



B.Tech. I Year COURSE STRUCTURE (SR24 Regulations)

B.Tech. in CIVIL ENGINEERING

Applicable from the Academic Year 2024-25

First Year First Semester (I/I)

S. No.	Course Code	Course	L	T	P	C
1	S24MA101BS	Matrices and Calculus	3	1	0	4
2	S24PH102BS	Applied Physics	3	1	0	4
3	S24CS103ES	C Programming and Data Structures	3	0	0	3
4	S24ME104ES	Engineering Workshop	0	1	3	2.5
5	S24EN105HS	English for Skill Enhancement	2	0	0	2
6	S24CE106ES	Elements of Civil Engineering	0	0	2	1
7	S24PH107BS	Applied Physics Laboratory	0	0	3	1.5
8	S24CS108ES	C Programming and Data Structures Laboratory	0	0	2	1
9	S24EN109HS	English Language and Communication Skills	0	0	2	1
10	*S24MC110	Universal Human values	3	0	0	0
		Induction Program				
		Total	14	3	12	20

First Year Second Semester (I/II)

S. No.	Course Code	Course	L	T	P	C
1	S24MA201BS	Ordinary Differential Equations and Vector Calculus	3	1	0	4
2	S24CH202BS	Engineering Chemistry	3	1	0	4
3	S24ME203ES	Computer Aided Engineering Graphics	1	0	2	2
4	S24CE204ES	Applied Mechanics	3	0	0	3
5	S24CE205PC	Surveying	2	0	0	2
6	S24CS206ES	Python Programming Laboratory	0	1	2	2
7	S24CH207BS	Engineering Chemistry Laboratory	0	0	2	1
8	S24ME208ES	Design Thinking	0	0	2	1
9	S24CE209PC	Surveying Laboratory-1	0	0	2	1
		Total	12	3	10	20



Matrices And Calculus

(S24MA101BS)

B.Tech. I Year I Sem.

L T P C

3 1 0 4

Course Objectives:

To learn

1. Types of matrices, concept of rank of a matrix and apply this to solve the system of linear equations.
2. Concept of eigen values and eigen vectors and to reduce the quadratic form to canonical form.
3. Geometrical interpretations of mean value theorems and their application to the mathematical problems.
4. Evaluation of improper integrals using Beta and Gamma functions.
5. Partial differentiation and its application in finding maxima and minima of function of two and three variables.
6. Concepts of double and triple integrations and their applications.

Course Outcomes:

After learning the content of this course, the students will able to

1. Write the matrix representation of system of linear equations and analyse the solution of it.
2. Find the eigen values and corresponding eigen vectors also obtain the canonical form of any quadratic form by using linear and orthogonal transformation.
3. Evaluate improper integrals using Beta-Gamma functions, verify mean value theorems for given functions.
4. Find the extreme values of functions of two & three variables with or without constraint.
5. Evaluate multiple integrals and apply it to find areas and volumes.

UNIT - I: Matrices

10L

Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Gauss Seidel Iteration Method

UNIT - II: Eigen values and Eigen vectors

10L

Linear Transformation and Orthogonal Transformation: Eigenvalues, Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of

the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

UNIT - III: Calculus

10L

Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem, Taylor's Series. Definition of Improper Integral: Beta and Gamma functions and their applications.

UNIT - IV: Multivariable Calculus (Partial Differentiation and applications)

10L

Definitions of Limit and continuity. Partial Differentiation: Euler's Theorem, Total derivative, Jacobian, Functional dependence & independence. Applications: Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

UNIT- V: Multivariable Calculus (Integration)

8L

Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (only Cartesian form), Evaluation of Triple Integrals, Change of variables (Cartesian to polar) for double Applications: Areas and volumes by double integrals.

Text Books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition, 2016.

Reference Books:

1. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.



APPLIED PHYSICS

(S24PH102BS)

B.Tech. I Year I Sem.

L T P C

3 1 0 4

Course Objectives:

To learn

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

Course Outcomes:

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

1. Analyze the physical world from a fundamental perspective using the concepts of quantum mechanics.
2. Classifying solids based on energy gap to examine the role of semiconductor devices in science and engineering applications.
3. Explore the fundamental properties of dielectric and magnetic materials for diverse applications.
4. Demonstrate the features, synthesis mechanisms and applications of Nanomaterials.
5. Apply the concepts of Lasers and Optical fiber in diverse fields.

UNIT - I: Quantum Physics (15 hrs)

Introduction to quantum physics, blackbody radiation – Stefan-Boltzmann's law, Wein's and Rayleigh-Jean's law (Qualitative), Planck's radiation law - Photoelectric effect -- de-Broglie's hypothesis, Wave-particle duality, Davisson and Germer experiment – Heisenberg uncertainty principle - Born interpretation of the wave function – time independent Schrodinger wave equation - particle in one dimensional potential box.

UNIT - II: Classification of Solids, Semiconductors and Optoelectronic Devices (15 hrs)

Free Electron theory, Bloch's theorem -Kronig-Penney model – E-K diagram- origin of energy bands and classification of solids. Intrinsic and extrinsic semiconductors – Drift and Diffusion - Hall effect - direct and indirect band gap semiconductors - construction, principle of operation and characteristics of P-N Junction diode, Zener diode. Generation and

Recombination, Structure, working principle and applications of –LED, Photodiode, PIN diode and solar cells.

UNIT - III: Dielectric and Magnetic materials (10 hrs)

Dielectric Materials: Basic definitions, Types of polarizations-Electronic, Ionic and orientation polarization (qualitative), ferroelectric, piezoelectric and pyroelectric materials - applications.

Magnetic materials: Origin of magnetic moment – Classification of magnetic materials – Weiss domain theory of ferromagnetism - Hysteresis- soft and hard magnetic materials - magnetostriction - magnetoresistance – applications.

UNIT - IV: Nanotechnology (08 hrs)

Introduction to Nanotechnology, Classification of nano materials (based on Dimension), Quantum confinement - surface to volume ratio - bottom-up fabrication- sol-gel - combustion methods - top-down fabrication- Ball milling - Physical vapour deposition (PVD) - Chemical vapour deposition (CVD) - characterization techniques- X-ray diffraction - Scanning Electron Microscope -Transmission Electron Microscope - Applications of nanomaterials.

UNIT- V: Laser and Fiber Optics (12 hrs)

Lasers: Laser beam characteristics - Einstein coefficients and their relations - Population Inversion - lasing action- Ruby laser - He-Ne laser - CO₂ laser –Semiconductor laser - Applications of laser.

Fiber Optics: Introduction - Total Internal Reflection - Construction of optical fiber - acceptance angle - numerical aperture - classification of optical fibers - losses in optical fiber - optical fiber for communication system- advantages and applications of optical fibers.

Learning Resources:

1. M.N. Avadhanulu, P.G. Kshirsagar, TVS Arun Murthy, “A Textbook of Engineering Physics”, S Chand Publications, 11th Edition 2019.
2. Donald A, Neamen, “Semiconductor Physics and Devices- Basic Principle”, Mc Graw Hill, 4th Edition 2021.
3. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2nd Edition 2022.
4. Essentials of Nanoscience and Nanotechnology by Narasimha Reddy Katta, Typical Creatives Nanodigest 1st Edition 2021.

