

**JNTUH UNIVERSITY COLLEGE OF ENGINEERING, SCIENCE & TECHNOLOGY  
HYDERABAD**

**B.Tech. in CIVIL ENGG.  
COURSE STRUCTURE & SYLLABUS (R25 Regulations)**

Applicable from AY 2025-26 Batch

**I Year I Semester (25 Hours)**

S. No.	Course Code	Course Title	L	T	P	Credits
1	BSC	Matrices and Calculus	3	1	0	4
2	BSC	Engineering Physics	3	0	0	3
3	CSC	C Programming and Data Structures	3	0	0	3
4	MEC	Computer Aided Engineering Graphics	2	0	2	3
5	MEC	Engineering Workshop	0	0	2	1
6	HSC	English for Skill Enhancement	3	0	0	3
7	BSC	Engineering Physics Laboratory	0	0	2	1
8	CSC	C Programming and Data Structures Laboratory	0	0	2	1
9	HSC	English Language and Communication Skills Laboratory	0	0	2	1
10	MC	Induction Program				
		<b>Total Credits</b>	<b>14</b>	<b>01</b>	<b>10</b>	<b>20</b>

**I Year II Semester (27 Hours)**

S. No.	Course Code	Course Title	L	T	P	Credits
1	BSC	Ordinary Differential Equations and Vector Calculus	3	0	0	3
2	BSC	Applied Chemistry	3	0	0	3
3	ESC	Basic Electrical and Electronics Engineering	3	0	0	3
4	DC	Engineering Geology and Building Materials	3	0	0	3
5	DC	Geology and Building Materials Testing Laboratory	0	0	2	1
6	DC	Engineering Mechanics	3	1	0	4
7	BSC	Chemistry Laboratory for Engineers	0	0	2	1
8	CSC	Python Programming Laboratory	0	1	2	2
9	ESC	Basic Electrical Engineering Laboratory	0	0	2	1
10	MC	NSS	0	0	2	0
		<b>Total Credits</b>	<b>15</b>	<b>2</b>	<b>10</b>	<b>21</b>

**II YEAR I SEMESTER(25 Hours)**

S. No.	Course Code	Course Title	L	T	P	Credits
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1	BSC	Probability and Statistics	3	0	0	3
2	DC	Building Planning and Construction	3	0	0	3
3	DC	Strength of Materials	3	0	0	3
4	DC	Surveying and Geomatics	3	0	0	3
5	DC	Fluid Mechanics	3	0	0	3
6	BSC	Computational Mathematics Laboratory	0	0	2	1
7	DC	Computer Aided Building Drafting Laboratory	0	0	2	1
8	DC	Strength of Materials Laboratory	0	0	2	1
9	DC	Surveying and <u>Geomatics</u> Laboratory	0	0	2	1
10	SDC	Design Thinking Laboratory	0	0	2	1
		<b>Total Credits</b>	<b>15</b>	<b>0</b>	<b>10</b>	<b>20</b>

#### II YEAR II SEMESTER(27 Hours)

S. No.	Course Code	Course Title	L	T	P	Credits
1	DC	Concrete Technology	3	0	0	3
2	DC	Advanced Strength of Materials	3	0	0	3
3	DC	Environmental Engineering	3	0	0	3
4	DC	Hydraulics and Hydraulic Machinery	3	0	0	3
5	DC	Basic Structural Analysis	2	0	0	2
6	DC	Innovation and Entrepreneurship	2	0	0	2
7	DC	Environmental Engineering Laboratory	0	0	2	1
8	DC	Concrete Technology Laboratory	0	0	2	1
9	DC	Hydraulics and Hydraulic Machinery Laboratory	0	0	2	1
10	SDC	Digital Surveying and GIS Laboratory	0	0	2	1
11	MC	Environmental Science	1	0	0	0
12	DC	Real Time / Field Based Project	0	0	2	1
		<b>Total Credits</b>	<b>17</b>	<b>0</b>	<b>10</b>	<b>21</b>

#### III YEAR I SEMESTER(26 Hours)

S. No.	Course Code	Course Title	L	T	P	Credits
1	DC	Reinforced Concrete Design	3	0	0	3
2	DC	Soil Mechanics	3	0	0	3
3	DC	Estimation , Quantity Surveying & Valuation	2	0	0	2

