
12. To perform ratio test and polarity test of single phase transformer.
13. To calculate efficiency of single phase transformer by direct loading.
14. To study construction of D.C. machine.
15. To study charging and discharging of a capacitor.
16. To study the Wattmeter and Energy meter.

Semester : II B.Tech **Branch: All Streams of Engineering**
Subject : Advance Programming Laboratory **Code: BT 208**
Total Theory Periods: 30 **Total Tutorial Periods: 00**
Total Credits: 01

1 Write a program to check whether a given number is Prime or not.

2 Write a program to read number and to display the largest value between two, three or four numbers by using switch-Case statements.

3 Write a program to find sum of first natural numbers : sum= 1+2+3+4+……. 100 by using
a. for loop b. while loop c. do-while loop

4 Write a program to find sum of the following series using function:
Sum= $x-(x)^3/3!+(x)^5/5!$ ..... $(x)^n/n!$

5 Write a program to read the elements of two matrices & to perform the matrix multiplication.

6 Write a program to swap the contents of two variable by using
a. call by value b. Call by reference

7 Write a program to perform the following arithmetic operations on complex numbers using structure
a. Addition of the two complex numbers b. Subtraction of two complex numbers
c. Multiplication of two complex numbers d. Division of two complex numbers

8 Write a C++ program to declare a class. Declare pointer to class. Initialize and display the contents of the class member.

9 Write an object-oriented program (OOP) using C++ to exchange the private data members of two different functions using friend functions.

10 Write an OOP using C++ to count how many times a particular member function of a class is called by:
a. A particular object b. Any objects

11 Write an OOP using C++ to define a constructor for a “Date” class that initializes the Date objects with initial values. In case initial values are not provided, it should initialize the objects with default values.

12 Write an OOP using C++ to overload:
a. + Operator b. = operator c. >> operator d. ++ operator

13 Write a C++ program to demonstrate how ambiguity is avoided using scope resolution operator in the following:
a. Single Inheritance b. Multiple Inheritance

14 Write a C++ Program to demonstrate function overloading for swapping of two variables of the various data types (integer, floating-point number and character type).

15 Write a C++ program to declare a class. Declare pointer to class. Initialize and display the contents of the class member.

16 Write a C++ program to access the private data of a class by non-member function through friend function where the friend function is declared:

a. in the location of public category
b. in the location of private category
c. within the scope of a class definition itself
d. defined with inline code subtraction

17 Write a C++ program to demonstrate how a pure virtual function is defined, declared and invoked from the object of derived class through the pointer of the base class.

18 Write a C++ program to open a file and count the number of characters, number of vowels and number of newline characters present in the file.

19 Write a program to copy the contents of one text file to another and display both the files using a text Menu.

20 Create a database of 10 students. The database should contain the name, marks of 5 subjects, aggregate marks, aggregate percentage and division according to the following conditions:

a. Percentage greater or equal to 60 – First division
b. Percentage between 50 and less than 60 – Second division
c. Percentage between 40 and less than 50 – Third division
d. Percentage below 40 – Improvement required

Display the above database of every student in a tabulated form. Implement the above program using Structures, Text-Menu and File I/O operations.

21 Write an OOP using a class template to read any five parameterized data type such as float and integer, and print the average.

22 Write a program for sorting of numbers with Bubble Sort using template function.

23 Write a C++ program to declare a class. Declare pointer to class. Initialize and display the contents of the class member.

24 Write a C++ program to read two numbers and find the division of these two numbers using exception handling.

25 Write a C++ program to create a function which take a parameter, if the value of parameter is > 0 then throw integer type, if parameter is = 0, then throw character type, if parameter is < 0 then throws float type exception but for all design use only one catch block.

26 Write a python program for finding biggest number among 3 numbers.

27 Implement Python Script to generate prime numbers series up to n

28 Implement python script to read person's age from keyboard and display whether he is eligible for voting or not.

29 Write a python program to work with classes and objects.

30 Write a python program that makes use of function to display all such numbers, which are divisible by 7 but are not a multiple of 5, between 1000 and 2000.

LIST OF EQUIPMENT/ MACHINE REQUIRED

PCs, Turbo C++ compiler, Online C++ Compiler, Python 3/Python IDE, Online python compiler

REFERENCES:

1. Programming with C++, D. Ravichandran, McGraw Hill Education.
2. Object Oriented Programming with C++, E. Balagurusamy, McGraw Hill Education.
3. Mastering C++, K. R. Venugopal, Mcgraw Hill Education.
4. The Complete Reference C++, Herbert Schildt, McGraw Hill Education.
5. Object Oriented Programming in C++, Robert Lafore, CourseSams Publishing.
6. Let Us C++, YashavantKanetkar, BPB Publication.
7. Head-First Python: A Brain-Friendly Guide (2nd Edition), Paul Barry, Oreilly.
8. Python Programming: An Introduction to Computer Science (3rd Edition), John Zelle,

Semester : II B. Tech
Lab: Fundamental of Mechanical Engineering Lab **Code: BTDSCESC207**
Total Practical Periods: 30 **Total Credits: 01**

Note: MINIMUM TEN NUMBERS OF EXPERIMENTS IS TO BE PERFORMED

LIST OF EXPERIMENTS

1. To verify law of triangle of forces.
2. To verify the Lami's theorem.
3. To verify the law of polygon of forces.
4. To verify the law of lever. 5. To determine the support reactions of a simply supported beam subjected to point loads.
6. To draw the variation of bending moment at a given section in a simply supported beam under a moving point load.
7. To find the coefficient of friction between surfaces of wooden plane and following blocks: i) Aluminum ii) Tin iii) Glass iv) Asbestos v) Teak ply vi) Sand paper vii) card board .
8. To determine the coefficient of friction between (i) Belt and pulley (ii) Rope and pulley.
9. To study simple jib crane and to determine the internal forces in members of jib crane.
10. To determine the stiffness of helical compression spring.
11. To study lifting machine.
12. To study the lifting machine "second order pulley system" and to draw the following characteristic diagram: (i) Load-effort diagram (ii) Load- ideal effort diagram (iii) Load-efficiency diagram Also to determine the law of machine and the maximum efficiency of machine.
13 To study the lifting machine "Wheel and Differential axle" and to draw the following characteristic diagram: (i). Load-effort diagram (ii) Load- ideal effort diagram (iii). Load-efficiency diagram. Also to determine the law of machine and the maximum efficiency of machine.
14. To study the lifting machine "Worm and worm wheel" and to draw the following characteristic diagram: (i). Load-effort diagram (ii). Load- ideal effort diagram (iii). Load-efficiency diagram. Also to determine the law of machine and the maximum efficiency of machine.
15. To study the lifting machine "Simple screw jack" and to draw the following characteristic diagrams of the machine: (i) Load-effort diagram (ii). Load- ideal effort diagram (iii) Load-efficiency diagram Also to determine the law of machine and the maximum efficiency of machine.
16. To study the lifting machine "Modified screw jack" and to draw the following characteristic diagrams of the machine: (i) Load-effort diagram (ii) Load- ideal effort diagram (iii) Load-efficiency diagram Also to determine the law of machine and the maximum efficiency of machine.