Web Resources:

1. <https://nptel.ac.in/courses/115102023> (Quantum Mechanics and Applications by Prof. Ajoy Ghatak, IIT Delhi Lecture 1 and 2).
2. https://onlinecourses.nptel.ac.in/noc22_ee13/preview (Fundamentals of Semiconductor devices by Prof. Digbijoy N. Nath, IISc Bangalore Week1 to Week 5).
3. <https://www.coursera.org/learn/nanotechnology#syllabus> (Nanotechnology: A Maker’s course by Coursera)
4. https://onlinecourses.nptel.ac.in/noc23_ph33/preview (Introduction to Laser by Prof. M. R. Shenoy, IIT Delhi Week 1, Week3, Week4, Week 11, Week 12).



C PROGRAMMING AND DATA STRUCTURES

(S24CS103ES)

B.Tech. I Year I Sem

L T P C

3 0 0 3

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

Course Outcomes:

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

UNIT – I

Introduction to Computers – Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Software Development

Introduction to C Language — Background, Simple C programs, Identifiers, Basic data types, Variables, Constants, Input / Output

Structure of a C Program — Operators, Bit-wise operators, Expressions, Precedence and Associativity, Expression Evaluation, Type conversions, Statements.

UNIT – II

Statements – if and switch statements, Repetition statements – while, for, do-while statements, Loop examples, other statements related to looping – break, continue, go to, Recursion.

Designing Structured Programs- Functions, basics, user defined functions, inter function communication, standard functions.

Arrays – Concepts, using arrays in C, inter function communication, array applications, two – dimensional arrays, multidimensional arrays.

UNIT – III

Pointers – Introduction, Pointers for inter function communication, pointers to pointers, compatibility, **Pointer Applications** – Passing an array to a function, Memory allocation functions, array of pointers **Strings** – Concepts, C Strings, String Input / Output functions, arrays of strings, string manipulation functions, string / data conversion.

UNIT – IV

Derived types – The Typedef, enumerated types, Structures – Declaration, definition and initialization of structures, accessing structures, operations on structures, complex structures. Unions – Referencing unions, initializers, unions and structures.

Input and Output – Text vs Binary streams, standard library functions for files, converting file types, File programs – copy, merge files.

UNIT – V

Sorting- selection sort, bubble sort, insertion sort,
Searching-linear and binary search methods.

Data Structures – Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks-Operations, array and linked representations of stacks, stack applications, Queues-operations, array and linked representations.

TEXT BOOKS:

1. C Programming & Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
2. Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, Fifth Edition, Pearson Education.
3. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI/Pearson Education

REFERENCE BOOKS:

1. C & Data structures – P. Padmanabham, 3rd Edition, B.S. Publications.
2. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press
3. Programming in C – Stephen G. Kochan, III Edition, Pearson Education.
4. C for Engineers and Scientists, H. Cheng, McGraw-Hill International Edition
5. Data Structures using C – A. M. Tanenbaum, Y. Langsam, and M.J. Augenstein, Pearson Education / PHI
6. C Programming & Data Structures, E. Balagurusamy, TMH.
7. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press
8. C & Data structures – E V Prasad and N B Venkateswarlu, S. Chand & Co.



ENGINEERING WORKSHOP

(S24ME104ES)

B.Tech. I Year I Sem.

L T P C

0 1 3 2.5

Course Objectives:

To learn

1. To Study of different hand operated power tools, uses and their demonstration.
2. To gain a good basic working knowledge required for the production of various Engineering products.
3. To provide hands on experience about use of different engineering materials, tools, Equipment and processes those are common in the engineering field.
4. To develop a right attitude, team working, precision and safety at work place.
5. It explains the construction, function, use and application of different working tools, Equipment and machines.
6. To study commonly used carpentry joints.
7. To have practical exposure to various welding and joining processes.
8. Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.

Course Outcomes:

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

1. Operate on machine tools and their operations with exposure towards 3-D printing.
2. Practice on manufacturing of components using workshop trades including plumbing, fitting, carpentry and welding.
3. Identify and apply suitable tools for different trades of engineering processes including drilling, material removing, measuring, chiseling.
4. Apply basic electrical engineering knowledge for house wiring practice.
5. Create different models in Tin -Smithy and Prepare different moulds in Foundry.

1. TRADES FOR EXERCISES:

At least two exercises from each trade:

- I. Carpentry – (**Planing Practice & Cutting**, T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
- II. Fitting – (**Cutting & Square Filing**, V-Fit, **Square** Fit & Semi-circular fit)
- III. Tin-Smithy – (Square Tin, Rectangular Tray & Conical **Making**)
- IV. Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)
- V. Welding Practice – (Arc Welding & **Soldering**)
- VI. House-wiring – (Parallel & Series, Two-way Switch and Tube Light)
- VII. Black Smithy – (Round to Square, Fan Hook and S-Hook)

2. TRADES FOR DEMONSTRATION & EXPOSURE: (Any Four)

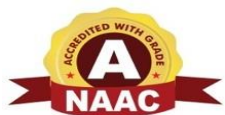
Plumbing, **3-D printing**, **Laser cutting**, **Introduction to Pneumatics**, Power tools in construction and Wood Working.

TEXT BOOKS:

1. Workshop Practice /B. L. Juneja / Cengage
2. Workshop Manual / K. Venugopal / Anuradha.

REFERENCE BOOKS:

1. Work shop Manual - P. Kannaiah/ K.L. Narayana/ Scitech
2. Workshop Manual / Venkat Reddy/ BSP



ENGLISH FOR SKILL ENHANCEMENT

(S24EN105HS)

B.Tech. I Year I Sem.

L T P C

2 0 0 2

Course Objectives :

- Improve the language proficiency of students in English with an emphasis on
- Reading and Writing skills.
- Develop study skills and communication skills in various professional situations.
- Equip students to study engineering subjects more effectively and critically using the theoretical and practical components of the syllabus.

Course Outcomes :

After learning the content of this course, Students will be able to:

1. Understand the importance of reading and writing and acquire basic proficiency in reading and writing modules of English
2. Choose appropriate expressions and sentence structures for their oral and written communication.
3. Develop comprehension skills from the known and unknown passages.
4. Take an active part in drafting paragraphs, letters, essays, abstracts, précis and reports in various contexts.
5. Students would be able to create substantial base by the formation of strong professional vocabulary

UNIT-I

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

Vocabulary: The Concept of Word Formation -The Use of Prefixes and Suffixes – Acquaintance with Prefixes and Suffixes from Foreign Languages to form Derivatives - Synonyms and Antonyms **Grammar:** Identifying Common Errors in Writing with Reference to Articles and Prepositions.

Reading: Reading and Its Importance-Techniques for Effective Reading.

Writing: Sentence Structures - Use of Phrases and Clauses in Sentences - Importance of Proper Punctuation –Techniques for Writing precisely – Paragraph Writing – Types, Structures and Features of a Paragraph – Creating Coherence - Organizing Principles of Paragraphs in Documents.

UNIT-II

Chapter entitled ‘**Appro JRD**’ by **Sudha Murthy** from “*English: Language, Context and Culture*” published by Orient Black Swan, Hyderabad.

Vocabulary: Words Often Miss pelt - Homophones, Homonyms and Homographs

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

Reading : Sub-Skills of Reading–Skimming and Scanning– Exercises for Practice

Writing : Nature and Style of Writing-Defining / Describing People, Objects, Places and Events Classifying-Providing Examples or Evidence.

UNIT-III

Chapter entitled ‘**Lessons from Online Learning**’ by **F. Haider Alvi, Deborah Hurst etal** from

“*English : Language, Context and Culture*” published by Orient Black Swan, Hyderabad.