4	PE	Professional Elective-I	3	0	0	3
5	OE	Open Elective-I	2	0	0	2
6	DC	Water Resources Engineering	3	0	0	3
7	DC	Geotechnical Engineering Laboratory	0	0	2	1
8	DC	Advanced English Communication Skills Laboratory	0	0	2	1
9	SDC	Project Management Software Laboratory	0	0	2	1
10	MC	Gender Sensitization Lab*/ Human Values and Professional Ethics*	1	0	0	0
11	MC	Yoga	0	0	2	0
		<b>Total Credits</b>	<b>18</b>	<b>0</b>	<b>08</b>	<b>20</b>

**\*Note: For the courses Gender Sensitization Lab and Human Values and Professional Ethics-** one hour of instruction will be conducted on alternate weeks. For example, if a one-hour class for Gender Sensitization Lab is conducted this week, then a one-hour class for Constitution of India will be conducted in the following week.

### **III YEAR II SEMESTER(25 Hours)**

S. No	Course Code	Course Title	L	T	P	Credits
1	DC	Foundation Engineering	3	0	0	3
2	DC	Design of Steel Structures	3	1	0	4
3	MS	Business Economics and Financial Analysis	3	0	0	3
4	PE	Professional Elective-II	3	0	0	3
5	OE	Open Elective – II	2	0	0	2
6	DC	Transportation Engineering	3	0	0	3
7	DC	Computer Aided Design Laboratory	0	0	2	1
8	DC	Transportation Engineering Laboratory	0	0	2	1
9	SDC	Building Information Modelling Laboratory	0	0	2	1
10	MC	Indian Knowledge System	1	0	0	0
		<b>Total Credits</b>	<b>18</b>	<b>1</b>	<b>06</b>	<b>21</b>

### **IV YEAR I SEMESTER (25 Hours)**

S. No.	Course Code	Course Title	L	T	P	Credits
1	DC	Railways, Waterways and Airport Engineering	3	0	0	3

2	DC	Prestressed Concrete	3	0	0	3
3	MS	Fundamentals of Management	3	0	0	3
4	PE	Professional Elective-III	3	0	0	3
5	PE	Professional Elective – IV	3	0	0	3
6	OE	Open Elective – III	2	0	0	2
7	DC	Civil Engineering Software Laboratory	0	0	2	1
8	DC	Computational Laboratory	0	0	2	1
9	DCP	Industry Oriented Mini Project/ Summer Internship	0	0	4	2
		<b>Total Credits</b>	<b>17</b>	<b>0</b>	<b>08</b>	<b>21</b>

#### IV YEAR II SEMESTER(34 Hours)

S. No.	Course Code	Course Title	L	T	P	Credits
1	PE	Professional Elective – V	3	0	0	3
2	PE	Professional Elective – VI	3	0	0	3
3	DCP	Project Work	0	0	28	14
		<b>Total Credits</b>	<b>6</b>	<b>0</b>	<b>28</b>	<b>20</b>

**\*Note:** Students who wish to exit after II Year II Semester has to register for this optional course and acquire the credits allotted by doing 6 weeks Work-based Vocational Course/ Internship or Apprenticeship. Please refer R25 Academic Regulations for more information.

#### Professional Elective - I

1	Indeterminate Structural Analysis
2	Air Pollution and Control Measures
3	Green Building Technologies
4	Advanced Construction Technologies
5.	Advanced Concrete Technology

#### Professional Elective – II

1	AI and ML Applications in Civil Engineering
2	Remote Sensing and GIS
3	Construction Planning and Management
4	Industrial Waste Water Treatment
5	EIA and Life Cycle Assessment

### **Professional Elective- III**

1	Smart Cities and Urban Innovation
2	Big Data Analytics in Civil Engineering
3	Ground Improvement Techniques
4	Ground Water Hydrology
5	Pre-Engineered Buildings

### **Professional Elective- IV**

1	Solid and Hazardous Waste Management
2	IoT Applications in Civil Engineering
3	Intelligent Transportation Systems
4	Elements of Earthquake Engineering
5	Hydraulic Structures