17. To study the lifting machine “Geared Jib crane” and to draw the following characteristic diagrams of the machine: (i) Load-effort diagram (ii) Load- ideal effort diagram (iii) Load-efficiency diagram Also to determine the law of machine and the maximum efficiency of machine.

18. To study the lifting machine “Single Purchase Winch crab” and to draw the following characteristic diagrams of the machine: (i) Load-effort diagram (ii) Load- ideal effort diagram

(iii) Load-efficiency diagram Also to determine the law of machine and the maximum efficiency of machine.

19. To study the lifting machine “Double Purchase Winch crab” and to draw the following characteristic diagrams of the machine: (i) Load-effort diagram (ii) Load- ideal effort diagram (iii) Load-efficiency diagram Also to determine the law of machine and the maximum efficiency of machine.

Semester: II B . Tech **Branch: All Streams of Engineering**

Manufacturing Practices– II Lab **Code: BTDSCESC208**

Total Practical Periods: 45(15 Instructional Periods) **Total Credits: 01**

Note: MINIMUM TEN NUMBERS OF EXPERIMENTS IS TO BE PERFORMED

Course Objective:

1. To make the student acquire practical skills in the machining, fitting and forging operations.

Instructional Syllabus

Machining:

Introduction to machining and common machining operations. Cutting tool materials. Definition of machine tools, specification and block diagram of lathe, shaper, drilling machine and grinder. Common lathe operations such as turning parting, chamfering and facing. Quick return mechanism of shaper. Difference between drilling and boring. Files-material and classification.

Fitting:

Need of fitting, different types of instruments used in fitting shop.

Forging:

Forging principle, materials, operations like drawing, upsetting, bending and forge welding, use of forged parts.

List of Experiments

1. Job on lathe with one step turning and chamfering operations

2. Job on shaper for finishing two sides of a job

3. (a) Drilling two holes of size 5 and 12 mm diameter on job used/to be used for shaping.

(b) Grinding a corner of above job on bench grinder

4. Finishing of two sides of a square piece of filling

5. Tin smithy for making mechanical joint and soldering of joints

6. Perform step cutting on mild steel plate.

Course Outcome:

1. The students will be conversant with hands-on knowledge in the machining, fitting and forging operations.

Scheme of Teaching & Examination

Semester-III

S. No.	Course SubCategory	CourseName	Code	TeachingScheme				EvaluationScheme		Total Marks
				Hours			Credits			
				Theory	Tutorial	Practical		CIA	ESE	
1	DSCC-BSC	Numerical Methods and Statistics	BTDSCBSC300	3	-	-	3	30	70	100
2	DSCC-PCC	Surveying & Geomatics	BTDSCCE341	3	1	-	4	30	70	100
3	DSCC-PCC	Fluid Mechanics & Hydraulic Engineering	BTDSCCE342	3	1	-	4	30	70	100
4	DSCC-PCC	Building Materials&Engineering Geology	BTDSCCE343	3	1	-	4	30	70	100
5	DSCC-PCC	Fluid Mechanics Laboratory	BTDSCCE344	-	-	2	1	20	30	50
6	AEC	Building Material Laboratory (AEC)	BTAEC345	-	-	2	1	20	30	50
7	SEC	Surveying Laboratory (SEC)	BTSEC346	-	-	4	2	20	30	50
8	RP	Project / Seminar	BTSEM347	-	-	2	1	20	30	50
9	GEC	Multi-Disciplinary Elective Course-III	GEA	3	-	-	3	30	70	100
	TOTAL			**15**	**3**	**10**	**23**	**230**	**470**	700

L – Lecture, T – Tutorial, ESE – End Semester Examination, P – Practical, IM – Internal Marks (Include Class Test & Teacher's Assessments)

Note : Theory Internal Marks (CIA) = 30 (CT-I = 05, CT-II=05, Assignment=05, Mid Term=15) Practical Internal Marks (CIA) = 20 (Attendance = 05, Lab Viva-Voce = 05, Lab Record Work = 10)

Discipline Specific Core Courses(DSCC) Major		Generic Elective(C)	AEC(Ability Enhancement Course)(D)	SEC/Internship (Skill Enhancement Course) (E)	RP/SEMINAR	Value Added Course (VAC)/Indian Knowledge System(IKS)/IKS (Core) (F)
Basic Sciences (A)	Engineering Sciences (B)					
Numerical Methods and Statistics	Surveying & Geomatics	GEA	Building Material Laboratory (AEC)	Surveying Laboratory (SEC)	Project / Seminar	
	Fluid Mechanics & Hydraulic Engineering					
	Building Material & Construction					
	Fluid Mechanics Laboratory					

Credit Definition:

- 1-hour lecture (L) per week per semester = 1Credit
- 1-hour tutorial (T) per week per semester = 1Credit
- 2-hour Practical/Drawing(P) per week per semester = 1 Credit
- Four credit courses are to be designed for 60 hours of Teaching-Learning process.
- Three credit courses are to be designed for 48 hours of Teaching-Learning process.
- Two credit courses are to be designed for 28 hours of Teaching-Learning process.
- One credit courses are to be designed for 15 hours of Teaching Learning process

Semester	**:**	**III**
Branch	**:**	**B.Tech Civil Engineering**
Subject	**:**	**Numerical Methods and Statics**
Total Theory Periods	**:**	**48**
Total Tutorial Periods	**:**	**0**
Total Credits	**:**	**03**
Code	**:**	**BTDSCBSC300**

COURSE OBJECTIVE:

•To provide required skills to apply different statistical tools to analyze Engineering problems.

•To provide the necessary basic concepts of few numerical methods.

•To provide procedures for solving numerically different kinds of problems occurring in the field of Engineering and Technology.

UNIT-I Statistics

Random variables, Discrete and continuous probability distributions, expectation, mean and standard deviation, moments and moment generating function, distributions binomial, poissoin and normal distributions.

