DEPARTMENT OF HUMANITIES & SCIENCES

ACADEMIC REGULATIONS & SYLLABI (R-22)

B.Tech I Year

Electrical & Electronics Engineering

w.e.f. the Academic Year 2022-2023

Vidya Jyothi Institute of Technology

(An Autonomous Institution)

(Accredited by NAAC A+ Approved by AICTE New Delhi & Permanently Affiliated to JNTUH)

Aziz Nagar Gate, C.B. Post, Hyderabad-500 075

DEPARTMENT OF HUMANITIES & SCIENCES

B. TECH I YEAR COURSE STRUCTURE 2022-23

(Electrical & Electronics Engineering)

Semester – I

S. No	Course Code	Course Title	L	T	P	Credits
1	A221001	Mathematics-I(Linear Algebra & Calculus)	3	1	0	4.0
2	A221002	Applied Physics	3	1	0	4.0
3	A221081	Applied Physics Lab	0	0	3	1.5
4	A221501	C-Programming for Engineers	3	0	0	3.0
5	A221581	C-Programming for Engineers Lab	0	0	2	1.0
6	A221003	English for Skill Enhancement	2	0	0	2.0
7	A221082	English Language & Communication Skills Lab	0	0	2	1.0
8	A221201	Elements of Electrical& Electronics Engineering	0	0	2	1.0
9	A221381	Engineering Workshop	0	1	3	2.5
10		Induction Programme				
		Total	11	3	12	20

Semester – II

S. No	Course Code	Course Title	L	T	P	Credits
1	A222005	Mathematics–II (Ordinary Differential Equations & Vector Calculus)	3	1	0	4.0
2	A222006	Engineering Chemistry	3	1	0	4.0
3	A222084	Engineering Chemistry Lab	0	0	2	1.0
4	A222203	Electrical Circuits	3	1	0	4.0
5	A222282	Electrical Circuits Lab	0	0	2	1.0
6	A222303	Engineering Graphics & Modelling	1	0	4	3.0
7	A222583	Python Programming Lab	0	2	2	3.0
		Total	11	4	10	20

MATHEMATICS-I (LINEAR ALGEBRA AND CALCULUS)

Department of Humanities & Sciences					I B.Tech I Semester		
Course Code	Hours/Week			Credits	Marks		
A221001	L	T	P	C	CIE	SEE	Total
	3	1	0	4	40	60	100

Pre-requisites: Mathematical Knowledge at pre-university level

Course Objectives:

To learn

- Types of matrices and their properties.
- Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
- Concept of eigen values and eigen vectors and to reduce the quadratic form to canonical form
- Geometrical approach to the mean value theorems and their application to the mathematical problems
- Evaluation of improper integrals using Beta and Gamma functions.
- Partial differentiation, concept of total derivative
- Finding maxima and minima of function of two and three variables.

Course Outcomes:

After learning the contents of this course, the students must able to:

1. Write the matrix representation of system of linear equations and identify the consistency of the system of equations.
2. Find the Eigen values and Eigen vectors of the matrix and discuss the nature of the quadratic form.
3. Analyze the convergence of sequence and series.
4. Discuss the applications of mean value theorems to the mathematical problems, Evaluation of improper integrals using Beta and Gamma functions.
5. Examine the extrima of functions of two variables with/ without constraints.

Syllabus

UNIT-I Matrices and Linear System of Equations :

Introduction of Matrices, Rank - Echelon form, Normal form. Solution of Linear Systems – Gauss Elimination and LU Decomposition methods.

UNIT-II: Eigen Values and Eigen Vectors:

Eigen values, Eigen vectors – properties, Cayley-Hamilton Theorem (without Proof) - Inverse and powers of a matrix by Cayley-Hamilton theorem – Diagonalization of matrix- Quadratic forms: Nature, Index and Signature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

UNIT-III: Sequences & Series:

Basic definitions of Sequences and series, Convergence and divergence, Ratio test, Comparison test, Cauchy’s root test, Raabe’s test, Integral test, Absolute and conditional convergence.

UNIT-IV: Improper Integrals and Mean Value Theorems:

Improper Integrals: Gamma and Beta Functions-Relation between them, their properties – evaluation of improper integrals using Gamma / Beta functions.

Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Generalized Mean Value theorem (Taylor's and MacLaurin's Series all theorems without proof) – Geometrical interpretation of Mean value theorems.

UNIT-V: Functions of several variables:

Partial Differentiation: Total derivative, Functional dependence, Jacobian Determinant- Maxima and Minima of functions of two variables with constraints and without constraints, Method of Lagrange Multipliers.

Textbooks:

1. Higher Engineering Mathematics by B.S. Grewal, Khanna Publishers, 36th Edition, 2010
2. Advanced Engineering Mathematics by Jain &Iyengar Narosa Publications.