Vocabulary : Words Often Confused - Words from Foreign Languages and their Use in English. **Grammar :**Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

Reading : Sub-Skills of Reading – Intensive Reading and Extensive Reading – Exercises for Practice.

Writing : Format of a Formal Letter-Writing Formal Letters E.g., Letter of Complaint, Letter of Requisition, Email Etiquette Job Application with CV/Resume.

UNIT-IV

Chapter entitled ‘**Art and Literature**’ by **Abdul Kalam** from “*English : Language,Context and Culture*” published by Orient Black Swan, Hyderabad.

Vocabulary : Standard Abbreviations in English

Grammar : Redundancies and Clichés in Oral and Written Communication.

Reading : Survey, Question, Read, Recite and Review (SQ3R Method) - Exercises for Practice

Writing : Writing Practices – Essay Writing – Writing Introduction and Conclusion - Précis Writing

UNIT-V

Chapter entitled ‘**Go, Kiss the World**’ by **Subroto Bagchi** from “*English : Language, Context and Culture*” published by Orient Black Swan, Hyderabad.

Vocabulary : Technical Vocabulary and their Usage

Grammar : Common Errors in English (*Covering all the other aspects of grammar which were not*

covered in the previous units)

Reading : Reading Comprehension - Exercises for Practice

Writing : Technical Reports - Introduction – Characteristics of a Report – Categories

of Reports

Formats - Structure of Reports (Manuscript Format) - Types of Reports - Writing a Report.

Note: *Listening and Speaking Skills which are given under Unit-6 in AICTE Model Curriculum are covered in the syllabus of ELCS Lab Course.*

- **Note: 1.** As the syllabus of English given in AICTE Model Curriculum-2018 for B.Tech First Year
- *is Open-ended*, besides following the prescribed textbook, it is required to prepare teaching /learning materials **by the teachers collectively** in the form of handouts based on the needs of the students in their respective colleges for effective teaching /learning in the class.
- **Note: 2.** Based on the recommendations of NEP2020, teachers are requested to be flexible to
- adopt Blended Learning in dealing with the course contents. They are advised to teach 40 percent of each topic from the syllabus in blended mode.

Text Book:

1. “English : Language, Context and Culture” by Orient Black Swan Pvt. Ltd, Hyderabad. 2022. Print.

Reference Books:

1. Effective Academic Writing by Liss and Davis (OUP)
2. Richards, Jack C. (2022) Interchange Series. Introduction, 1,2,3. Cambridge University Press
3. Wood, F.T. (2007). Remedial English Grammar. Macmillan.
4. Chaudhuri, Santanu Sinha. (2018). Learn English : A Fun Book of Functional Language, Grammar and Vocabulary. (2nd ed.,). Sage Publications India Pvt. Ltd.
5. (2019). Technical Communication. Wiley India Pvt. Ltd.
6. Vishwamohan, Aysha. (2013). English for Technical Communication for Engineering Students. Mc Graw-Hill Education India Pvt. Ltd.
7. Swan, Michael. (2016). Practical English Usage. Oxford University Press. Fourth Edition.

Web Resources:

GRAMMAR:

1. www.bbc.co.uk/learningenglish
2. <https://dictionary.cambridge.org/grammar/british-grammar/>
3. www.eslpod.com/index.html
4. <https://www.learngrammar.net/>
5. <https://english4today.com/english-grammar-online-with-quizzes/>
6. <https://www.talkenglish.com/grammar/grammar.aspx>

VOCABULARY

1. <https://www.youtube.com/c/DailyVideoVocabulary/videos>
2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA



ELEMENTS OF CIVIL ENGINEERING

(S24 CE106ES)

B.Tech. I Year I Sem.

L T P C

0 0 2 1

Pre-requisites: Nil

Course objectives:

- To provide practical knowledge about physical properties of minerals and rocks.
- To determine the characteristics of cement, Coarse & Fine aggregates.

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

- Understands the method and ways of investigations required for Civil Engineering projects
- Identify the various rocks, minerals depending on geological classifications
- Evaluate the properties of cement, fine and coarse aggregates and determine its suitability for construction.

List of Experiments:

1. **Identification of Minerals** – Silica Group, Feldspar Group, Crystalline Group, Carbonate Group, Pyroxene Group, Mica Group, Amphibole Group.
2. **Identification of Rocks** – Igneous Petrology, Sedimentary Petrology, Metamorphic Petrology.
3. 1. Study of topographical features from Geological maps. Identification of symbols in maps.
1. Simple structural Geology Problems (Folds, Faults & Unconformities)
4. **Tests on Cement**
 - a. Fineness test & Normal Consistency test.
 - b. Specific gravity test, Initial and Final setting time of cement.
5. **Tests on Fine Aggregates**
 - a. Specific Gravity test.
 - b. Bulking of sand & Fineness modulus of Fine aggregate.
6. **Tests on Coarse Aggregate**
 - a. Specific Gravity test.
 - b. Fineness modulus of Coarse aggregate.

TEXT BOOK:

1. IS 383 :1993 “Specification for Coarse and Fine Aggregates from Natural Sources for Concrete”.



APPLIED PHYSICS LABORATORY

(S24PH107BS)

B.Tech. I Year I Sem.

L T P C

0 0 3 1.5

Course Objectives:

- Capable of handling instruments related to the Hall effect and photoelectric effect experiments and their measurements.
- Understand the characteristics of various devices such as PN junction diode, Zener diode, LED, solar cell, lasers and optical fiber and measurement of energy gap and resistivity of semiconductor materials.
- Able to measure the characteristics of dielectric constant of a given material.
- Study the behavior of B-H curve of ferromagnetic materials.
- Understanding the method of least squares fitting.

Course Outcomes:

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

1. Know the determination of the Planck's constant using Photo electric effect and identify the material whether it is n-type or p-type by Hall experiment.
2. Appreciate quantum physics in semiconductor devices and optoelectronics.
3. Gain the knowledge of applications of dielectric constant.
4. Understand the variation of magnetic field and behavior of hysteresis curve.
5. Carry out data analysis.

List of Experiments:

1. Understanding the method of least squares – torsional pendulum as an example.
2. Determination of work function and Planck's constant using photoelectric effect.
3. Determination of Hall co-efficient and carrier concentration of a given semiconductor.
4. V-I characteristics of a p-n junction diode and Zener diode.
5. a) V-I and L-I characteristics of light emitting diode (LED).
b) V-I Characteristics of solar cell.
6. Determination of the resistivity of semiconductor by two probe method.
7. Study B-H curve of a magnetic material.
8. Determination of dielectric constant of a given material.
9. Determination of the beam divergence of the given LASER beam
10. Calculate Acceptance angle and Numerical Aperture of Optical Fiber
11. Determination of bending losses in an optical fiber.

12. Any one Experiment from mentioned using virtual labs:

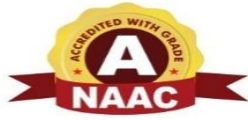
- a) Determination of Stefans Constant
- b) Determination of Energy gap of a semiconductor
- c) Laser diffraction Grating

Note: Any 08 experiments are to be performed.

Reference Book:

1. S. Balasubramanian, M.N. Srinivasan “A Text book of Practical Physics” – S. Chand Publishers, 2017.

2. <https://www.vlab.co.in/broad-area-physical-sciences>



**C PROGRAMMING AND DATA STRUCTURES LABORATORY
(S24CS108ES)**

B.Tech. I Year I Sem.