UNIT-II Numerical Solution of Algebraic, Transcendental & Simultaneous Linear Equation

Errors in numerical computation, error type, bisection method, Regula–Falsi Method, secant Method, Newton Raphson Method, direct Methods: Gauss Elimination, Gauss-Jordan & Crout's Triangularisation method, Iterative methods: Jacobi, Gauss-Seidel & relaxation methods.

UNIT-III Interpolation & Curve Fitting

Finite differences, forward, backward & central difference interpolation, Lagrange's method and Newton's divided difference method, Principle of least squares, Fitting a straight line, Fitting a parabola, exponential function, method of group averages.

UNIT-IV Numerical Differentiation & Integration

Derivatives using forward, backward and central difference methods, Derivatives using unequally spaced values, Newton-Cote's quadrature method, Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Weddle's rule.

UNIT-V Numerical Solution of ODE & PDE

Numerical solution of ODE's by Taylor's series method, Picard's method, Euler's method, Euler's modified method, Runge–Kutta method, Predictor, corrector method, Milne's method, Adams Bash forth method.

Numerical Solution of PDE's: Classifications of second order PDE, Elliptic equations, solution of Laplace equations, solution of poisons equation, Solution of elliptic equation by relaxation method, Parabolic

equations, Solution of one dimensional and 2-D heat equations, Hyperbolic equation, Wave equations.

COURSE OUTCOME:

On completion of course students will be able to:

- Solve statistics problems that arise during the study of Engineering.
- Use various interpolation techniques for solving problems in Engineering.
- Use numerical methods to solve problems involving numerical differentiation and integration.
- Solve initial value problems numerically that arise in Science and Engineering.
- Solve boundary value problems that encounter in different fields of engineering study.

TEXT BOOK:

1. B.S. Grewal, “Higher Engineering Mathematics”, Khanna Publications (2007).

REFERENCES:

1. Glyn James “Advanced Modern Engineering Mathematics, Pearson Education (2007).
2. B. V. Ramana, “Higher Engineering Mathematics” Tata McGraw Hill 2007.
3. N. P. Bali, and Manish Goyal, “A Text Book of Engineering 7th Edition (2007) Lakshmi Publications (P) Limited, New Delhi.

Semester	**:**	**III**
Branch	**:**	**B.Tech Civil Engineering**
Subject	**:**	**Surveying & Geomatics**
Total Theory Periods	**:**	**48**
Total Tutorial Periods	**:**	**0**
Total Credits	**:**	**03**
Code	**:**	**BTDSCCE341**

COURSE OBJECTIVE:

- To provide basic knowledge about principles of surveying for location, design and construction of engineering projects
- To develop skills using surveying instruments including measuring tapes, automatic levels, theodolites, and electronic distance measurement equipment.
- The ability to identify error sources and the procedures to minimize errors.
- To use standard survey tools and apply measurement error, accuracy, precision and techniques to improve accuracy of surveys.

UNIT – I Chain & Compass Surveying

Chain: Definition, Principles, Classification, field and office work, conventional signs, Ranging and chaining, reciprocal ranging, Setting perpendiculars, well- conditioned triangles.

Compass: Prismatic compass, Surveyor's compass, Bearing systems and conversions, Local attraction, Magnetic declination, dip, Traversing, Plotting, Adjustment of error.

UNIT – II Leveling

Level line, Horizontal line, Levels and Staves, Spirit level, sensitiveness, Bench marks, Temporary and Permanent adjustments, Fly and check leveling, Booking, Reduction, Curvature and Refraction, Reciprocal leveling, Longitudinal and Cross sections, Plotting.

UNIT – III Trilateration & Triangulation

Principle of Trilateration, EDM instrument and their uses, Reduction of observation, Principle and classification of Triangulation System, Triangulation chains, Strength of Figures, Station marks and Signals, Satellite station, intersected and resected points, field work, Reconnaissance, Intervisibility of station, Angular measurement, Base line measurement and its extension, Adjustment of Field observation and computation of co-ordinates.

UNIT – IV Adjustment & Computation

Weighting of observation, Treatment of random errors, probability equation, Normal law of error, Most Probable value measures of precision, Propagation of errors and variances, Most probable value,

Principle of least square, observations and co-relative normal equations, adjustment triangulation figures and level net.

UNIT – V Plane Table Surveying & Minor Instrument

Plane Table Surveying: Plane table instruments and accessories – merits and demerits – methods – Radiation, Intersection – Resection – Traversing.

Minor Instrument: Hand level, Abney level, Clinometers, Ceylon ghat tracer, Pentagraph, Planimeter, Ideograph.

COURSE OUTCOME:

Students will be able to:

- Determine elevations by applying different techniques.
- Deal with the minor instruments and will be familiar with their functioning.
- Do transverse computations, detect and rectify errors.
- Set out various curves with the field problems.

TEXT BOOK:

1. Surveying Vol-I by B.C. Punmia& Ashok Jain.
2. Surveying Vol-II by B.C. Punmia & Ashok Jain.
3. Surveying Vol- I by S.K. Duggal.
4. Surveying Vol-II by S.K. Duggal.

REFERENCE:

1. James Williamson, Surveying & Field Work, A Practical Text Book on Surveying, Levelling & Setting Out, Paperback – Import, 1 May 2012.
2. M. Chandra, Advanced Surveying, New Age International Publishers, New Delhi, 2000.

Semester	**:**	**III**
Branch	**:**	**B.Tech Civil Engineering**
Subject	**:**	**Fluid Mechanics and Hydraulic Engineering**
Total Theory Periods	**:**	**60**
Total Tutorial Periods	**:**	**1**
Total Credits	**:**	**04**
Code	**:**	**BTDSCCE342**

COURSE OBJECTIVE:

- Students will be familiar with different fluids properties.
- Students will be familiar with different fluids flow condition.
- Students will learn different flow & losses in pipes.
- Students will be familiar with flow in open channel & different sections.

UNIT-I Introduction of Fluid Statics

Fluid and its properties, Pressure density, height relationship, Pressure measurement by manometers, Center of pressure, Buoyancy, Meta-centric height, Fluid mass subjected to uniform accelerations.

Kinematics of Fluid Flow: Classification of fluid flow: steady and unsteady flow, uniform and non- uniform flow, laminar and turbulent flow, rotational and irrotational flow, compressible and incompressible flow, ideal and real fluid flow, one, two and three dimensional flows, vortex flows, Stream line, path line, streak line and stream tube, One, two and three-dimensional continuity equations in Cartesian coordinates.

UNIT-II Turbulent Flow in Pipe

Turbulent flow in pipes, Energy and momentum correction factor, Resistance coefficient (Friction factor) and its variation, Explicit equation for friction factors, Concept of equivalent length, pipes in series and parallel, Analysis of pipe network (Hardy-Cross method).