### **Professional Elective- V**

1	Pavement Engineering
2	Digital Image Processing in Civil Engineering
3	Urban Hydrology
4	Earth Retaining Structures
5.	Finite Element Analysis

### **Professional Elective- VI**

1	Repair and Rehabilitation of Structures
2	Highway Construction and Practices
3	Sustainable Engineering Technologies
4	Climate Change Adaptation and Mitigation
5	Rock Mechanics

## **OPEN ELECTIVES**

### **Open Elective- I**

1	Disaster Management
2	Low Carbon Materials and Green Buildings

### **Open Elective- II**

1	Building Science and Technology
2	Environmental Impact Assessment

### Open Elective- III

1	Road Safety Engineering
2	Building Services Engineering

## MATRICES AND CALCULUS

**B.Tech. I Year I Sem.**

**L T P C**

**3 1 0 4**

<b>Pre-requisites: Mathematical Knowledge at pre-university level</b>	
<b>Objectives:</b>	
To learn	
<ul style="list-style-type: none"> <li>• Applying basic operations on matrices and their properties.</li> <li>• Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.</li> <li>• Concept of eigenvalues and eigenvectors and to reduce the quadratic form to canonical form</li> <li>• Geometrical approach to the mean value theorems and their application to the mathematical problems</li> <li>• Evaluation of surface areas and volumes of revolutions of curves.</li> <li>• Evaluation of improper integrals using Beta and Gamma functions.</li> <li>• Partial differentiation, concept of total derivative</li> <li>• Finding maxima and minima of function of two and three variables.</li> <li>• Evaluation of multiple integrals and their applications</li> </ul>	
<b>UNIT-I: Matrices</b>	<b>10 L</b>
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, Gauss Seidel Iteration Method.	
<b>UNIT-II: Eigen values and Eigen vectors</b>	<b>10 L</b>
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.	
<b>UNIT-III: Calculus</b>	<b>10 L</b>
Limits and Continuous function and its properties, 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 (All the theorems without proof).	
<b>UNIT-IV: Multivariable Calculus (Partial Differentiation and applications)</b>	<b>10 L</b>
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.	
<b>UNIT-V: Multivariable Calculus (Integration)</b>	<b>8 L</b>
Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of	

integration (only Cartesian form), Change of variables for double integrals (Cartesian to polar), Evaluation of Triple Integrals, Change of variables for triple integrals (Cartesian to Spherical and Cylindrical polar coordinates).

Applications: Areas by double integrals and volumes by triple integrals.

**Course outcomes:**

After learning the contents of this paper, the student must be able to

- Write the matrix representation of a set of linear equations and to analyze the solution of the system of equations
- Find the Eigenvalues and Eigen vectors
- Reduce the quadratic form to canonical form using orthogonal transformations.
- Solve the applications on the mean value theorems.
- Evaluate the improper integrals using Beta and Gamma functions
- Find the extreme values of functions of two variables with/ without constraints.
- Evaluate the multiple integrals and apply the concept to find areas, volumes,

**Text Books**

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

**References**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9<sup>th</sup> Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9<sup>th</sup> 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.

**ENGINEERING PHYSICS**  
(Common To All Non-circuit Branches)

**B.Tech. II Year I Sem.**

**L T P C**

**3 0 0 3**

**Pre-requisites: 10+2 Physics**

**COURSE OBJECTIVES:**

- To understand the wave nature of light and related phenomena such as interference, diffraction and polarization.
- To explore the acoustic properties of buildings and the generation, detection and applications of ultrasonic waves.
- To provide a foundation in quantum mechanics and introduce basic principles of quantum computing.
- To study the classification, properties, and technological applications of magnetic, dielectric and superconducting materials.
- To understand the principles, types, and applications of lasers and optical fiber communication systems.

**UNIT - I: WAVE OPTICS**

Huygens' principle, superposition of waves and interference of light by wave front splitting and amplitude splitting; Young's double slit experiment, Newton's rings, Fraunhofer diffraction from a single slit and a circular aperture, Diffraction gratings and their resolving power. Introduction to polarization, double refraction, Nicol's Prism, quarter and half wave plates.