L T P C

0 0 2 1

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

Course Outcomes:

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

List of Experiments:

1. Write a C program to find the sum of individual digits of a positive integer.
2. Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
3. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
4. Write a C program to find the roots of a quadratic equation.
5. Write a C program to find the factorial of a given integer.
6. Write a C program to find the GCD (greatest common divisor) of two given integers.
7. Write a C program to solve Towers of Hanoi problem.
8. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result.
(Consider the operators +, -, *, /, % and use Switch Statement)
9. Write a C program to find both the largest and smallest number in a list of integers.
10. Write a C program that uses functions to perform the following:

- i) Addition of Two Matrices
 - ii) Multiplication of Two Matrices
11. Write a C program that uses functions to perform the following operations:
- i) To insert a sub-string in to a given main string from a given position.
 - ii) To delete n Characters from a given position in a given string.
12. Write a C program to determine if the given string is a palindrome or not
13. Write a C program that displays the position or index in the string S where the string T begins, or — 1 if S doesn't contain T.
14. Write a C program to count the lines, words and characters in a given text.
15. Write a C program to generate Pascal's triangle.
16. Write a C program to construct a pyramid of numbers.
17. Write a C program that uses functions to perform the following operations:
- i) Reading a complex number
 - ii) Writing a complex number
 - iii) Addition of two complex numbers
 - iv) Multiplication of two complex numbers
- (Note: represent complex number using a structure.)
- 18.
- i. Write a C program which copies one file to another.
 - ii. Write a C program to reverse the first n characters in a file. (Note: The file name and n are specified on the command line.)
- 19.
- i. Write a C program to display the contents of a file.
 - ii. Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file)
20. Write a C program that uses functions to perform the following operations on singly linked list.:
- i) Creation
 - ii) Insertion
 - iii) Deletion
 - iv) Traversal
21. Write C programs that implement stack (its operations) using
- i) Arrays
 - ii) Pointers
22. Write C programs that implement Queue (its operations) using
- i) Arrays
 - ii) Pointers
23. Write a C program that implements the following sorting methods to sort a given list of integers in ascending order
- i) Bubble sort
 - ii) Selection sort
 - iii) Insertion sort

24. Write C programs that use both recursive and non recursive functions to perform the following searching operations for a Key value in a given list of integers:

- i) Linear search ii) Binary search

TEXT BOOKS:

1. C Programming & Data Structures, B.A. Forouzan and R. F. Gilberg, Third Edition, Cengage Learning.
2. Let us C, Yeswanth Kanitkar
3. C Programming, Balaguruswamy.



ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

(S24EN109HS)

B.Tech. I Year I Sem

L T P C

0 0 2 1

The English Language and Communication Skills (ELCS) Lab focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

Course Objectives:

This LAB will enable the students to:

- To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm
- To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking
- To improve the fluency of students in spoken English and neutralize the impact of dialects.
- To train students to use language appropriately for public speaking, group discussions and interviews

Course Outcomes:

After learning the content of this course, the students will be able to

1. Understand the nuances of English language through individual, pair, and group Activities.
2. Speak with clarity and confidence which in turn enhances their employability skills.
3. Develop their listening skills so that they may appreciate the role in the LSRW skills approach to language and improve their pronunciation
4. Speak fluently in various activities viz group discussion, interviews, presentations, and public speaking.
5. Express themselves fluently and appropriately in social and professional contexts.

English Language and Communication Skills Lab (ELCS) shall have two parts: a. Computer Assisted Language Learning (CALL) Lab b. Interactive Communication Skills (ICS) Lab

BASIC COMMUNICATION SKILLS

EXERCISE -I

CALL Lab:

A. Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers- Effective Listening. Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants – Minimal Pairs-Consonant Clusters- Past Tense Marker and Plural Marker- Testing Exercises

ICS Lab:

B. Understand: Spoken vs. Written language- Formal and Informal English.

Practice: Ice-Breaking Activity and JAM Session- Introducing Oneself and Others.

EXERCISE - II:

CALL Lab:

A. Understand: Structure of Syllables – Word Stress– Weak Forms and Strong Forms – Stress pattern in sentences – Intonation.

Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms- Stress pattern in sentences – Intonation - Testing Exercises

ICS Lab:

B. Understand: Descriptions- Narrations- Giving Directions and Guidelines.

Practice: Situational Dialogues – Greetings – Taking Leave –Giving Instructions – Seeking Clarifications

– Asking for and Giving Directions – Thanking and Responding – Agreeing and Disagreeing – Seeking

and Giving Advice – Making Suggestions.

ADVANCED COMMUNICATION SKILLS

EXERCISE - III:

CALL Lab:

A. Understand: Errors in Pronunciation-Neutralizing Mother Tongue Interference (MTI).

Practice: Common Indian Variants in Pronunciation – Differences between British and American Pronunciation -Testing Exercises

ICS Lab:

B. Understand: Public Speaking – Exposure to Structured Talks - Non-verbal Communication- Presentation Skills.

Practice: Making a Short Speech – Extempore- Making a Presentation.

EXERCISE - IV

CALL Lab:

A. Understand: Listening for General Details.

Practice: Listening Comprehension Tests.

ICS Lab:

B. Understand: Interview Skills.

Practice: Mock Interviews.

EXERCISE- V

CALL Lab:

A. Understand: Listening for Specific Details.

Practice: Listening Comprehension Tests -Testing Exercises

ICS Lab:

B. Understand: Group Discussion

Practice: Group Discussion

REFERENCE BOOKS:

1. (2022). English Language Communication Skills – Lab Manual cum Workbook. Cengage Learning India Pvt. Ltd.
2. Shobha, KN & Rayen, J. Lourdes. (2019). Communicative English – A workbook. Cambridge University Press
3. Kumar, Sanjay & Lata, Pushp. (2019). Communication Skills: A Workbook. Oxford University Press
4. Board of Editors. (2016). ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities. Orient Black Swan Pvt. Ltd.
5. Mishra, Veerendra et al. (2020). English Language Skills: A Practical Approach. Cambridge University Press.
6. Strengthen your communication skills, Maruthi publication 2021.

Minimum Requirement of infrastructural facilities for ELCS Lab:

1. Computer Assisted Language Learning (CALL) Lab:

The Computer Assisted Language Learning Lab has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self- study by students.

System Requirement (Hardware component):

Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:

- i) Computers with Suitable Configuration
- ii) High Fidelity Headphone

2. Interactive Communication Skills (ICS)Lab:

The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio- visual aids with a Public Address System, a T.V or LCD, a digital stereo – audio & video system and camcorder etc.

Source of Material (Master Copy):

- *Exercises in Spoken English. Part1,2,3.* CIEFL and Oxford University Press

Note: Teachers are requested to make use of the master copy and get it tailor-made to suit the contents of the syllabus

Suggested Software:

- Cambridge Advanced Learners' English Dictionary with CD.
- Grammar Made Easy by Darling Kindersley.
- Punctuation Made Easy by Darling Kindersley.
- OxfordAdvancedLearner'sCompass,10th Edition.
- English in Mind(Series 1-4),Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
- English Pronunciation in Use(Elementary, Intermediate, Advanced) Cambridge University Press.
- English Vocabulary in Use (Elementary , Intermediate ,Advanced)Cambridge University Press.
- TOEFL & GRE(KAPLAN ,AARCO & BARRONS, USA ,Cracking GRE by CLIFFS).
- Digital All
- Oral Digital Language Lab(Licensed Version)

Reference Books:

1. (2022). English Language Communication Skills – Lab Manual cum Workbook. Cengage Learning India Pvt. Ltd.
2. Shobha, KN & Rayen, J. Lourdes. (2019). Communicative English – A workbook. Cambridge University Press
3. Kumar, Sanjay & Lata, Pushp. (2019). Communication Skills: A Workbook. Oxford University Press
4. Board of Editors. (2016). ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities Orient Black Swan Pvt. Ltd.
5. Mishra, Veerendra et al. (2020). English Language Skills: A Practical Approach. Cambridge University Press.
6. Strengthen your communication skills, Maruthi publication 2021.