Reference Books:

1. Calculus and Analytic geometry by G.B. Thomas and R.L. Finney, 9th Edition, Pearson, Reprint, 2002.
2. Advanced Engineering Mathematics by Erwin Kreyszig, 9th Edition, John Wiley & Sons, 2006.
3. Advanced Engineering Mathematics (2nd Edition) Michael D. Greenberg

APPLIED PHYSICS

Department of Humanities & Sciences					I B.Tech I Semester		
Course Code	Hours/Week			Credits	Marks		
A221002	L	T	P	C	CIE	SEE	Total
	3	1	0	4	40	60	100

B.Tech I Year I Semester

Course Outcomes:

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

1. Understand various optical phenomena of light
2. Apply the basic principles of quantum mechanics to classify solids based on the band theory
3. Elucidate the characteristics of semiconductors and semiconductor devices
4. Apply the knowledge of nanotechnology for societal applications
5. Explain the working principle of lasers and optical fibers

Unit – I Wave Optics

Principle of superposition, coherence. Interference - Interference in thin films by reflection, Newton's rings. Diffraction – Fresnel and Fraunhofer diffraction, Fraunhofer diffraction due to single slit, Plane diffraction grating, Resolving power of grating (qualitative treatment). Polarization – Polarization of light waves, Plane of vibration, Plane of polarization, Double refraction, Nicol's Prism, Applications of polarization.

UNIT-II Introduction to Quantum Physics and Band theory of solids

Introduction to quantum physics: Planck's Law (qualitative treatment), wave-particle duality, de-Broglie hypothesis of matter waves, properties of matter waves, time independent Schrodinger equation, Born interpretation of wave function, particle in one dimensional potential box, Fermi-Dirac distribution.

Classical free electron Theory (Qualitative treatment)- merits and demerits, Bloch theorem, Kronig-Penny model (qualitative treatment), E-k diagram, effective mass of electron, Energy bands in solids, classification of materials into metals, semiconductors and insulators.

UNIT-III Semiconductors and Semiconductor devices

Intrinsic and extrinsic semiconductors- energy band diagram and position of fermi level (qualitative treatment).

Direct and indirect band-gap semiconductors, Formation of PN junction, energy level diagram of PN junction, I-V characteristics of PN junction diode; construction, working and characteristics of Photo diode, solar cell and light emitting diode, Hall effect and its applications

UNIT-IV Nanotechnology

Nanoscale, quantum confinement, surface to volume ratio, bottom-up fabrication: sol-gel, precipitation, combustion methods-top-down fabrication: Ball milling, physical vapor deposition (PVD), chemical vapor deposition (CVD), characterization techniques – basic principles of XRD, SEM, TEM; applications of nanomaterials.

UNIT-V Lasers and Fiber Optics

Introduction to interaction of radiation with matter: Absorption, spontaneous emission and stimulated emission, Einstein coefficients and their relations, characteristics of a laser, population inversion, important

components of a laser: active medium, pumping source, optical resonator. Construction and working of Ruby laser, He-Ne laser and semiconductor laser, applications of lasers.

Introduction to optical fibers, total internal reflection, construction of optical fiber, acceptance angle and numerical aperture, step and graded index fibers, block diagram of optical fiber communication system, applications of optical fibers.

Text books:

1. A Text book of Engineering Physics by P K Palanisamy: Scietech publication.
2. Engineering Physics by V Rajendran, McGraw Hill Education.

Reference books:

1. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2nd dition,2022.
2. Essentials of Nanoscience & Nanotechnology by Narsimha Reddy Katta, Typical Creatives NANO DIGEST, 1st Edition, 2021.
3. M. N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy" A Text book of Engineering Physics"- S. Chand Publications.

APPLIED PHYSICS LAB

Department of Humanities & Sciences					I B.Tech I Semester		
Course Code	Hours/Week			Credits	Marks		
A221081	L	T	P	C	CIE	SEE	Total
	0	0	3	1.5	40	60	100

B. Tech I Year I Semester

Course Outcomes:

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

1. Apply optical phenomena to characterize optical sources and components.
2. Characterize semiconductors and semiconductor devices.
3. Study transient response of RC circuit and resonance mechanisms in mechanical and electrical systems.
4. Collect data and evaluate the outcomes of an experiment quantitatively and qualitatively.
5. Carry out experimental data analysis.

LIST OF EXPERIMENTS

1. Newton's rings: Determination of the radius of curvature of a given plano-convex lens by forming Newton's rings.
2. Diffraction grating: Determination of wavelength of a given monochromatic source using a plane diffraction grating.
3. Dispersive power: Determination of dispersive power of given prism.
4. Single Slit Diffraction using Laser- Determination of wavelength of given Laser.
5. Energy gap of P-N junction diode: Determination of the energy gap of a semiconductor diode.
6. Light emitting diode: Study of V-I and P-I characteristics of a given light emitting diode.
7. Photo diode: Study of V-I characteristics of photo diode at different intensities.
8. Solar cell: Study of V-I characteristics of solar cell.
9. LCR Circuit: Determination of the resonance frequency of forced electrical oscillator in series and parallel.
10. RC- Circuit: Determination of the time constant of RC-circuit.
11. Optical fiber: a) Determination of the acceptance angle and numerical aperture of optical fiber.
    b) Estimation of attenuation in optical fiber
12. Method of least squares-Torsional pendulum.