**UNIT - II: ACOUSTICS OF BUILDINGS & ULTRASONICS**

Introduction to Acoustics of Buildings, Reverberation, Time of Reverberation, Sabine's Formulae, Basic Requirements of Acoustically good hall, Factors affecting the Architectural Acoustics and their Remedies. Introduction to Ultrasonics, Production of Ultrasonics by Piezoelectric and Magnetostriction Methods, Detection of Ultrasonics by Kundt's Tube and Quartz Crystal Methods, Applications of Ultrasonics.

**UNIT - III: QUANTUM MECHANICS AND QUANTUM COMPUTING**

Introduction, de-Broglie hypothesis, Heisenberg uncertainty principle, physical significance of wave function, postulates of quantum mechanics: operators in quantum mechanics, Eigen values and Eigen functions, expectation value; Schrödinger's time independent wave equation, particle in a 1D box. Introduction to Quantum Computing, linear algebra for quantum computation, Dirac's Bra and Ket notation and their properties, Hilbert space, Bloch's sphere, concept of quantum computer, classical bits, Qubits.

#### **UNIT - IV: MAGNETIC AND DIELECTRIC MATERIALS**

Introduction to magnetic materials, origin of magnetic moment-classification of magnetic materials, hysteresis, Weiss domain theory of ferromagnetism, soft and hard magnetic materials, introduction to superconductivity; properties, Type –I and Type –II superconductors.Applications of superconductors.Introduction to dielectric materials, types of polarization,electronic and ionic polarizabilities.Ferroelectric, piezoelectric, pyroelectric materials and their applications.

#### **UNIT - V: LASER AND FIBRE OPTICS**

Introduction to laser, characteristics of laser, population inversion, pumping, lasing action, Einstein coefficients and their relations, Ruby laser, He-Ne laser, CO<sub>2</sub> laser, semiconductor diode laser, applications of laser.Introduction to fibre optics, total internal reflection, construction of optical fibre, acceptance angle, numerical aperture, classification of optical fibres, losses in optical fibre, optical fibre for communication system, applications.

#### **COURSE OUTCOMES:**

- Students will be able to explain and analyze optical phenomena such as interference, diffraction, and polarization using wave theory.(SDG 9)
- Students will demonstrate understanding of architectural acoustics and the generation and detection techniques of ultrasonic waves.(SDG 4)
- Students will apply quantum mechanical concepts like wave functions and Schrödinger's equation and explain the structure of a quantum computer.(SDG 9)
- Students will classify magnetic and dielectric materials and describe their behavior, including superconductivity and various polarization effects.(SDG 9)
- Students will describe laser operation principles and fiber optics fundamentals and apply them in communication and instrumentation systems.(SDG 9, SDG 7)

#### **TEXT BOOKS:**

1. Walter Borhardt-Ott,*Crystallography: An Introduction*, Springer.
2. Charles Kittel, *Introduction to Solid State Physics*, John Wiley & Sons, Inc.
3. Thomas G. Wong, *Introduction to Classical and Quantum Computing*, Rooted Grove

#### **REFERENCE BOOKS:**

1. JozefGruska, *Quantum Computing*, McGraw Hill
2. Michael A. Nielsen & Isaac L. Chuang, *Quantum Computation and Quantum Information*, Cambridge University Press.
3. John M. Senior, *Optical Fiber Communications Principles and Practice*, Pearson Education Limited.

# C PROGRAMMING AND DATA STRUCTURES

**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, 3<sup>rd</sup> 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.

# COMPUTER AIDED ENGINEERING GRAPHICS

**B.Tech. I Year I Sem.**

**L T P C**

**2 0 2 3**

## **Course Objectives:**

1. To develop the ability of visualization of different objects through technical drawings
2. To acquire computer drafting skill for communication of concepts, ideas in the design of engineering products

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

1. Apply computer aided drafting tools to create 2D and 3D objects
2. sketch conics and different types of solids
3. Appreciate the need of Sectional views of solids and Development of surfaces of solids
4. Read and interpret engineering drawings
5. Conversion of orthographic projection into isometric view and vice versa manually and by using computer aided drafting

## **UNIT – I: Introduction to Engineering Graphics**

Principles of Engineering Graphics and their Significance, Geometrical Constructions, 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 (Conventional and Computer Aided)**

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: (Conventional and Computer Aided)**

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 (Conventional and Computer Aided)**

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. Engineering Drawing,N.D. Bhatt,Charotar, 54<sup>th</sup> Edition, 2023.
2. Engineering Drawing and graphics Using AutoCAD, T. Jeyapoovan andVikas: S. Chand and company Ltd., 3<sup>rd</sup>Edition,2010.