Web Resources

Spoken English:

1. www.esl-lab.com
2. www.englishmedialab.com
3. www.englishinteractive.net
4. <https://www.britishcouncil.in/english/online>
5. <http://www.letstalkpodcast.com/>
6. https://www.youtube.com/c/mmmEnglish_Emma/featured
7. <https://www.youtube.com/c/ArnelsEverydayEnglish/featured>
8. <https://www.youtube.com/c/engvidAdam/featured>
9. <https://www.youtube.com/c/EnglishClass101/featured>
10. <https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists>
11. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw

Voice & Accent:

1. <https://www.youtube.com/user/letstalkaccent/videos>
2. <https://www.youtube.com/c/EngLanguageClub/featured>
3. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA



UNIVERSAL HUMAN VALUES (UHV)

(S24*MC110)

B.Tech. I Year I Sem.

L T P C

2 0 0 0

Course Objectives:

1. To instill among the Engineering professionals, the need to follow ethical principles in life.
2. To help students initiate a process of dialog within themselves to know what they 'really want to be' in their life and profession
3. To help students understand the meaning of happiness and prosperity for a human being.
4. To inculcate a sense of moral responsibility and professional ethics as Engineers.
5. To facilitate the students in applying the understanding of harmony in existence in their profession and lead an ethical life

UNIT 1: Understanding Value Education:

Basic Concepts: Moral and Morality, Ethics, Values, Principles – Thoughts of Ethics: Indian Thought versus Global Thought – Objectives of Value Education – Importance of Value Education – Personal Ethics – Professional Ethics.

UNIT II: Understanding Harmony in the Human Being & Family

Harmony in Myself Understanding human being as a co-existence of the sentient 'I' and the material 'Body', Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha, Understanding the Body as an instrument of 'I'

Harmony and Values in Relationships in the Family- the basic unit of human interaction, Trust (Vishwas) and Respect (Samman) as the foundational values of relationship, Understanding the meaning of Vishwas & Samman; Difference between intention and competence,

UNIT III: Understanding Harmony in the Society & Nature

Understanding the harmony in the society: Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals, Visualizing Undivided Society (Akhand Samaj), Universal Order (SarvabhaumVyawastha).

Whole existence as Co-existence Understanding the harmony in the Nature, Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature

UNIT 4: Professional Ethics:

Profession and Professionalism – Ethics in Engineering – Role of Engineers – Responsibilities of Engineers – Engineering Code of Ethics – Ethical Dilemmas– CASE STUDIES.

UNIT V: Exploring Attitudes towards gender

Understanding gender and Basic Gender Concepts/terminology- exploring attitude towards gender-construction of gender- socialization: Making Women, making Men.

Text Books:

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.
2. Towards a World of Equals: a bilingual Textbook on Gender. A Suneetha, and others... Telugu Academy, Telangana Gov. 2015

References:

1. Fundamentals of Ethics for Scientists and Engineers by Edmund G, SeeBauer, Robert L, Barry Oxford University Press, 2015.
2. Professional Ethics by R.Subramanian, Oxford University Press, 2013



Ordinary Differential Equations & Vector Calculus Syllabus

(S24MA201BS)

B.Tech. I Year II Sem.

L T P C

3 1 0 4

Course Objectives:

To learn

1. Methods of solving the differential equations of first and higher order.
2. Concept, properties of Laplace and inverse Laplace transforms.
3. Solving ordinary differential equations using Laplace transforms techniques.
4. Concept of gradient, divergence, curl and their applications.
5. Line, surface and volume integrals and relations among them.

Course Outcomes:

After learning the content of this course, students will be able to

1. Recognise and solve first-order differential equations, and apply this to Newton's law of cooling and the Law of natural growth and decay.
2. Solve higher order linear differential equation with constant coefficients and few specific non homogeneous terms.
3. Find Laplace and Inverse Laplace transform of various functions and apply it to solve ordinary differential equations.
4. Evaluate the tangent planes and normal lines of any given surface.
5. Evaluate the line, surface and volume integrals and establish the relation among them.

UNIT-I: First Order ODE

8L

Exact differential equations, Equations reducible to exact differential equations, linear and Bernoulli's equations, Orthogonal Trajectories (only in Cartesian Coordinates).

Applications: Newton's law of cooling, Law of natural growth and decay.

UNIT-II: Ordinary Differential Equations of Higher Order

10L

Higher order linear differential equations with constant coefficients: Non-Homogeneous terms of the type e^{ax} , \sin , $\cos ax$, polynomials in x , $e^{ax}V(x)$ and $xV(x)$, method of variation of parameters, Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation. Applications: Electric Circuits

UNIT-III: Laplace Transforms

10L

Laplace Transforms: Laplace Transform of standard functions, First shifting theorem, Second shifting theorem, Unit step function, Dirac delta function, Laplace transforms of functions when they are multiplied and divided by 't', Laplace transforms of derivatives and integrals

of function, Evaluation of integrals by Laplace transforms, Laplace transform of periodic functions, Inverse Laplace transform by different methods, convolution theorem (without proof). Applications: solving Initial value problems by Laplace Transform method.

UNIT-IV: Vector Differentiation

10L

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

UNIT-V: Vector Integrations

10L

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

Text Books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition, 2016.

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
3. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.



ENGINEERING CHEMISTRY
(S24CH202BS)

B.Tech. I Year II Sem.

L T P C

3 1 0 4

Course Objectives:

1. To bring adaptability to new developments in Engineering Chemistry and to acquire the skills required to become a perfect engineer.
2. To include the importance of water in industrial usage, fundamental aspects of battery chemistry, significance of corrosion it's control to protect the structures.
3. To imbibe the basic concepts of petroleum and its products.
4. To acquire required knowledge about engineering materials like cement, smart materials and Lubricants.

Course Outcomes: After learning the content of this course

1. The students are able to understand the basic properties of water and its usage in domestic and industrial purposes.
2. Students will acquire the basic knowledge of electrochemical procedures related to corrosion and its control.
3. They can learn the fundamentals and general properties of polymers and other engineering materials.
4. Gain knowledge about different types of fuels, combustion and refining of petroleum.
5. Student will describe the different types of smart materials, cements, and Lubricants and their engineering applications.

UNIT - I: Water and its treatment

Introduction to hardness of water – Estimation of hardness of water by complexometric method and related numerical problems. Potable water and its specifications - Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and break - point chlorination. Defluoridation- Determination of F^- ion by ion- selective electrode method.

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

UNIT – II Battery Chemistry & Corrosion

Introduction - Classification of batteries- primary, secondary and reserve batteries with examples. Basic requirements for commercial batteries. Construction, working and applications of Lithium-ion battery. Applications of Li-ion battery to electric vehicles.

Fuel Cells- Differences between battery and fuel cell, Construction and applications of Methanol-Oxygen fuel cell[MOFC] and solid-oxide fuel cell [SOFC).

Solar cells: Construction, working and applications of solar cell

Corrosion: Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current methods.