Note: Any 10 experiments are to be performed.

Reference books:

1. Engineering Physics Theory and Practical, C. K. Pandey, A. K. Katiyar.
2. Engineering Physics Lab Manual, C. V. Madhusudan Rao.

C-PROGRAMMING FOR ENGINEERS

Department of Humanities & Sciences					I B.Tech I Semester		
Course Code	Hours/Week			Credits	Marks		
A221501	L	T	P	C	CIE	SEE	Total
	3	0	0	3	40	60	100

B.Tech. I Year I Semester

Course Outcomes:

At the end of this course, the student would be able to

1. Design Algorithms and Flowcharts for real world applications.
2. Know various operators and decision statements for Program development.
3 Design programs involving iteration statements and code reusability using Functions.
4. Develop programs using arrays and identify various string handling functions.
5. Analyze various searching and sorting techniques.

UNIT - I:

Introduction: Introduction to Computers, Number Systems & Conversions, Algorithms, Flowcharts.
Overview of C Language: Introduction, Salient Features of C Language, Structure of a "C" Program.

C Language Preliminaries: Keywords and Identifiers, Constants, Variables, Data Types, and Input / Output Statements with suitable illustrative "C" Programs.

UNIT - II:

Operators: Assignment Operators, Relational and Logical Operators, Increment and Decrement Operators, Bitwise Operators, Ternary Operator, Type Conversion, Precedence and Associatively with suitable illustrative "C" Programs.
Conditional/Decision Statements: if, if-else, Nested if-else, else-if ladder, and Switch-Statement with suitable illustrative "C" Programs.

UNIT - III:

Loop Control Statements: while, do-while and for with suitable illustrative "C" Programs, break, continue.
Pointers: Defining pointers, increment & decrement operations, Pointer to Pointers.
Functions: Introduction to Functions, benefits of functions, types of functions, Function calls, return Statement, Parameter Passing mechanism: Call-by-Value, Call-by-reference Recursion, Storage Classes.

UNIT - IV:

Arrays: Introduction to Arrays, One-Dimensional Arrays, Two-Dimensional Arrays, Arrays and Functions, Pointers and Arrays.
Strings: Introduction to Strings, String I/O, String Manipulation Functions (strlen( ), strcmp( ), strcat( ),strcpy( ) , strrev( ), toupper(), tolower()).

UNIT - V:

Structures: Definition and Initialization of Structures, Accessing structure members, Unions, typedef.
Searching and Sorting: Linear Search, Binary Search, Bubble Sort, Insertion Sort.
Data Structures: Introduction, Stacks, Queues.

TEXT BOOKS:

1. B.A.Forouzon and R.F. Gilberg, “COMPUTER SCIENCE: A Structured Programming Approach Using C”, Third edition, CENGAGE Learning, 2016.
2. Ashok N. Kamthane, “C and Data Structures”, Pearson Education. 2010.

REFERENCE BOOKS:

1.M.T.Somashekara, “Problem Solving Using C”, PHI, 2nd Edition 2009.
2. A.K.Sharma, Computer Fundamentals and Programming in C, 2nd Edition, University Press .
3. PradipDey and Manas Ghosh, "Programming in C 2/e", Oxford University Press, 2nd Edition 2011.
4. Rajaraman V., "The Fundamentals of Computers", 4th Edition,Prentice Hall of India, 2006.
5. R S Bichker, "Programming in C", University Press, 2012.

C-PROGRAMMING FOR ENGINEERS LAB

Department of Humanities & Sciences					I B.Tech I Semester		
Course Code	Hours/Week			Credits	Marks		
A221581	L	T	P	C	CIE	SEE	Total
	0	0	2	1.0	40	60	100

B.Tech. I Year I Semester

Course Outcomes:

At the end of this course, the student would be able to

1. Apply the specification of syntax rules for numerical constants, variables and data types.
2. Know the usage of various operators and design programs on decision Statements.
3. Design programs on loop control statements, pointers and code reusability using functions.
4. Develop programs on array and strings.
5. Implement programs on structures and various searching and sorting techniques.

Week 1

Ubuntu and Linux Commands.

Week 2

Designing of flowcharts and algorithms

1. Areas of Polygons.
2. Calculation of Simple and Compound Interest.
3. Swapping of Two numbers with and without temporary variable.
4. Checking whether a number is even or odd.
5. Sum of first ‘n’ natural numbers.
6. Checking a number whether it is divisible by any given number.
7. Evaluation of mathematical expressions.
8. Programs using scanf( ) and printf( ) statements.
9. Program to find the roots of quadratic equation.