Boundary Layer Analysis: Boundary layer thickness, Boundary layer over a flat plate, Types of boundary layer, Application of momentum equation, Fluid flow past submerged bodies, Drag and lift, Drag on sphere, Cylinder and disc, Magnus effect.

UNIT-III Dynamics of Fluid

Euler's equation of motion, Bernoulli's equation and its application, Momentum equation and its application to stationary and moving plates/vanes, Combined application of energy and momentum equations.

Flow in Pipes: Reynolds's experiment, experimental determination of critical velocity, transition from laminar to turbulent flow. Different types of losses in pipe.

UNIT-IV Compressibility Effect in Pipe Flow

Water hammer, Analysis of simple surge tank excluding friction, Buckingham's theorem, Kinematics and dynamic similarity.

Flow in Open Channel: Comparison between open channel and pipe flow, definition of uniform and non-uniform flow, uniform flow formula, Chezy's and Manning's formula, Hydraulically efficient channel section of rectangular, trapezoidal and circular type. Specific energy, critical flow, analysis of flow over hump and transition, broad crested weir, equation of gradually varied flow, hydraulic jump and evaluation of its elements in rectangular channel.

UNIT-V Flow through Mouthpiece & Orifice

Hydraulic coefficients of orifice, bell method orifice, mouthpieces, Borda's mouthpiece, running free and submerged.

Notches and Weirs: Rectangular, triangular and trapezoidal notches and weir, cippoletti and crested weir, aeration of nape, cavitations submerged weir.

Hydraulic Machines: Turbines and Pumps& their types.

COURSE OUTCOME:

- Students are able to understand different types of fluids and their mechanical behaviour.
- Students are able to compare fluids flow condition.
- Students are able to understand & evaluate flow in pipes & losses.
- Students are able to compare flow of different fluids.

TEXT BOOK:

1. A text book of fluid mechanics by R. K. Bansal (Laxmi publication).
2. A text book of fluid mechanics and Hydraulic mechanics in SI Units by R. K. Rajput (S. Chand and company).

REFERENCES:

1. Fluid Mechanics by Frank M. White (TMH).
2. Theory and Applications of Fluid Mechanics by K. Subramanya, Tata McGraw, Hill Publishing Company Ltd., New Delhi, 1993.
3. Fluid Mechanics and its applications by Vijay Gupta and Santosh K. Gupta, Wiley Eastern Ltd., New Delhi, 1984.
4. Engineering Fluid Mechanics by K.L. Kumar, Eurasia Publishing House Pvt. Ltd., New Delhi, 2009.
5. Applied Hydrodynamics by Vallentine, H.R. Butterworths & Co Ltd., London 1959.

Semester	**:**	**III**
Branch	**:**	**B.Tech Civil Engineering**
Subject	**:**	**Building Material & Engineering Geology**
Total Theory Periods	**:**	**48**
Total Tutorial Periods	**:**	**0**
Total Credits	**:**	**03**
Code	**:**	**BTDSCCE343**

COURSE OBJECTIVE:

- To provide an understanding of materials of construction.
- To provide an understanding of Special types of materials.
- To provide an understanding about timber, plywood, paints and glass materials.

UNIT-I Building Material

Bricks: Classification, Dimension, Characteristics, moulding, Various Test on bricks, Fly ash bricks.

Mortar: Definition, properties and uses.

Stone: Geological, physical and chemical classification of stone, important stones, uses of stone.

Steel: Cast, iron, Wrought iron, Steel, mild steel and Tor, steel.

Other Metals: Aluminum, Various Alloys.

UNIT-II Cement, Aggregate, Timber & Plywood Lime: Lime, Types of Lime.

Cement: Raw materials, manufacturing process, Setting times, Vicat apparatus, Grades of cement, Pozzolana cement & its classification, usages, Fly ash. Types of Cement, Hydration of cement, tests on properties of cement, ferro cement.

Aggregate: Classification of Aggregates and their properties, grading curve and fineness modules.

Timber and Plywood: Characteristics of good timber, seasoning and preservation, Types and uses of plywood, veneers and hard boards, low cost materials for construction.

UNIT-III Foundation

Brief study of different Types of foundations, nature of soil (expansive or non-expansive, alluvial or residual, sandy or clayey for settlement etc.), Approximate values of bearing capacities, breadth and depth of foundation, typical cross sections for foundations under walls and R.C.C. Columns. Foundations in black cotton soils, under-reamed pile foundations, foundation failures and remedial measures.

UNIT-IV Rocks and Minerals

Introduction to Minerals, Physical and Chemical Properties of Minerals, Classification of Minerals, Rock-forming and Ore Minerals, Introduction to Rocks, Classification of Rocks, Igneous Rocks – Formation, Types, and Textures, Sedimentary Rocks – Formation and Structures, Metamorphic Rocks – Types and Textures,

The Rock Cycle, Engineering Properties of Rocks, Weathering of Rocks, Rock Mass Classification Systems, Rocks as Construction Materials, and Applications of Rocks and Minerals in Engineering Projects.

UNIT-V Earthquake, Landslide, and Engineering Structures

Basics of Seismology, Types and Causes of Earthquakes, Seismic Zones and Ground Shaking, Earthquake Effects on Structures, Earthquake-Resistant Design Principles, Causes and Types of Landslides, Slope Stability, Landslide Mitigation Measures, and Engineering Considerations for Hazard-Prone Areas.

COURSE OUTCOME:

- Students are able to understand materials of construction.
- Students are able to read about timber, plywood, paints and glass materials
- Students are able to understand various parts of building.
- Students are able to understand various types of foundation and importance of foundation.
- Students are able to understand importance of damp proofing and fire in construction.

TEXT BOOK:

1. Building Materials – S.K. Duggal (New Age Publication).
2. Building Materials – S. C. Rangwala (Charotar Publication).
3. Building Construction: B.C. Punmia (Laxmi Publication Pvt. Ltd.).
4. Building Construction: Sushil Kumar (Standard Publication Distributors).

REFERENCE:

1. Engineering Materials – Surendra Singh (Laxmi Publication).
2. Construction Engineering and Management – S. Seetharaman (Umesh Publication).
3. Building Materials – Gurucharan Singh (Standard Publishers, Delhi).
4. Building Construction: Gurucharan Singh (Standard Publication Distributors).