UNIT - III: Polymeric materials

Definition – Classification of polymers with examples – Types of polymerization –addition (free radical addition) and condensation polymerization with examples – Nylon 6:6, Terylene

Plastics: Definition and characteristics- thermoplastic and thermosetting plastics, Preparation, Properties and engineering applications of PVC, Bakelite, Teflon.

Rubbers: Natural rubber and its vulcanization.

Elastomers: Characteristics –preparation – properties and applications of Buna-S, Butyl and Thiokol rubber.

Conducting polymers: Classification with examples-mechanism of conduction in trans-polyacetylene and applications of conducting polymers.

Biodegradable polymers: Concept and advantages - Polylactic acid and poly vinyl alcohol and their applications.

UNIT - IV: Energy Sources

Thermal energy: Introduction, Calorific value of fuel – HCV, LCV- Dulong's formula. Classification- **solid fuels:** coal – analysis of coal – proximate and ultimate analysis and their significance. **Liquid fuels** – petroleum and its refining, cracking types – moving bed catalytic cracking. Knocking – octane and cetane rating, synthetic petrol - Fischer-Tropsch's process; **Gaseous fuels** – composition and uses of natural gas, LPG and CNG.

UNIT - V: Engineering Materials:

Cement: Portland cement, its composition, setting and hardening.

Smart materials and their engineering applications

Shape memory materials- Poly L- Lactic acid. Thermoresponse materials- Polyacryl amides, Poly vinyl amides

Piezoelectric materials-classification with examples, properties and applications.

Lubricants: Classification of lubricants with examples-characteristics of a good lubricant -- properties of lubricants: viscosity, cloud point, pour point, flash point and fire point

TEXT BOOKS:

1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010
2. Engineering Chemistry by Rama Devi, Venkata Ramana Reddy and Rath, Cengage learning, 2016

REFERENCE BOOKS:

1. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi (2015)
2. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi (2011)

NPTEL Courses

<https://nptel.ac.in/courses/122101001>

<https://nptel.ac.in/courses/104103069>

<https://nptel.ac.in/courses/104103071>

<https://nptel.ac.in/courses/104106137>

Animated videos.

<https://www.youtube.com/watch?v=Pu7g3uIG6Zo>

https://www.youtube.com/watch?v=qpFC_Ecu_yQ

<https://www.youtube.com/watch?v=EkjjeS2TATg>

https://www.youtube.com/watch?v=4RDA_B_dRQ0

<https://www.youtube.com/watch?v=cZg4bfEnLcU>

<https://www.youtube.com/watch?v=4vGjHU2YsYM>

<https://www.youtube.com/watch?v=Tn6xKhQ61Vs>



COMPUTER AIDED ENGINEERING GRAPHICS

(S24ME203ES)

B.Tech. I Year II Sem.

L T P C

1 0 2 2

Course Objectives:

To learn

1. To acquire visualization computer drafting skill for ideas in design of engg products.
2. To apply drafting techniques using Auto Cad.
3. To explain principles of conventions in Engg. drawing & to make use of the instruments in real-time industry.
4. To prepare the student to draw pictorial views of solids.
5. To enable the student for creation of 2D & 3D CAD Modeling of objects.
6. To acquire the knowledge to plot conversion of isometric views to orthographic view and vice vers.

Course Outcomes:

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

1. Sketch free hand sketches for all constructions with imaginary and creativity by applying Auto CAD.
2. Construct different curves and scales & to communicate the ideas and information.
3. Draw the projections of objects like straight lines, planes and solids to interpret engineering drawings.
4. Design & prepare working drawings and estimate lateral surface of sheet to make solids.
5. Produce the conversion of the orthographic views in to isometric views and vice versa.

UNIT – I: Introduction to Engineering Graphics: Principles of Engineering Graphics and their Significance, Scales – Plain & Diagonal, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Introduction to Computer aided drafting – views, commands and conics.

UNIT- II: Orthographic Projections: Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures. Auxiliary Planes. Computer aided orthographic projections – points, lines and planes

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

UNIT – IV: Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Development of surfaces using computer aided drafting.

UNIT – V: Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa –Conventions. Conversion of orthographic projection into isometric view using computer aided drafting.

Text Books:

1. Basant Agrawal and C M Agrawal, Engineering Drawing, Third Edition, McGraw Hill
2. N.D. Bhatt /Charotar , Engineering Graphics,15th Edition, McGraw Hill, 2015
3. T. Jeyapoovan, Vikas: S. Chand and company Ltd ,Engineering Drawing and graphics Using Auto CAD ,Third Edition,2022

References:

1. WILEY, Engineering Graphics and Design, Edition 2020
2. M. B. Shah, B.C. Rane / Pearson, Engineering graphics
3. N. S. Parthasarathy and Vela Murali , Engineering Drawing, Oxford
4. PK Balaveera Reddy et al – Computer Aided Engineering Drawing, CBS Publishers



APPLIED MECHANICS

(S24CE204ES)

B.Tech. I Year II Sem.

L T P C

3 0 0 3

Course Objectives: The objectives of this course are to

- Explain the resolution of a system of forces, compute their resultant and solve problems using equations of equilibrium
- Perform analysis of bodies lying on rough surfaces.
- Locate the centroid of a body and compute the area moment of inertia and mass moment of inertia of standard and composite sections
- Explain kinetics and kinematics of particles, projectiles, curvilinear motion, centroidal motion and plane motion of rigid bodies.
- Explain the concepts of work-energy method and its applications to translation, rotation and plane motion and the concept of vibrations

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

- Determine resultant of forces acting on a body and analyse equilibrium of a body subjected to a system of forces.
- Solve problem of bodies subjected to friction.
- Find the location of centroid and calculate moment of inertia of a given section.
- Understand the kinetics and kinematics of a body undergoing rectilinear, curvilinear, rotatory motion and rigid body motion.

UNIT - I

Introduction to Engineering Mechanics - Force Systems: Basic concepts, Particle equilibrium in 2-D & 3-D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces, Components in Space — Resultant- Moment of Forces and its Application; Couples and Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems; Static Indeterminacy.

UNIT - II

Friction: Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, ladder friction
Centroid and Centre of Gravity -Centroid of Lines, Areas and Volumes from first

principle, centroid of composite sections; Centre of Gravity and its implications. – Theorem of Pappus.

UNIT - III

Area moment of inertia- Definition, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections; Product of Inertia, Parallel Axis Theorem, Perpendicular Axis Theorem.

Mass Moment of Inertia: Moment of Inertia of Masses - Transfer Formula for Mass Moments of Inertia — Mass moment of inertia of composite bodies.

UNIT - IV

Kinematics of Particles: Kinematics of particles – Rectilinear motion – Curvilinear motion – Projectiles. Kinetics of Particles: Kinetics of particles – Newton’s Second Law – Differential equations of rectilinear and curvilinear motion – Dynamic equilibrium – Inertia force – D. Alembert’s Principle applied for rectilinear and curvilinear motion.

UNIT – V

Work - Energy Principle: Equation of translation, principle of conservation of energy, work - energy principle applied to particle motion and connected systems, fixed axis rotation. Impulse – Momentum Principle: Introduction, linear impulse momentum, principle of conservation of linear momentum, elastic impact and types of impact, loss of kinetic energy, co efficient of restitution.

TEXT BOOKS:

1. Shames and Rao (2006), Engineering Mechanics, Pearson Education
2. Reddy Vijay Kumar K. and J. Suresh Kumar (2010), Singer’s Engineering Mechanics — Statics & Dynamics

REFERENCE BOOKS:

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



SURVEYING
(S24CE205PC)

B.Tech. I Year II Sem.