Week 3

Programs on operators.(min 9 programs)

Programs on precedence and Associativity & Type conversions.

Programs on Conditional Statements or Decision Statements.(12)

Week 4,5,6

Programs on Loop Control Statements.(12)

Programs on Pointers, pointer arithmetic, pointer to pointer (6).

Programs on Functions, Recursion& Storage classes.(8)

Week 7,8

Programs on One Dimensional Arrays. (3)

Programs on Two Dimensional Arrays. (2)

Programs on Arrays and Functions, Pointer to Array.

Programs on Strings with string built-in or manipulation Functions.(8)

Week 9,10,11

Programs on Accessing Structures.(4)

Programs on Unions, typedef(4)

Implementation of Linear Search and Binary Search.

Implementation of Bubble Sort and Insertion Sort

ENGLISH FOR SKILL ENHANCEMENT

Department of Humanities & Sciences					I B.Tech I Semester		
Course Code	Hours/Week			Credits	Marks		
A221003	L	T	P	C	CIE	SEE	Total
	2	0	0	2	40	60	100

B. Tech I Year I Semester

Course Objectives:

This course will enable the students to:

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

Course Outcomes:

Students will be able to:

1. Understand the importance of vocabulary and sentence structures.
2. Choose appropriate vocabulary and sentence structures for oral and written communication.
3. Demonstrate understanding of the rules of functional grammar.
4. Develop comprehension skills from the known and unknown passages through effective reading strategies.
5. Construct paragraphs, letters, essays, abstracts, précis and reports in various contexts thereby improving proficiency in writing modules of English.

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 BlackSwan, Hyderabad.

Vocabulary: Words Often Misspelt - 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 et al** from ***"English: Language, Context and Culture"*** published by Orient BlackSwan, 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 BlackSwan, 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 BlackSwan, 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.

TEXTBOOK:

1. "English: Language, Context and Culture" by Orient BlackSwan Pvt. Ltd, Hyderabad. 2022. Print.

REFERENCE BOOKS:

1. Effective Academic Writing by Liss and Davis (OUP)
2. Wood, F.T. (2007). Remedial English Grammar. Macmillan.
3. Vishwamohan, Aysha. (2013). English for Technical Communication for Engineering Students. Mc Graw-Hill Education India Pvt. Ltd.
4. Swan, Michael. (2016). Practical English Usage. Oxford University Press. Fourth Edition.

ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

Department of Humanities & Sciences					I B.Tech I Semester		
Course Code	Hours/Week			Credits	Marks		
A221082	L	T	P	C	CIE	SEE	Total
	0	0	2	1	40	60	100

B. Tech I Year I Semester

Course Objectives:

1. To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning
2. To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm
3. To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking
4. To improve the fluency of students in spoken English and neutralize the impact of dialects.
5. To train students to use language appropriately for public speaking, group discussions and interviews

Course Outcomes:

Students will be able to:

1. Reproduce speech sounds and improve language
2. Develop accent and pronunciation in various situations
3. Understand variants in pronunciation by differentiating between British and American accents
4. Identify the diverse purposes of listening and speaking
5. Exhibit critical thinking, problem-solving and decision-making skills through Group Discussions

Exercise I

CALL Lab:

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:

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

Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

Exercise II

CALL Lab:

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 patternin sentences – Intonation - *Testing Exercises*

ICS Lab:

Understand: Features of Good Conversation – Strategies for Effective Communication.

Practice: Situational Dialogues – Role Play- Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette.

Exercise III

CALL Lab:

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:

Understand: Descriptions – Narrations - Giving Directions and Guidelines – Blog Writing

Practice: Giving Instructions – Seeking Clarifications – Asking for and Giving Directions – Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

Exercise IV

CALL Lab:

Understand: Listening for General Details.

Practice: Listening Comprehension Tests - *Testing Exercises*

ICS Lab:

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

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

Exercise V

CALL Lab:

Understand: Listening for Specific Details.

Practice: Listening Comprehension Tests -*Testing Exercises*

ICS Lab:

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.* CambridgeUniversity Press
3. Board of Editors. (2016). *ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities.*Orient Black Swan Pvt. Ltd.

ELEMENTS OF ELECTRICAL & ELECTRONICS ENGINEERING

Department of Humanities & Sciences					I B.Tech I Semester		
Course Code	Hours/Week			Credits	Marks		
A221201	L	T	P	C	CIE	SEE	Total
	0	0	2	1	50	-	50

B.Tech. I Year I Semester

Course Outcomes:

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

1. Understand the fundamentals of basic circuit components and connections.
2. Demonstrate the usage of electrical measuring instruments.
3. Classify the types of electronic components.
4. Explain the parts of electrical machines.
5. Interpret the operation of power converters and the components of control systems.