Semester	**:**	**III**
Branch	**:**	**B.Tech Civil Engineering**
Subject	**:**	**Fluid Mechanics Laboratory**
Total Laboratory Periods	**:**	**28**
Total Tutorial Periods	**:**	**02**
Total Credits	**:**	**01**
Code	**:**	**BTDSCCE344**

COURSE OBJECTIVE:

The course should enable the students to:

- Enrich the concept of fluid mechanics and hydraulic machines.
- Demonstrate the classical experiments in fluid mechanics and hydraulic machinery.
- Correlate various flow measuring devices such as venturimeter, orifice meter and notches etc.
- Discuss the performance characteristics of turbines and pumps

List of Experiment (Minimum 10 numbers of experiments to be perform)

1. To determine the meta-centric height of a ship model.
2. To calibrate an orifice meter.
3. To determine the head loss in various pipe fittings.
4. To study the variation of friction factor for pipe flow.
5. To verify the Bernoulli's theorem.
6. To verify impulse momentum principle.
7. To calibrate a venturimeter and study the variation of coefficient of discharge.
8. Experimental determination of critical velocity of pipe.
9. To study the transition from laminar to turbulent flow and to determine the lower critical Reynolds's number.
10. To determine the hydraulic coefficients (Cc, Cd and Cv) of an orifice.
11. To determine the roughness coefficient of an open channel.
12. To determine the coefficient of discharge of a weir.
13. To determine the coefficient of discharge of a venturiflume.
14. To Study of hydraulic jump in an open channel.
15. To determine the coefficient of discharge of a spillway.
16. To determine the performance characteristics of Variable Speed Centrifugal Pump.
17. To determine Impact of moment for impact of free jet.

COURSE OUTCOME:

At the end of the course, the student will have the ability to:

- Calibration of venturimeter & Orifice meter.
- Coefficient of discharge for a small orifice / Mouth piece by constant head method.

- Calibration of contracted rectangular notch / triangular Notch.
- Determination of friction factor of pipe.
- Co-efficient for minor losses in different types of pipes.

Semester	**:**	**III**
Branch	**:**	**B.Tech Civil Engineering**
Subject	**:**	**Building Material Laboratory**
Total Laboratory Periods	**:**	**28**
Total Tutorial Periods	**:**	**0**
Total Credits	**:**	**01**
Code	**:**	**BTAEC345**

COURSE OBJECTIVE:

- Investigate the properties and behavior of materials.
- Develop skills for analyzing experimental data and working in teams.
- Design and conduct a custom laboratory experiment, analyze and interpret the data, and make a presentation on the results of the testing

List of Experiment (Minimum 10 numbers of experiments to be perform)

1. Determination of normal consistency of cement.
2. Determination of Initial & final setting time of cement.
3. Determination of fineness of cement by sieving method.
4. Determination of fineness of cement by Blain Apparatus.
5. Determination of Soundness of cement.
6. Determination of compressive strength of cement cube.
7. Determination of tensile strength of cement cube.
8. Determination of Water absorption of aggregate.
9. To perform Sieve Analysis of Aggregate
10. To determine Compressive strength of wood: (a.) Along the fiber and (b.) Across the fiber.

COURSE OUTCOME:

- Understand terminology and units related to engineering properties and testing of construction materials (aggregates, cement, concrete, steel, masonry, wood, and soil).
- Understand terminology and selected standard test methods for construction materials.
- Understand how to interpret select testing reports for construction materials.

Semester	**:**	**III**
Branch	**:**	**B.Tech Civil Engineering**
Subject	**:**	**Surveying Laboratory**
Total Laboratory Periods	**:**	**28**
Total Tutorial Periods	**:**	**0**
Total Credits	**:**	**03**
Code	**:**	**BTSEC346**

COURSE OBJECTIVE:

- To impart practical knowledge in the field, measuring distance, direction, angels.
- To determine RL'S Area and volume.
- To stake out points by using different methods.

List of Experiment (Minimum 10 numbers of experiments to be perform)

2. Determination of location of a point with the help of two point problem.
3. Determination of location of a point with the help of three point problem.
4. Determination of area of polygon by chain and cross staff survey.
5. To plot a transverse of area by prismatic compass (open).
6. To plot a transverse of area by prismatic compass (close).
7. Measurement of horizontal angles theodolite by method of repetition.
8. To workout relative elevation of various points on area by performing profile leveling.
9. To determine the elevation of a point with respect to reference by fly leveling.
10. Determination of elevation of point by trigonometric levelling.
11. Study of minor instruments.

COURSE OUTCOME:

At the end of the course students will be able to:

- Apply principle of surveying for civil engineering application.
- To determine location of a point.
- To determine elevation of points.

Scheme of Teaching & Examination

Semester-IV

S. No.	Course Sub Category	Course Name	Code	Teaching Scheme				Evaluation Scheme		Total Marks
				Hours			Credits			
				Theory	Tutorial	Practical		CIA	ESE	
1	DSCC-PCC	Structural Analysis-I	BTDSCCE440	3	-	-	3	30	70	100
2	DSCC-PCC	Geotechnical Engineering	BTDSCCE441	3	1	-	4	30	70	100
3	DSCC-PCC	Civil Engineering Drawing	BTDSCCE442	3	-	-	3	30	70	100
4	DSCC-PCC	Geotechnical Engineering-I Laboratory	BTDSCCE443	-	-	2	1	20	30	50
5	AEC	Concrete Technology Laboratory (AEC)	BTAEC444	-	-	2	1	20	30	50
6	SEC	Computer Aided Engineering Laboratory (SEC)	BTSEC445	-	-	2	1	20	30	50
7	RP	Project/ Seminar	BTSEM446	-	-	1	1	30	70	100
8	INT	Internship- I	BTINT447	-	-	1	3	20	30	50
9	DSCC-PEC	Professional Elective Course-I	BTDSCPE4XX	3	-	-	3	30	70	100
10	GEC	Multi-Disciplinary Elective Course-III	GEA	3	-	-	3	30	70	100
	TOTAL			**15**	**15**	**8**	**23**	**260**	**540**	**800**

L – Lecture, T – Tutorial, ESE – End Semester Examination, P – Practical, IM – Internal Marks (Include Class Test & Teacher's Assessments)
Note : Theory Internal Marks (CIA) = 30 (CT-I = 05, CT-II=05, Assignment=05, Mid Term=15) Practical Internal Marks (CIA) = 20 (Attendance = 05, Lab Viva-Voce = 05, Lab Record Work = 10)