L T P C

2 0 0 2

Course Objectives: The first step in engineering practice is surveying and the soundness of any civil engineering work is dependent on the reliability and accuracy of surveying. Therefore, it is imperative that a student of engineering should have good knowledge of surveying. To impart the knowledge of surveying and latest technologies in surveying it is necessary to introduce this subject in the curriculum.

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

- Calculate angles, distances and levels
- Identify data collection methods and prepare field notes
- Understand the working principles of survey instruments
- Estimate measurement errors and apply corrections
- Interpret survey data and compute areas and volumes

UNIT - I

Introduction and Basic Concepts: Introduction, Objectives, classification and principles of surveying, Scales, Shrinkage of Map, Conventional symbols and Code of Signals, Surveying accessories, phases of surveying.

Measurement of Distances and Directions

Linear distances- Approximate methods, Direct Methods- Chains- Tapes, ranging, Tape corrections, indirect methods- optical methods- E.D.M. method.

Prismatic Compass- Bearings, included angles, Local Attraction, Magnetic Declination and dip.

UNIT - II

Levelling and Contouring Leveling- Basics definitions, types of levels and levelling staves, temporary adjustments, methods of levelling, booking and Determination of levels- HI Method-Rise and Fall method, Effect of Curvature of Earth and Refraction.

Contouring- Characteristics and uses of Contours, Direct & Indirect methods of contour surveying, interpolation and sketching of Contours.

Computation of Areas and Volumes

Areas - Determination of areas consisting of irregular boundary and regular boundary (coordinates, MDM, DMD methods), Planimeter.

Volumes - Computation of areas for level section and two level sections with and without transverse slopes, determination of volume of earth work in cutting and embankments, volume of borrow pits, capacity of reservoirs.

UNIT - III

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

Traversing: Methods of traversing, traverse computations and adjustments, Gale's traverse table, Omitted measurements.

UNIT - IV

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

Curves: Types of curves and their necessity, elements of simple curve, setting out of simple Curves,

UNIT - V

Modern Surveying Methods: Total Station and Global Positioning System: Basic principles, classifications, applications, comparison with conventional surveying. Electromagnetic wave theory - electromagnetic distance measuring system - principle of working and EDM instruments, Components

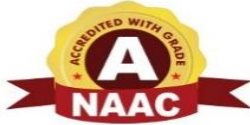
of GPS – space segment, control segment and user segment, reference systems, satellite orbits, GPS observations. Applications of GPS.

TEXT BOOKS:

1. Surveying and levelling by R. Subramanian, Oxford university press, New Delhi.
2. Chandra A M, "Higher Surveying", New age International Pvt. Ltd., Publishers, New Delhi, 2002.
3. Hoffman. B, H. Lichtenegga and J. Collins, Global Positioning System - Theory and Practice, Springer -Verlag Publishers, 2001.

REFERENCE BOOKS:

1. Arthur R Benton and Philip J Taety, Elements of Plane Surveying, McGraw Hill – 2000.
2. Arora K R “Surveying Vol 1, 2 & 3), Standard Book House, Delhi, 2004.
3. Surveying (Vol – 1, 2 & 3), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi.
4. Chandra A M, “Plane Surveying”, New Age International Pvt. Ltd., New Delhi, 2002.
5. Surveying by Bhavikatti; Vikas publishing house ltd.
6. Duggal S K, “Surveying (Vol – 1 & 2), Tata McGraw Hill Publishing Co. Ltd. New Delhi, 2004.
7. Surveying and leveling by R. Agor Khanna Publishers 2015.



PYTHON PROGRAMMING LABORATORY
(S24CS206ES)

B.Tech. I Year II Sem.

L T P C

1 2 2 0

Course Objectives:

1. To install and run the Python interpreter
2. To learn control structures.
3. To Understand Lists, Dictionaries in python
4. To Handle Strings and Files in Python

Course Outcomes:

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

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

Week-1:

1. i) Use a web browser to go to the Python website <http://python.org>. This page contains information about Python and links to Python-related pages, and it gives you the ability to search the Python documentation.
ii) Start the Python interpreter and type help () to start the online help utility.
2. Start a Python interpreter and use it as a Calculator.
3.
 - 1) Write a program to calculate compound interest when principal, rate and number of periods are given.
 - 2) periods are given.
 - 3) Given coordinates (x1, y1), (x2, y2) find the distance between two points
4. Read name, address, email and phone number of a person through key board and print the details.

Week-2:

1. Print the below triangle using for loop.
5
4 4
3 33
2 222
1 1111
2. Write a program to check whether the given input is digit or lowercase character or uppercase character or a special character (use 'if-else-if' ladder)

3. Python Program to Print the Fibonacci sequence using while loop
4. Python program to print all prime numbers in a given interval (use break)

Week-3:

1. i) Write a program to convert a list and tuple into arrays.
ii) Write a program to find common values between two arrays.
2. Write a function called gcd that takes parameters a and b and returns their greatest common divisor.
3. Write a function called palindrome that takes a string argument and returns True if it is a palindrome and False otherwise. Remember that you can use the built-in function len to check the length of a string.

Week-4:

1. Write a function called is_sorted that takes a list as a parameter and returns True if the list is sorted in ascending order and False otherwise.
2. Write a function called has_duplicates that takes a list and returns True if there is any element that appears more than once. It should not modify the original list.
 - i) Write a function called remove_duplicates that takes a list and returns a new list with only the unique elements from the original. Hint: they don't have to be in the same order.
 - ii) The wordlist I provided, words.txt, doesn't contain single letter words. So you might want to add "I", "a", and the empty string.
 - iii) Write a python code to read dictionary values from the user. Construct a function to invert its content. i.e., keys should be values and values should be keys.
3. i) Add a comma between the characters. If the given word is 'Apple', it should become 'A,p,p,l,e'.
 - ii) Remove the given word in all the places in a string?
 - iii) Write a function that takes a sentence as an input parameter and replaces the first letter of every word with the corresponding uppercase letter and then stop the letters in the word by corresponding letters in lowercase without using a built-in function?
4. Write a recursive function that generates all binary strings of n-bit length

Week-5:

1. i) Write a python program that defines a matrix and prints
ii) Write a python program to perform addition of two square matrices
iii) Write a python program to perform multiplication of two square matrices
2. How do you make a module? Give an example of construction of a module using different geometrical shapes and operations on them as its functions.
3. Use the structure of exception handling all general purpose exceptions.

Week-6:

1. a. Write a function called draw_rectangle that takes a Canvas and a Rectangle as arguments and draws a representation of the Rectangle on the Canvas.
b. Add an attribute named color to your Rectangle objects and modify draw_rectangle so that it uses the color attribute as the fill color.
c. Write a function called draw_point that takes a Canvas and a Point as arguments and draws a representation of the Point on the Canvas.
d. Define a new class called Circle with appropriate attributes and instantiate a few Circle objects. Write a function called draw_circle that draws circles on the canvas.

2. Write a Python program to demonstrate the usage of Method Resolution Order (MRO) in multiple levels of Inheritances.
3. Write a python code to read a phone number and email-id from the user and validate it for correctness.

Week-7

1. Write a Python code to merge two given file contents into a third file.
2. Write a Python code to open a given file and construct a function to check forgiven words present in it and display on found.
3. Write a Python code to Read text from a text file, find the word with most number of occurrences
4. Write a function that reads a file *file1* and displays the number of words, number of vowels, blank spaces, lowercase letters and uppercase letters.