**REFERENCE BOOKS:**

1. Engineering Drawing, Basant Agrawal and C M Agrawal, McGraw Hill, 3<sup>rd</sup> Edition, 2019.
2. Engineering Graphics and Design, WILEY, John Wiley & Sons Inc, 3<sup>rd</sup>Edition, 2020.
3. Engineering Drawing, M. B. Shah and B.C. Rane, Pearson, 2<sup>nd</sup> Edition, 2009.
4. Engineering Drawing, N. S. Parthasarathy and Vela Murali, Oxford, 1<sup>st</sup> Edition, 2015.
5. Computer Aided Engineering Drawing, K Balaveera Reddy, CBS Publishers, 2<sup>nd</sup> Edition, 2015.

**Note: - External examination is conducted in conventional mode and internal evaluation to be done by both conventional as well as using computer aided drafting.**

# ENGINEERING WORKSHOP

**B.Tech. I Year I Sem.**

**L T P C**

**0 0 2 1**

**Pre-requisites:** Practical skill

**Course Objectives:**

- To Study of different hand operated power tools, uses and their demonstration.
- To gain a good basic working knowledge required for the production of various engineering products.
- To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.
- To develop a right attitude, team working, precision and safety at work place.
- It explains the construction, function, use and application of different working tools, equipment and machines.
- To study commonly used carpentry joints.
- To have practical exposure to various welding and joining processes.
- 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:

- CO 1: Study and practice on machine tools and their operations
- CO 2: Practice on manufacturing of components using workshop trades including plumbing, fitting, carpentry, foundry, house wiring and welding.
- CO 3: Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
- CO 4: Apply basic electrical engineering knowledge for house wiring practice.

**1. TRADES FOR EXERCISES:**

**At least two exercises from each trade:**

- I. Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
- II. Fitting – (V-Fit, Dovetail Fit & Semi-circular fit)
- III. Tin-Smithy – (Square Tin, Rectangular Tray & Conical Funnel)
- IV. Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)
- V. Welding Practice – (Arc Welding & Gas Welding)
- 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:**

Plumbing, Machine Shop, Metal Cutting (Water Plasma), 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

**B.Tech. I Year I Sem.**

**L T P C**

**3 0 0 3**

### INTRODUCTION

National Education Policy-2020 aims at preparing students with knowledge, skills, values, leadership qualities and initiates them for lifelong learning. It also emphasizes language study and promotion of languages through understanding and proper interpretation. English language is central to the educational eco system. The importance of language as medium of communication for personal, social, official and professional needs to be emphasized for clear and concise expression. Teaching and learning of receptive and productive skills viz., Listening, Speaking, Reading and Writing (LSRW) are to be taught and learnt effectively in the undergraduate Engineering programs. Learners should be encouraged to engage in a rigorous process of learning to become proficient users of English language by adopting a deeply focused and yet flexible approach as opposed to rote learning.

In this connection, suitable syllabus, effective pedagogy, continuous assessments and students' involvement result in productive learning. This course supports the latest knowledge and skill requirements and shall meet specified learning outcomes. The main objectives of English language teaching and learning as medium of communication and for promotion of cultural values are embedded in this syllabus. Efforts are being made in providing a holistic approach towards value-based language learning which equips the learner with receptive as well as productive skills.

The focus in this syllabus is on skill development, fostering ideas and practice of language skills in various contexts and cultures in the areas of vocabulary, grammar, reading and writing. For this, the teachers should use the prescribed textbook for detailed study. The students should be encouraged to read the texts leading to reading comprehension. The time should be utilized for working out the exercises given after each excerpt, and also for supplementing the exercises

with authentic materials of a similar kind, for example, newspaper articles, advertisements, promotional material.

### **LEARNING OBJECTIVES**

This course will enable the students to:

- a. Improve their vocabulary.
- b. Use appropriate sentence structures in their oral and written communication.
- c. Develop their reading and study skills.
- d. Equip students to write paragraphs, essays, précis and draft letters.
- e. Acquire skills for Technical report writing.