LIST OF EXPERIMENTS

Any ten experiments from the following should be conducted

1. Demonstrate the usage of DC, AC supplies and their applications.
2. Demonstrate the usage of basic electrical circuit components (Resistor, Inductor and Capacitor) and identification of these components and their applications.
3. Demonstrate series and parallel connections
4. Demonstrate the usage of measuring Instruments Voltmeters, Ammeters, Wattmeter, CRO, tachometer and Multimeters.
5. Demonstrate the different types of Electrical Wiring.
6. Demonstrate Earthing and Grounding practices.
7. Demonstrate the Identification of Electronic devices (Diode, BJT, FET, MOSFET, IGBT and SCR), their terminals and connections.
8. Demonstrate the operation of half wave and full wave diode rectifiers
9. Demonstrate different types and ratings of electrical cables
10. Demonstrate the construction of DC Machines
11. Demonstrate the construction of AC Machines
12. Demonstrate the Components of control systems and understand their functions.
13. Demonstrate the operation of different types of power converters and their applications.

ENGINEERING WORKSHOP

Department of Humanities & Sciences					I B.Tech I Semester		
Course Code	Hours/Week			Credits	Marks		
A221381	L	T	P	C	CIE	SEE	Total
	0	1	3	2.5	40	60	100

B. Tech. I Year I Semester

Course Outcomes:

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

1. Understanding the tools and methods of using to fabricate engineering Components.
2. Applying the measuring techniques to verify the dimensional accuracy.
3. Evaluating various methods and trades of workshop in the component building.

1. TRADES FOR EXERCISES:

At least two exercises from each trade:

1. Carpentry – T-Lap Joint, Dovetail Joint & Tenon Joint.
2. Fitting – V-Fit, Step Cutting & Flat Filling.
3. Tin-Smithy – Open Scoop, Rectangular Tray & Conical Funnel.
4. Foundry – Preparation of Green Sand Mould using Single Piece and Split Pattern.
5. Welding Practice – Arc Welding – Lap Joint & Butt Joint.
6. House-wiring – Parallel Connection, Series Connection & Two-way Switch.

2.TRADES FOR DEMONSTRATION & EXPOSURE

Plumbing, Machine Shop, Power tools in construction and Wood Working

TEXT BOOKS:

1. Manufacturing Engineering and Technology, Kalpakjian S. and Steven S. Schmid, 4th edition, Pearson Education India Edition, 2002.
2. Elements of Workshop Technology, Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.

REFERENCE BOOKS:

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

MATHEMATICS II (ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS)

Department of Humanities & Sciences					I B.Tech II Semester		
Course Code	Hours/Week			Credits	Marks		
A222005	L	T	P	C	CIE	SEE	Total
	3	1	0	4	40	60	100

B.Tech I Year II Semester

Pre-requisites: Mathematical Knowledge at pre-university level

Course Objectives:

To learn

- Methods of solving the differential equations of first and higher order.
- Concept, properties of Laplace transforms
- Solving ordinary differential equations using Laplace transforms techniques.
- The physical quantities involved in engineering field related to vector valued functions

The basic properties of vector valued functions and their applications to line, surface and volume integrals

Course Outcomes:

After learning the contents of this course the students must be able to:

1. Classify the various types of differential equations of first order and first degree and apply the concepts of differential equations to the real-world problems.
2. Solve higher order differential equations and apply the concepts of differential equations to the real-world problems.
3. Find the Laplace Transform of various functions and apply to find the solutions of differential equations.
4. Evaluate the multiple integrals and identify the vector differential operators physically in engineering problems.
5. Evaluate the line, surface and volume integrals and converting them from one to another by using vector integral theorems.

UNIT-I:

First order Ordinary Differential Equations and their Applications:

Introduction to ODE, Exact, Linear and Bernoulli, Applications of ODE: Newton's law of cooling, law of natural growth and decay, orthogonal trajectories.

UNIT-II:

Higher Order Linear Differential Equations:

Linear differential equations of second and higher order with constant coefficients, RHS term of the type f(X) $= e^{ax}, \sin ax, \cos ax$ *and* $x^k, e^{ax}V(x), x^kV(x)$. Method of variation of parameters, Equations reducible to Linear ODE with constant coefficients: Cauchy-Euler Equation and Legendre's Equations.

Applications: Electric Circuits.

UNIT-III:

Laplace transforms:

Laplace transform of standard functions – Inverse transform – first shifting Theorem, transforms of derivatives and integrals – Unit step function – second shifting theorem – Dirac's delta function – Convolution theorem – Periodic function - Differentiation and integration of transforms – Application of Laplace transforms to ordinary differential equations.

UNIT-IV:

Multiple Integrals & Vector Differentiation:

Multiple integrals - double and triple integrals – change of order of integration (Only Cartesian form)- change of variables (Cartesian to Polar for double integral, Cartesian to Spherical for triple integral). Gradient- Divergence- Curl and their related properties - Potential function - Laplacian and second order operators.

UNIT-V:

Vector Integration:

Line integral, work done, Surface and Volume integrals. Vector integrals theorems: Green's, Stoke's and Gauss Divergence Theorems (Only Statements & their Verifications).