Discipline Specific Core Courses(DSCC) Major		Generic Elective(C)	AEC(Ability Enhancement Course)(D)	SEC/Internship (Skill Enhancement Course) (E)	RP/SEMINAR	INTERNSHIP
Engineering Sciences (A)	Professional Elective(B)					
Structural Analysis-I	Professional Elective Course-I	GEA	Concrete Technology Laboratory (AEC)	Computer Aided Engineering Laboratory (SEC)	Project/ Seminar	Internship- I
Geotechnical Engineering						
Civil Engineering Drawing						
Geotechnical Engineering-I Laboratory						

Credit Definition:

- 1-hour lecture (L) per week per semester = 1Credit
- 1-hour tutorial (T) per week per semester = 1Credit
- 2-hour Practical/Drawing(P) per week per semester = 1 Credit
- Four credit courses are to be designed for 60 hours of Teaching-Learning process.
- Three credit courses are to be designed for 48 hours of Teaching-Learning process.
- Two credit courses are to be designed for 28 hours of Teaching-Learning process.
- One credit courses are to be designed for 15 hours of Teaching Learning process

Semester : IV
Branch : B.Tech Civil Engineering
Subject : Structural Analysis - I
Total Theory Periods : 48
Total Tutorial Periods : 0
Total Credits : 03
Code : BTDSCCE440

COURSE OBJECTIVE:

- To make student to understand between determinate and indeterminate structures.
- To understand the methods to analyze slopes and deflections of structures.
- To understand the method of Strain Energy to analyze deflections of structures.
- To provide an understanding about loads position variation on structures and corresponding analysis by rolling loads and ILDs.
- To understand behavior of suspension bridges, cables and Arches.

UNIT-I Stress-Strain Relation

Stresses and Strains, Properties and testing of Steel, Stress–Strain Curve, Relation between the elastic constants, Elongation of bars, Statically indeterminate problems in tension and compression.

Analysis of Stresses and Strains Principal stresses, Transformation equations, Stress invariants, Plane stresses, Differential equations of equilibrium, Deformable bodies, Transformation equations, Principal strains, Mohr's circle, Compatibility conditions, Displacement equation of equilibrium.

UNIT-II Bending of Beams & Frames

Theory of simple bending, limitations, Beams of uniform strength, Beams of two materials, Shear stresses in symmetrical elastic beams. Shear force and bending moment diagrams.

Determinate Structures: Determinate vs. Indeterminate structures. Pin Jointed determinate space trusses, Distinction between determinate and indeterminate space trusses and simple.

Deflection and Slope: Moment curvature relation, the elastic curve, Macaulay's method, Area moment method, Basics of Conjugate beam method.

UNIT-III Columns & Combined Stresses

Stable and unstable equilibrium, Short columns, Euler's formula for long columns, Rankine's formula, Beams subjected to bending and shear, eccentrically loaded short column, Middle third rule.

UNIT-IV Torsion

Torsion of circular, solid and hollow circular shafts, power transmission, closed coiled and open coiled helical springs.

Strain Energy: Strain energy due to axial load, bending, shear and torsion, Castigliano's theorem for deflection, Betti's theorem, Maxwell's law of reciprocal deflections, Unit load and strain energy method for determination of deflections of statically determinate beams, pin-joined trusses and rigid frames.

UNIT-V Rolling Loads & Influence Line

Introduction to Rolling loads, concept of influence lines , influence lines for reaction, Shear force and Bending moment in simply supported beams , influence lines for forces in trusses, analysis for different types of rolling loads , single concentrated load , several concentrated loads , uniformly distributed load shorter and longer than the span, Absolute maximum bending moment.

COURSE OUTCOME:

- Students are able to understand various methods to analyze structures for slopes and deflections.
- Students are able to understand various types of determinate and indeterminate structures.
- Students are able to understand rolling effects of loads and Influence diagrams.
- Students are able to understand concept of bridges of suspension and arch types.

TEXT BOOK:

1. Strength of Materials – R.K. Rajput (S. Chand & Co.).
2. Basic Structural Analysis (Vol. I & II): S.S. Bhavikatti (Vikas Publishing).
3. Theory of Structures: B.C. Punmia (Laxmi Publication).
4. Strength of Materials – S. Ramamurtham (Dhanpat Rai Publications).

REFERENCE:

1. Mechanics of Structures (Vol. – I) – Junarkar (Charotar Publications).
2. Strength of Materials – Timoshenko, S. & Gere (CBS Publishers).
3. Introductions to Solid Mechanics –Shames & Pitarresi (Prentice Hall of India).
4. Engineering Mechanics of Solid – Popov (Pearson Publication).
5. Strength of Materials (Part-I) – Timoshenko (CBS Pubishers).
6. Theory& Analysis of Structures (Vol. – I & II): O.P. Jain and B.K. Jain (Nem Chand).
7. Structural Analysis: R.C. Hibber (Pearson Publication).
8. Structural Analysis: A. Ghali & M. Neville (Chapman & Hall Publication. 1974).

9. Elementary Structural Analysis: Willbur and Norris (Tata McGraw Hill).
10. Structural Analysis: L.S. Negi & R.S. Jangid (Tata McGraw Hill).
11. Theory of Structures: S. Ramamurtham & R. Narayan (Dhanpat Rai Publications).

Semester	**:**	**IV**
Branch	**:**	**B.Tech Civil Engineering**
Subject	**:**	**Geotechnical Engineering**
Total Theory Periods	**:**	**48**
Total Tutorial Periods	**:**	**0**
Total Credits	**:**	**03**
Code	**:**	**BTDSCCE441**

COURSE OBJECTIVE:

• To understand the origin, formation, and types of soil.

• To study soil properties, index parameters, and classification systems.

• To learn principles of permeability, seepage, compaction, and consolidation.

• To understand shear strength of soil and its engineering significance.

• To develop the ability to analyze bearing capacity, earth pressure, and stability of soil structures.

UNIT–I: Soil Formation & Index Properties

Formation of soil, soil structure, soil particle size and shape, three-phase system of soil, weight–volume relationships; definitions and determination of water content, void ratio, porosity, degree of saturation, unit weight, specific gravity; consistency limits (Atterberg limits), sensitivity, activity of clays; index properties and their engineering significance.

UNIT–II: Soil Classification & Permeability

Soil classification systems: IS classification, Unified Soil Classification System (USCS), AASHTO classification.

Permeability of soil: Darcy's law, laboratory and field methods of permeability determination, factors affecting permeability; seepage through soils, flow nets—construction and uses; piping, uplift pressure, exit gradient.

UNIT–III: Compaction & Consolidation of Soil

Compaction of soil: standard and modified Proctor tests, factors affecting compaction, field compaction methods, compaction control.