### **COURSE OUTCOMES**

Students will be able to:

- CO1** Choose appropriate vocabulary in their oral and written communication. **(SDG 4, 8)**
- CO2** Demonstrate their understanding of the rules of functional grammar and sentence structures. **(SDG 4)**
- CO3** Develop comprehension skills from known and unknown passages. **(SDG 4, 8)**
- CO4** Write paragraphs, essays, précis and draft letters. **(SDG 4)**
- CO5** Write abstracts and reports in various contexts. **(SDG 4, 8)**

### **SYLLABUS**

The course content / study material is divided into **Five Units**.

#### **Unit –I**

**Theme:** Perspectives

**Lesson on ‘The Generation Gap’ by Benjamin M. Spock from the prescribed textbook titled *English for the Young in the Digital World* published by Orient BlackSwan Pvt. Ltd.**

**Vocabulary:** The Concept of Word Formation -The Use of Prefixes and Suffixes - Words Often Misspelt - Synonyms and Antonyms

**Grammar:** Identifying Common Errors in Writing with Reference to Parts of Speech particularly Articles and Prepositions – Degrees of Comparison

**Reading:** Reading and Its Importance- Sub Skills of Reading – Skimming and Scanning.

**Writing:** Sentence Structures and Types -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for Writing Precisely –Nature and Style of Formal Writing.

#### Unit –II

**Theme:** Digital Transformation

**Lesson on ‘Emerging Technologies’ from the prescribed textbook titled *English for the Young in the Digital World* published by Orient BlackSwan Pvt. Ltd.**

**Vocabulary:** Homophones, Homonyms and Homographs

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

**Reading:** Reading Strategies-Guessing Meaning from Context – Identifying Main Ideas – Exercises for Practice

**Writing:** Paragraph Writing – Types, Structures and Features of a Paragraph - Creating Coherence – Linkers and Connectives - Organizing Principles in a Paragraph – Defining- Describing People, Objects, Places and Events – Classifying- Providing Examples or Evidence - Essay Writing - Writing Introduction and Conclusion.

#### Unit –III

**Theme:** Attitude and Gratitude

**Poems on ‘Leisure’ by William Henry Davies and ‘Be Thankful’ - Unknown Author from the prescribed textbook titled *English for the Young in the Digital World* published by Orient BlackSwan Pvt. Ltd.**

**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 – Identifying Topic Sentence and Providing Supporting Ideas - Exercises for Practice.

**Writing:** Format of a Formal Letter-Writing Formal Letters E.g., Letter of Complaint, Letter of Requisition, Job Application with CV/Resume –Difference between Writing a Letter and an Email - Email Etiquette.

#### Unit –IV

**Theme:** Entrepreneurship

**Lesson on ‘Why a Start-Up Needs to Find its Customers First’ by Pranav Jain from the prescribed textbook titled *English for the Young in the Digital World* published by Orient BlackSwan Pvt. Ltd.**

- Vocabulary:** Standard Abbreviations in English – Inferring Meanings of Words through Context – Phrasal Verbs – Idioms.
- Grammar:** Redundancies and Clichés in Written Communication – Converting Passive to Active Voice and Vice-Versa.
- Reading:** Prompt Engineering Techniques– Comprehending and Generating Appropriate Prompts - Exercises for Practice
- Writing:** Writing Practices- Note Making-Précis Writing.

**Unit –V**

**Theme:** **Integrity and Professionalism**  
**Lesson on ‘Professional Ethics’ from the prescribed textbook titled *English for the Young in the Digital World* published by Orient BlackSwan Pvt. Ltd.**

- Vocabulary:** Technical Vocabulary and their Usage– One Word Substitutes – Collocations.
- Grammar:** Direct and Indirect Speech - Common Errors in English (Covering all the other aspects of grammar which were not covered in the previous units)
- Reading:** Survey, Question, Read, Recite and Review (SQ3R Method) – Inferring the Meaning and Evaluating a Text- Exercises for Practice
- Writing:** **Report Writing - Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Technical 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: 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.)