Textbooks:

1. Higher Engineering Mathematics by B.S. Grewal, Khanna Publishers, 36th Edition, 2010
2. Advanced Engineering Mathematics by Jain &Iyengar, Narosa Publications.

Reference Books:

1. Calculus and Analytic geometry by G.B. Thomas and R.L. Finney, 9th Edition, Pearson, Reprint, 2002.
2. Advanced Engineering Mathematics by Erwin Kreyszig, 9th Edition, John Wiley & Sons, 2006.
3. Advanced Engineering Mathematics (2nd Edition) by Michael D. Greenberg

ENGINEERING CHEMISTRY

Department of Humanities & Sciences					I B.Tech II Semester		
Course Code	Hours/Week			Credits	Marks		
A222006	L	T	P	C	CIE	SEE	Total
	3	1	0	4	40	60	100

B.Tech I Year II Semester

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:

The students will able to

1. understand the basic properties of water and its usage in domestic and industrial purposes.
2. acquire the basic knowledge of electrochemical procedures related to corrosion and its control.
3. learn the fundamentals and general properties of polymers and other engineering materials.
4. acquire knowledge of various energy sources.
5. apply the knowledge of engineering materials in daily life.

UNIT - I: Water and its treatment: (10)

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 - Introduction. Internal treatment of Boiler feed water - Calgon conditioning - Phosphate conditioning - Colloidal conditioning, External treatment methods - Softening of water by ion- exchange process. Desalination of Brackish water - Reverse osmosis.

UNIT – II Battery Chemistry & Corrosion: (11)

Introduction - Classification of batteries- primary, secondary and reserve batteries with examples. Basic requirements for commercial batteries. Construction, working and applications of Zn-air and Lithium-ion battery. Applications of Li-ion battery to electrical vehicles. Fuel Cells- Differences between battery and a fuel cell, Construction and applications of Methanol Oxygen fuel cell and Solid oxide fuel cell. Solar cells - Introduction and applications of Solar cells.

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 & impressed current methods and Electroless plating.

UNIT - III: Polymeric materials: (9)

Definition – Classification of polymers with examples – Types of polymerizations – 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 and Teflon.

Rubbers: Natural rubber and its vulcanization.

Synthetic Rubbers- Characteristics –preparation – properties and applications of Buna-S, Butyl and Thiokol rubber.

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

Biodegradable polymers: Concept and advantages – Poly lactic acid and poly vinyl alcohol and their applications.

UNIT - IV: Energy Sources: (9)

Introduction, Calorific value of fuel – HCV, LCV- Dulongs formula, Numerical problems. 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, Biodiesel – Trans esterification and advantages.

UNIT - V: Engineering Materials: (9)

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

Smart materials and their engineering applications

Shape memory materials- Poly L- Lactic acid. Thermo response materials- Poly acryl amides and Poly vinyl amides

Lubricants: Classification of lubricants with examples-characteristics of a good lubricant - mechanism of lubrication (thick film, thin film and extreme pressure)- 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, Dhanpat rai Publishing Company, 2010
2. Engineering Chemistry by Rama Devi, Venkata Ramana Reddy and Rath, Cengage learning, 2016
3. A text book of Engineering Chemistry by M. Thirumala Chary, E. Laxminarayana and K. Shashikala, Pearson Publications, 2021.

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)

ENGINEERING CHEMISTRY LABORATORY

Department of Humanities & Sciences					I B.Tech II Semester		
Course Code	Hours/Week			Credits	Marks		
A222084	L	T	P	C	CIE	SEE	Total
	0	0	2	1	40	60	100

B.Tech I Year II Semester

Course Objectives:

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

1. Estimation of hardness and chloride content of water to check its suitability for drinking purpose.
2. To perform estimation of acids and bases using conductometry, potentiometry and pH metry methods.
3. To prepare polymers such as Thiokol rubber and Nylon-6 in the laboratory.
4. Skills related to the lubricant properties such as saponification value, surface tension and viscosity of oils.

Course Outcomes:

The experiments will make the student gain skills on:

1. Determination of parameters like hardness and Chloride content of water.
2. Determination of rate of corrosion of mild steel in various conditions.
3. To perform methods such as conductometry, potentiometry and pH metry in order to find out the concentrations or equivalence points of acids and bases.
4. To prepare polymers like Thiokol rubber and Nylon-6.
5. Estimation of Saponification value, Viscosity and Surface tension of lubricant oils.

Choice of 8-10 Experiments from the following:

1. **Volumetric Analysis:** Estimation of Hardness of water by EDTA Complexometry method.
2. **Corrosion:** Determination of rate of corrosion of mild steel in various conditions.
3. **Conductometry:**
   a. **1.**Estimation of the concentration of an acid by Conductometry.
   b. **2.**Estimation of the concentration of Mixture of acids by conductometry
4. **Potentiometry:**
   a. Estimation of the Concentration of an acid by potentiometry
   b. Estimation of the amount of Fe^{+2} by Potentiometry
5. **pH Metry:** Determination of an acid concentration using pH meter.
6. **Argentometry:** Estimation of Chloride content of water by argentometry
7. **Preparations:**
   a. Preparation of Thiokol rubber.
   b. Preparation Nylon – 6.