Consolidation: Terzaghi's theory of one-dimensional consolidation, coefficient of consolidation, compression index, recompression index, settlement analysis, primary and secondary consolidation, consolidation test and interpretation.

UNIT–IV: Shear Strength of Soil

Concept of shear strength, Mohr–Coulomb failure criteria; direct shear test, triaxial shear test (UU, CU,

CD), unconfined compression test, vane shear test; drained and undrained shear strength parameters; stress paths; influence of drainage conditions; factors affecting shear strength.

UNIT–V: Bearing Capacity, Earth Pressure & Stability

Bearing capacity of shallow foundations: Terzaghi's bearing capacity theory, bearing capacity factors, corrections for shape, depth, and inclination; plate load test, allowable bearing pressure and settlement.
Earth pressure theories: Rankine's and Coulomb's active and passive earth pressure; retaining walls and stability considerations.
Slope stability: types of slopes, causes of failure, analysis of infinite and finite slopes in cohesive and cohesionless soils.

COURSE OUTCOME:

Students will be able to:

- Understand soil formation, properties, and classification systems used in geotechnical engineering.
- Analyze soil behavior under permeability, compaction, consolidation, and shear conditions.
- Evaluate bearing capacity of foundations and earth pressure on retaining structures.
- Assess stability of slopes and design basic geotechnical solutions for field problems.

TEXT BOOKS:

1. Basic and Applied Soil Mechanics – Gopal Ranjan & A.S.R. Rao (New Age International)
2. Soil Mechanics and Foundations – B.C. Punmia (Laxmi Publications)

REFERENCE BOOKS:

1. Principles of Geotechnical Engineering – Braja M. Das (Cengage Learning)
2. Foundation Engineering – Peck, Hanson & Thornburn (Wiley Eastern)
3. Soil Mechanics in Engineering Practice – Terzaghi, Peck & Mesri (Wiley)
4. Geotechnical Engineering – C.Venkatramaiah (New Age International)

Semester	**:**	**IV**
Branch	**:**	**B.Tech Civil Engineering**
Subject	**:**	**Building Construction & Civil Engineering Drawing**
Total Theory Periods	**:**	**48**
Total Tutorial Periods	**:**	**0**
Total Credits	**:**	**03**
Code	**:**	**BTDSCCE442**

COURSE OBJECTIVE:

• To develop fundamental knowledge of building components, construction methods, and materials.
• To enable students to understand principles of planning, layout, and execution of building works.
• To train students in engineering drawing related to buildings, including plans, elevations, sections, and detailing.
• To familiarize students with BIS codes (SP-46, IS 962) for drawing standards.
• To enhance the ability to visualize, interpret, and prepare working drawings for residential and public buildings.

UNIT–I: Building Construction – I (Foundations & Building Components)

Introduction to buildings, classification and requirements; site selection and site investigation; building layout and setting out; excavation methods, shoring, strutting, and underpinning; types of foundations—shallow foundations (spread, isolated, wall, combined) and deep foundations (pile, well foundation); damp-proof course (DPC), waterproofing methods, and anti-termite treatment; introduction to building components such as walls, floors, roofs, doors, windows, and staircases.

UNIT–II: Building Construction – II (Superstructure & Finishing Works)

Brick and stone masonry—tools, bonds, and construction practices; arches, lintels, chajja and sunshade details; flooring types—tile, stone, concrete, and industrial floors; roofing systems—flat, pitched, RCC slab roofs; types of staircases and design considerations; plastering, pointing and painting processes; scaffolding, centering, staging, and formwork used in construction; safety in building construction.

UNIT–III: Civil Engineering Drawing – I (Plan, Elevation & Section)

Basics of civil drawing, BIS (SP-46) conventions, lettering, dimensioning, and symbols; preparation of building drawings including plan, elevation, and section of single-room and double-room buildings; drawing of residential building with doors, windows, ventilators, and staircases; sectional details of foundations, walls, lintels, sunshades, roofs, and parapets; introduction to scale selection, hatching, **and material** representation.

UNIT–IV: Civil Engineering Drawing – II (Component & Structural Detailing)

Detailed drawings of door and window frames and shutters; staircase drawings (dog-legged, open-well, spiral); kitchen and toilet layout drawings; structural drawings including isolated footing, combined footing, strap footing, column detailing, beam detailing, slab reinforcement (one-way and two-way slabs); RCC staircase reinforcement; standard detailing practices as per IS 456 and SP-34.

UNIT–V: Civil Engineering Drawing – III (Introduction to CAD for Civil Engineering)

Basics of computer-aided drafting—CAD interface, drawing setup, layers, commands; creating civil drawings using CAD including plan, elevation, and section; preparation of building working drawings—site plan, location plan, foundation plan, roof plan, and structural layouts; commands for text, dimensions, hatching, blocks, and editing; printing, plotting, and introduction to basic 3D modelling for civil structures.

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COURSE OUTCOME:

Students will be able to:

• Understand and interpret standard civil engineering drawing practices.
• Prepare plans, elevations, sections, and detailed component drawings.
• Produce professional structural drawings with reinforcement details.
• Use CAD software effectively for creating and editing engineering drawings.
• Apply drawing knowledge in real construction and project documentation.

TEXT BOOKS:

1. Civil Engineering Drawing – M. Chakraborti (Chakraborti Publications)
2. Engineering Drawing – N.D. Bhatt (Charotar Publishing House)

REFERENCE BOOKS:

1. Building Drawing – Shah, Kale & Patki (Tata McGraw-Hill)
2. Civil Drafting Technology – David A. Madsen (Delmar Publishers)
3. Engineering Graphics & Design – P.J. Shah (S.Chand)
4. SP-46 (BIS Handbook): Engineering Drawing Practice for Schools & Colleges

Semester	**:**	**IV**
Branch	**:**	**B.Tech Civil Engineering**
Subject	**:**	**Geotechnical Engineering Laboratory**
Total Laboratory Periods	**:**	**28**
Total Tutorial Periods	**:**	**0**
Total Credits	**:**	**03**
Code	**:**	**BTDSCCE443**

COURSE OBJECTIVE:

- To provide hands-on experience for identifying and classifying soils based on physical properties.
- To train students in determining essential soil parameters used in geotechnical design.
- To expose students to standard laboratory procedures for index and engineering property tests of soils.
- To develop practical skills in sample preparation, testing, data interpretation, and report writing.
- To correlate laboratory results with field behavior of soils in civil engineering applications.