**Prescribed Textbook**

1. Board of Editors. 2025. *English for the Young in the Digital World*. Orient BlackSwan Pvt. Ltd.

**References:**

1. Swan, Michael. (2016). *Practical English Usage*. Oxford University Press. New Edition.
2. Karal, Rajeevan. 2023. *English Grammar Just for You*. Oxford University Press. New Delhi
3. 2024. *Empowering with Language: Communicative English for Undergraduates*. Cengage Learning India Pvt. Ltd. New Delhi
4. Sanjay Kumar & Pushp Lata. 2022. *Communication Skills – A Workbook*. Oxford Univeristy Press. New Delhi
5. Wood,F.T. (2007). *Remedial English Grammar*. Macmillan.

6. Vishwamohan, Aysha. (2013). *English for Technical Communication for Engineering Students*.  
Mc Graw-Hill Education India Pvt. Ltd.

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## ENGINEERING PHYSICS LABORATORY

(Common To All Non-circuit Branches)

**B.Tech. II Year I Sem.**

**L T P C**

**0 0 2 1**

### **COURSE OBJECTIVES:**

- To explore the electromagnetic and dielectric behavior of materials through experiments such as B-H curve and dielectric constant determination.
- To understand fundamental quantum phenomena by experimentally determining physical constants like Planck's constant and work function.
- To investigate optical phenomena using diffraction, interference (Newton's Rings), and study of optical fiber properties.
- To characterize the performance of semiconductor and optoelectronic devices like laser diodes, solar cells, and Hall effect sensors.
- To develop analytical and data fitting skills through experimental modeling and application of the least squares method.

1. Study of B-H curve of a ferromagnetic material.
2. Determination of dielectric constant of a given material.
3. Determination of work function and Planck's constant using photoelectric effect.
4. Determination of wavelength of source using diffraction grating.
5. Study of V-I & L-I characteristics of a given laser diode.
6. Determination of acceptance angle and numerical aperture of a given optical fibre.
7. Newton Rings: to determine the radius of curvature of Plano-convex lens.
8. Determination of energy gap of a semiconductor.
9. Determination of Hall coefficient and carrier concentration of a given semiconductor.
10. Understanding the method of least squares – Torsional pendulum as an example.

11. To study and analyze the characteristics of a solar cell by plotting the V-I (voltage-current) and P-V (power-voltage) curves
12. To determine the frequency of the A.C. mains supply using a sonometer by finding the resonant length of the vibrating wire that matches the frequency of the alternating current.

*Note: Any 8 experiments are to be performed.*

### **COURSE OUTCOMES:**

Upon successful completion of this course, students will be able to:

- Analyse magnetic and dielectric properties of materials using B-H curve and dielectric constant experiments. **(SDG 9)**
- Determine key quantum mechanical constants and validate the photoelectric effect. **(SDG 4, 9)**
- Measure optical parameters using diffraction gratings and Newton's Rings, and study fiber optic properties. **(SDG 7, 9)**
- Evaluate characteristics of semiconductor and optoelectronic devices, including energy gap, Hall Effect, laser diodes, LEDs, and solar cells. **(SDG 7, 13)**
- Apply curve fitting techniques such as the least squares method to analyze experimental data and estimate physical quantities. **(SDG 4, 9)**

## C PROGRAMMING AND DATA STRUCTURES LABORATORY

**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, YeswanthKanitkar
3. C Programming, Balaguruswamy.

# ENGLISH LANGUAGE AND COMMUNICATION SKILLS LABORATORY

(Common to all Branches of Engineering)

**B.Tech. I Year I Sem.**

**L T P C**

**0 0 2 1**

The **English Language and Communication Skills (ELCS) Lab** focuses on listening and speaking skills, particularly 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.

## **Listening Skills:**

Objectives

1. To enable students develop their active listening skills
2. To equip students with necessary training in listening, so that they can comprehend the speech of people from different linguistic backgrounds

## **Speaking Skills:**

3. To improve their pronunciation and neutralize accent
4. To enable students express themselves fluently and appropriately
5. To practise speaking in social and professional contexts

## **Learning Outcomes**

Students will be able to:

- CO1** Listen actively and identify important information in spoken texts **(SDG 4)**
- CO2** Interpret the speech and infer the intention of the speaker **(SDG 4)**
- CO3** Improve their accent for intelligibility **(SDG 4, 8, 10)**
- CO4** Speak fluently with clarity and confidence **(SDG 4, 8, 10)**
- CO5** Use the language in real life situations **(SDG 4, 8)**

**Syllabus: English Language and Communication Skills Lab (ELCS) shall have two parts:**

- a. **Computer Assisted Language Learning (CALL) Lab** which focusses on listening skills

## **b. Interactive Communication Skills (ICS) Lab which focusses on speaking skills**

The following course content is prescribed for the **English Language and Communication Skills Lab**.