I. **Lubricants:**

1. Estimation of acid value of given lubricant oil.
2. Estimation of Viscosity of lubricant oil using Ostwald's Viscometer.
3. Estimation of Surface tension of lubricant oil using Stalagmometer.

REFERENCE BOOKS:

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

ELECTRICAL CIRCUITS

Department of Humanities & Sciences					I B.Tech II Semester		
Course Code	Hours/Week			Credits	Marks		
A222203	L	T	P	C	CIE	SEE	Total
	3	1	0	4	40	60	100

B.Tech I Year II Semester

Course Outcomes:

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

1. Understand the fundamentals of basic circuit components, laws and their usage.
2. Apply basic electrical circuit concepts.
3. Analyse locus diagrams of RL and RC circuits.
4. Use Network theorems to solve electrical circuits.
5. Evaluate networks using topology and assess inductance in coupled circuits

UNIT- I

Network Elements & Laws: Active elements, Independent and dependent sources. Passive elements- R, L and C, Energy stored in inductor and capacitor, Ohm's Law, Kirchhoff's laws, Source transformations, Star-delta transformations, Mesh analysis, Nodal analysis including super mesh and super node analysis

UNIT- II

Single-Phase Circuits – I: RMS and average values of periodic sinusoidal and non- sinusoidal waveforms, Phasor representation, Steady-state response of series, parallel and series-parallel circuits.Impedance, Admittance.

UNIT- III

Single-Phase Circuits – II: Current locus diagrams of RL and RC series and parallel circuits with variation of resistance. Resonance: Series and parallel circuits, Bandwidth and Q-factor.

UNTI- IV

Network theorems: Superposition theorem, Thevenin's theorem, Norton's theorems, Maximum power transfer theorem, Tellegen's theorem, Compensation theorem, Millman's theorem and Reciprocitytheorem. (AC & DC).

UNIT- V

Coupled circuits: Concept of self and mutual inductance, Dot convention, Coefficient of coupling, Analysis of circuits with mutual inductance.

Topological Description of Networks: Graph, tree, chord, cut-set, incident matrix, circuit matrix andcut-set matrix,

TEXT BOOKS:

1. Van Valkenburg M.E, "Network Analysis", Prentice Hall of India, 3rd Edition, 2000.
2. Ravish R Singh, "Network Analysis and Synthesis", McGrawHill, 2nd Edition, 2019

REFERENCE BOOKS:

1. B. Subramanyam, "Electric Circuit Analysis", Dreamtech Press & Wiley, 2021.
2. James W.Nilsson, Susan A.Riedel, "Electric Circuits", Pearson, 11th Edition, 2020.
3. A Sudhakar, Shyammohan S Palli, "Circuits and Networks: Analysis and Synthesis", McGrawHill, 5th Edition, 2017.

4. Jagan N.C, Lakshrninarayana C., "Network Analysis", B.S. Publications, 3rd Edition, 2014.
5. William Hayt H, Kimmerly Jack E. and Steven Durbin M, "Engineering Circuit Analysis", McGrawHill, 6th Edition, 2002.
6. Chakravarthy A., "Circuit Theory", Dhanpat Rai & Co., First Edition, 1999.

ELECTRICAL CIRCUITS LABORATORY

Department of Humanities & Sciences				I B.Tech II Semester		
Course Code	Hours/Week		Credits	Marks		
A222282	L	T	P	C	CIE	SEE	Total
	0	0	2	1	40	60	100

B.Tech I Year II Semester

Course Outcomes:

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

1.Use Ohms law and other electrical concepts to design circuits.
2. Verify network theorems.
3. Analyse electrical circuits with the help of mesh and nodal analysis.
4. Assess the operation of electrical circuits.
5. Outline the parameters of various electrical circuits.

List of experiments

Any ten experiments from the following should be conducted

1. Verification of Ohm's Law
2. Determination of equivalent resistance, current and voltage across each element in a given circuit.
3. Verification of KVL and KCL
4. Verification of Mesh Analysis
5. Verification of Nodal Analysis
6. Verification of Thevenin's theorem
7. Verification of Norton's theorem
8. Verification of Superposition theorem
9. Verification of Reciprocity Theorem.
10. Verification of Millman's Theorem
11. Verification of Maximum Power Transfer Theorem.
12. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits

.