Week-8:

1. Import numpy, Plotpy and Scipy and explore their functionalities.
2. a) Install NumPy package with pip and explore it.
3. Write a program to implement Digital Logic Gates–AND, OR, NOT, EX-OR
4. Write a program to implement Half Adder, Full Adder, and Parallel Adder
5. Write a GUI program to create a window wizard having two text labels, two text fields and two buttons as Submit and Reset.

Week-9

Create a class Car with attributes like brand, model, and year. Define a method car_details() that prints the details of the car. Create an object of this class and call the method to display the car's details.

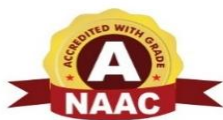
1. Create a class Animal with a method sound() that prints "This animal makes a sound." Create a subclass Dog that inherits from Animal and overrides the sound() method to print "The dog barks." Demonstrate the inheritance and method overriding.
2. Create two classes, Cat and Bird, both having a method speak() that prints a different message for each class. Write a function that takes an object and calls its speak() method. Demonstrate polymorphism by passing objects of both classes to this function.

Text Books:

1. Super charged Python: Take your code to the next level, Overland Learning Python, MarkLutz,O'reilly

Reference Books:

1. Python for Data Science, Dr. Mohd. Abdul Hameed, Wiley Publications-1stEd.2021.
2. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
3. Python Programming A Modular Approach with Graphics, Database, Mobile, and Web Applications, Sheetal Taneja, Naveen Kumar, Pearson
4. Programming with Python, A User's Book, Michael Dawson, Cengage Learning, India Edition
5. Think Python, Allen Downey, Green Tea Press
6. Core Python Programming, W. Chun, Pearson
7. Introduction to Python, Kenneth A. Lambert, Cengage



ENGINEERING CHEMISTRY LABORATORY

(S24CH207BS)

B.Tech. I Year II Sem.

L T P C

0 0 2 1

Course Objectives:

The course consists of experiments related to the principles of chemistry required for engineering student.

- Students will learn Estimation of hardness of water to check its suitability for drinking purpose.
- Students are able to perform estimation of acid using bases by conductometry and pH-metry methods and Fe(II) using std. KMnO_4 by potentiometric method.
- Students will learn to prepare polymers such as Bakelite and Thiokol rubber in the laboratory.
- Students will learn skills related to the lubricant properties such as saponification value and viscosity of lubricating oils.
- Students will learn how to draw the chemical structures using chem draw/chemsketch softwares.

Course Outcomes:

The experiments will make the student gain skills on:

- Determination of parameters like hardness of water
- Able to perform methods such as conductometry, potentiometry and pH-metry in order to find the concentrations or equivalence points of acids, bases and reducing agents.
- Preparation of polymers like Bakelite and Thiokol rubber.
- Estimation of saponification value and viscosity of lubricating oils.
- Determination of the strength of sulphuric acid in batteries.
- Drawing chemical structures using Chemdraw/chemsketch softwares

List of Experiments:

- **Volumetric Analysis:** Estimation of Hardness of water by EDTA Complexometry method.
- **Conductometry:** Estimation of the concentration of an acid by Conductometry.
- **Potentiometry:** Estimation of the amount of Fe^{+2} by Potentiometry.

- **pH Metry:** Determination of an acid concentration using pH meter.
- Determination of pH of mineral water, soft drinks and fruit juice using universal indicator, universal pH paper and compare with pH-meter.

Preparations:

- Preparation of Bakelite.
- Preparation of Thiokol rubber.

Lubricants:

- Estimation of acid value of given lubricant oil.
- Estimation of Viscosity of lubricant oil using Ostwald's Viscometer.

Battery: Determination of strength of sulphuric acid in Lead-acid battery by acid-base titration.

Computer based lab(virtual lab):

Draw the following chemical structures using Chemdraw/Chemsketch softwares

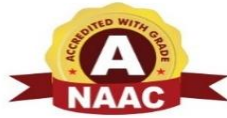
- i. EDTA ii. EBT iii. M-EDTA iv. M-EBT

REFERENCE BOOKS:

- Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna, S Chand Publications, New Delhi (2022)
- Vogel's text book of practical organic chemistry 5th edition
- Inorganic Quantitative analysis by A.I. Vogel, ELBS Publications.

College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi (2007).

<https://www.acdlabs.com/resources/free-chemistry-software-apps/chemsketch-freeware/>



DESIGN THINKING

(S24ME208ES)

B.Tech. I Year II Sem.

L T P C

0 0 2 1

Course Objectives:

The main objectives of this course are

1. To inculcate attitude to solve societal problems using design thinking tools.
2. To come-up with proper design which further leads to successful products or enterprises.
3. To install a sense of significance towards applying creativity to product and service design.

UNIT 1:

Introduction to Design Thinking: Origin of Design thinking, Importance of Design thinking, Understanding Design thinking: A non-linear process - 5-stage d.school process model, Application of design thinking.

UNIT 2:

Empathy: Difference between Empathy and Sympathy, Role of Empathy in design thinking, Empathy mapping, Understanding empathy tools: Customer Journey map, Persona; Importance of Empathizing before Ideating.

Define: Explore define phase in Design Thinking, Methods of Define phase.

UNIT 3:

Ideation : Introduction, Types of Thinking- convergent, divergent, critical and creative thinking; Ideation Methods-Brainstorming, Story boarding, Bingo Selection, Six Thinking Hats, Mind mapping.

UNIT 4:

Prototyping and Testing: Prototyping and methods of prototyping. User testing methods, Advantages and disadvantages of user Testing/ Validation. Iteration and Pitching.

UNIT 5:

Innovation: Definition, Innovation and creativity, Innovation Triangle- Desirability, Feasibility and Viability; Types of Innovation – Product Innovation, Process Innovation and Business Model Innovation.

Design thinking in various sectors: Design thinking to meet corporate needs. Case studies in Information Technology, Finance, Education, Management, Health care and Retail sector.

Text Books:

1. Daniel Ling, Complete Design Thinking Guide for Successful Professionals, Create Space Independent Publishing, 2015.
2. Andrew Pressman, Design Thinking: A Guide to Creative Problem Solving for Everyone, Routledge Taylor and Francis group, 2019.



Surveying Laboratory-1

(S24CE209PC)

B.Tech. I Year II Sem.

L T P C

0 0 2 1

Course Objective:

1. Student will be able to learn and understand the various basic concept and principles used in surveying like Chain Surveying, Compass Surveying, Plane Table Surveying, and Levelling Surveying.
2. Student will be able to learn and understand various instrument used in surveying.
3. Student will learn and understand how to calculate Area of plot and Ground.
4. Student will learn and understand about Horizontal Angle, Vertical Angle, Horizontal distance and Vertical distance to study the ground profile.

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

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

CYCLE - I

1. Chaining of a line using chain, measurements of area by cross staff survey.
2. Measurement of distance between two points when there is an obstacle for both chaining and ranging. Compass survey
3. Traversing by compass and adjustments in included angles and measurement of area - graphical adjustments.
4. Distance between two inaccessible points by compass. Plane Table Surveying
5. Measurement & Plotting of the area by Radiation method.
6. Determination of Positions objects by Intersection Method – Plane Table Survey.
7. Traverse by Plane table Survey

CYCLE – II

Leveling

8. Measurement of elevation of various given points.
9. Elevation difference between two given points by reciprocal leveling.
10. Longitudinal Leveling
11. Cross – section Leveling
12. Plotting of Contours by Indirect Method