### **Exercise – I**

#### **CALL Lab:**

*Instruction:* Speech Sounds-Listening Skill - Importance – Purpose - Types- Barriers- Active Listening

*Practice:* Listening to Distinguish Speech Sounds (Minimal Pairs) - *Testing Exercises*

#### **ICS Lab:**

##### **❖ Diagnostic Test – Activity titled ‘Express Your View’**

*Instruction:* Spoken and Written language - Formal and Informal English - Greetings - Introducing Oneself and Others

*Practice:* Any Ice-Breaking Activity

### **Exercise – II**

#### **CALL Lab:**

*Instruction:* *Listening vs. Hearing - Barriers to Listening*

*Practice:* Listening for General Information - Multiple Choice Questions - *Listening Comprehension Exercises (It is essential to identify a suitable passage with exercises for practice.)*

#### **ICS Lab:**

*Instruction:* Features of Good Conversation – Strategies for Effective Communication

*Practice:* Role Play Activity - Situational Dialogues –Expressions used in Various Situations –Making Requests and Seeking Permissions – Taking Leave - Telephone Etiquette

### **Exercise - III**

#### **CALL Lab:**

*Instruction:* Errors in Pronunciation – Tips for Neutralizing Mother Tongue Influence (MTI)

*Practice:* Differences between British and American Pronunciation –*Listening Comprehension Exercises*

#### **ICS Lab:**

*Instruction:* Describing Objects, Situations, Places, People and Events

*Practice:* Picture Description Activity – Looking at a Picture and Describing Objects, Situations, Places, People and Events (*A wide range of Materials / Handouts are to be made available in the lab.*)

## **Exercise – IV**

### **CALL Lab:**

Instruction: Techniques for *Effective* Listening

*Practice: Listening for Specific Details - Listening - Gap Fill Exercises - Listening Comprehension Exercises*

*(It is essential to identify a suitable passage with exercises for practice.)*

### **ICS Lab:**

Instruction: How to Tell a Good Story - Story Star- Sequencing-Creativity

*Practice: Activity on Telling and Retelling Stories - Collage*

## **Exercise – V**

### **CALL Lab:**

Instruction: Identifying the literal and implied meaning

Practice: Listening for Evaluation - Write the Summary – Listening Comprehension Exercises

*(It is essential to identify a suitable passage with exercises for practice.)*

### **ICS Lab:**

Instruction: Understanding Non-Verbal Communication

*Practice: Silent Speech - Dumb Charades Activity*

### **❖ Post-Assessment Test on 'Express Your View'**

### **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 Headphones

#### **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.

 **Note: English Language Teachers are requested to prepare Materials / Handouts for each Activity for the Use of those Materials in CALL & ICS Labs.**

**Suggested Software:**

- Cambridge Advanced Learners' English Dictionary with CD.
- Grammar Made Easy by Darling Kindersley.
- Punctuation Made Easy by Darling Kindersley.
- Oxford Advanced Learner's Compass, 10<sup>th</sup> 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).

**References:**

1. Shobha, KN & Rayen, J. Lourdes. (2019). *Communicative English – A workbook*. Cambridge University Press
2. Board of Editors. (2016). *ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities*. Orient BlackSwan Pvt. Ltd.
3. Mishra, Veerendra et al. (2020). *English Language Skills: A Practical Approach*. Cambridge University Press
4. (2022). *English Language Communication Skills – Lab Manual cum Workbook*. Cengage Learning India Pvt. Ltd.
5. Ur, Penny and Wright, Andrew. 2022. *Five Minute Activities – A Resource Book for Language Teachers*. Cambridge University Press.

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## **INDUCTION PROGRAM**

**B.Tech. I Year I Sem.**

**L T P C**

**3 0 0 3**