LIST OF EXPERIMENTS

(Minimum 10 experiments to be performed)

1. **Determination of Water Content** of soil by oven drying method and rapid moisture meter.
2. **Specific Gravity Test** using density bottle and pycnometer.
3. **Grain Size Distribution** by sieve analysis and hydrometer analysis.
4. **Determination of Atterberg Limits** – Liquid limit, Plastic limit, and Shrinkage limit.
5. **Field Density Determination** using core cutter and sand replacement methods.
6. **Relative Density Test** for cohesionless soils.
7. **Proctor Compaction Test** – Standard and Modified Proctor tests.
8. **Permeability Test** by constant head and falling head methods.
9. **Direct Shear Test** for determining shear strength parameters of soil.
10. **Unconfined Compression Test (UCC)** for cohesive soils.
11. **Vane Shear Test** for soft clays.
12. **Consolidation Test** – determination of compression index and coefficient of consolidation.
13. **California Bearing Ratio (CBR) Test** – laboratory CBR for pavement design.
14. **Demonstration of Field Visit** for understanding soil sampling, bore logs, and in-situ testing methods (SPT, DCPT).

COURSE OUTCOME:

- Students will be able to identify and classify soils based on laboratory test results.
- Students will understand the physical and engineering properties of soil relevant to geotechnical design.
- Students will gain practical understanding of compaction, permeability, consolidation, and shear strength behavior.
- Students will apply laboratory test results for foundation design, slope analysis, and earthwork planning.
- Students will develop skills in test procedure execution, data interpretation, and preparation of geotechnical reports.

Semester : IV
Branch : B.Tech Civil Engineering
Subject : Concrete Technology Laboratory
Total Laboratory Periods : 28
Total Tutorial Periods : 0
Total Credits : 03
Code : BTAEC444

COURSE OBJECTIVE:

• To provide practical exposure to properties of cement, aggregates, and fresh/hardened concrete.
• To train students in conducting standard tests on cement, fine aggregates, coarse aggregates, and concrete.
• To develop skills in proportioning, mixing, curing, and testing concrete as per IS standards.
• To understand factors influencing workability, strength, durability, and performance of concrete.
• To interpret laboratory data for designing concrete mixes and ensuring quality control in the field.

LIST OF EXPERIMENTS

(Minimum 10 experiments to be performed)

Tests on Cement

1. **Fineness of Cement** by sieve method and Blaine's air permeability method.
2. **Consistency Test of Cement** using Vicat apparatus.
3. **Initial and Final Setting Time** determination.
4. **Soundness Test** of cement by Le-Chatelier method.
5. **Compressive Strength of Cement** mortar cubes.

Tests on Aggregates

6. **Sieve Analysis of Fine and Coarse Aggregates** for determining gradation.
7. **Specific Gravity and Water Absorption** of aggregates.
8. **Bulk Density and Voids Ratio** of aggregates.
9. **Impact Value Test** of aggregates.
10. **Crushing Value Test** of aggregates.
11. **Flakiness and Elongation Index** determination.

Tests on Fresh Concrete

12. **Slump Cone Test** for workability.
13. **Compacting Factor Test**.
14. **Vee-Bee Consistometer Test** for stiff concrete.
15. **Flow Table Test** for concrete mortar.

Tests on Hardened Concrete

16. **Compressive Strength Test** on concrete cubes.
17. **Flexural Strength Test** on concrete beams.
18. **Split Tensile Strength Test** on concrete cylinders.
19. **Non-destructive Tests** – Rebound hammer and Ultrasonic Pulse Velocity (UPV) (Demonstration).

Concrete Mix Design

20. **Concrete Mix Design as per IS 10262** (theory + practical preparation and testing of designed mix).

COURSE OUTCOME:

• Students will understand physical properties of cement, aggregates, and concrete.
• Students will be able to evaluate workability, strength, durability, and performance of concrete.
• Students will carry out proportioning, mixing, casting, and curing of concrete specimens as per standards.
• Students will interpret laboratory results for concrete quality control and mix design.
• Students will develop competence in applying IS codes (IS 4031, IS 2386, IS 516, IS 10262) in real construction practice.

Semester : IV
Branch : B.Tech Civil Engineering
Subject : Computer Aided Engineering Laboratory
Total Laboratory Periods : 28
Total Tutorial Periods : 0
Total Credits : 03
Code : BTSEC445

COURSE OBJECTIVE:

• To introduce students to the fundamentals of CAD software used in civil engineering.
• To develop skills in creating 2D drawings and 3D models of civil engineering components.
• To learn drafting standards, layers, dimensioning, and detailing techniques using CAD tools.
• To understand basic structural modelling, analysis, and interpretation using CAE software.
• To enhance the ability to prepare professional drawings, plans, and structural models suitable for engineering applications.

LIST OF EXPERIMENTS

(Minimum 10 experiments to be performed)

Module–I: Basic CAD Operations

1. Introduction to CAD environment: commands, coordinate systems, units, layers, and properties.
2. Drawing basic 2D shapes: line, circle, arc, polyline, rectangle, polygon, ellipse.
3. Modify commands: move, copy, trim, extend, fillet, chamfer, offset, mirror, array.

Module–II: 2D Civil Engineering Drawings

4. Drafting of **building components** – walls, doors, windows, lintels, sunshades.
5. Preparation of **plan, elevation & section** of a single-room building.
6. Drawing **staircase details** – dog-legged and open-well.
7. Reinforcement detailing of **slab, beam, column, and footing** as per standard CAD conventions.

Module–III: 3D Modelling & Visualization

8. Creating **3D primitives** – box, cylinder, cone, wedge, sphere.
9. 3D modelling of basic building blocks: extrude, revolve, sweep, loft.
10. Surface and solid modelling of simple structural elements.
11. Generating 3D views, isometric views, sections, and rendering.

Module–IV: Structural Analysis (CAE Introduction)

12. Introduction to structural modelling in CAE software (STAAD Pro / ETABS / SAP2000).
13. Modelling of simple structures:
    • 2D frames

- 3D frames
- Beams and trusses

14. Assigning supports, loads (DL, LL, WL) and load combinations.
15. Analysis and interpretation of results: bending moment, shear force, deflection.

Module–V: Project Work (Optional but Recommended)

16. Preparation of a **complete plan, elevation, section** of a residential building.
17. 3D building model + walkthrough/visualization (software demonstration).
18. Structural analysis of a simple building frame.

COURSE OUTCOME:

- Students will gain proficiency in CAD tools for preparing technical drawings and models.
- Students will be able to create 2D drafting and 3D modelling of civil engineering components.
- Students will understand reinforcement detailing and drawing standards used in practice.
- Students will learn the basics of structural analysis using CAE software.
- Students will be capable of producing industry-oriented engineering drawings and structural models.