ENGINEERING GRAPHICS & MODELING

Department of Humanities & Sciences					I B.Tech II Semester		
Course Code	Hours/Week			Credits	Marks		
A222303	L	T	P	C	CIE	SEE	Total
	1	0	4	3	40	60	100

B.Tech I Year II Semester

Course Outcomes:

1. Comprehend the concepts of engineering drawing and CAD software.
2. Conceptualize and draw the projections of points and straight lines.
3. Visualize and project different views of a planes and solids.
4. Evaluate the surfaces of solids developed for further processing in the engineering applications.
5. Generate isometric and corresponding orthographic views of any given component.

UNIT- I:

Introduction To Engineering Drawing: Principles of engineering graphics and their significance, usage of drawing instruments, conic sections, including the rectangular hyperbola– general method only. Cycloid, Epicycloid, Hypocycloid. Scales – plain & diagonal only.

INTRODUCTION TO CAD: Introduction to CAD software and its importance, standard toolbar/menus and navigation tools used in the software.

UNIT- II:

Principles Of Orthographic Projections: Conventions. Projections of points.

Projections Of Lines: (first angle projection) inclined to both planes (traces and midpoint problem to be excluded).

Implementation Of CAD: Drawing orthographic projections of points and lines using a CAD package.

UNIT – III:

Projections Of The Planes: Projections of regular planes inclined to both the planes.

Projections Of Solids: Projections of regular solids inclined to both the planes (prisms, pyramids, cones and cylinders, Change of potion method only).

Implementation In CAD: Drawing orthographic projection of planes and regular solids using a CAD package.

UNIT- IV:

Sections And Sectional Views of Right Angular Solids: Prism, Cylinder, Pyramid, Cone.

Development Of Surfaces of Right Regular Solids: Prism, Pyramid, Cylinder and Cone.

Implementation In CAD: Drawing sectional views of solids and the development of right regular solids using a CAD package.

UNIT-V:

Principles Of Isometric Projection: Isometric scale, isometric views, conventions, isometric views of lines, planes, simple solids. Conversion of orthographic views to isometric views.

Orthographic Projections: conversion of isometric views to orthographic views.

Implementation In Cad: Drawing isometric views from giving orthographic views and vice-versa using a CAD package.

TEXT BOOKS:

1. Engineering Drawing, Bhatt N.D., Panchal V.M. & Ingle P.R., Charotar Publishing House.

REFERENCE BOOKS:

1. Text book on Engineering Drawing, Narayana, K.L. & P. Kannaiah, Scitech Publishers.
2. Engineering Drawing and Computer Graphics, Shah, M.B. & Rana B.C, Pearson Education.
3. http://docs.autodesk.com/ACDMAC/2013/ENU/PDFs/acdmac_2013_users_guide.pdf

PYTHON PROGRAMMING LAB

Department of Humanities & Sciences					I B.Tech II Semester		
Course Code	Hours/Week			Credits	Marks		
A222583	L	T	P	C	CIE	SEE	Total
	0	2	2	3	40	60	100

B. Tech I Year II Semester

Course Outcomes:

After completion of the course, the student should be able to

- Develop the application specific codes using python.
- Understand Strings, Lists, Tuples and Dictionaries in Python
- Implement programs using modular approach, file I/O, Python standard library

Week -1 (Installation & Simple Applications)

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.

Week - 2: (Mathematical Expressions & I/O Operations)

1. i) Write a program to calculate compound interest when principal, rate and number of periods are given.
   ii) Given coordinates (x1, y1), (x2, y2), find the distance between these two points.
2. Read name, address, email and phone number of a person through keyboard and print the details.

Week – 3 (Conditional statements)

1. Write a Program to find the given number is even or odd.
2. Write a program to find the maximum of three numbers (use 'if-elif-else' ladder).

Week – 4 (Loop Statements)

1. Write a program to Print the Fibonacci sequence using while loop.
2. Write a program to Print the below triangle using for loop:

   5
   4 4
   3 3 3
   2 2 2 2
   1 1 1 1 1
3. Write a program to print all prime numbers in a given interval (using break statement).

Week – 5 (List, Tuple, Dictionary)

1. i) Write a program to illustrate operations of List & Tuple
   ii) Write a program to find common values between two lists.
2. Write a program to perform addition of two matrices.
3. Write a program to read dictionary values from the user and find an element using given key.

Week – 6 (Functions & Modules)

1. Write a function called is_sorted that takes a list as a parameter and return True if the list is sorted in ascending order and False otherwise.

2. Write a function called GCD that takes parameters **a** and **b** and return their greatest common divisor.
3. 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.

Week –7(Strings)

1. Write a program to add a comma between the characters. If the given word is 'Apple', it should become 'A,p,p,l,e'
2. Write a program to remove the given word in all the places in a string?
3. Write a function that takes a sentence as an input parameter and replaces the first letter of everyword with the corresponding upper case letter and the rest of the letters in the word by corresponding letters in lower case without using a built-in function?

Week–8 (Classes & objects)

1. Write a program to add two complex numbers using classes and objects
2. Write a function called draw_rectangle that takes a Canvas and a Rectangle as arguments and draw a representation of the Rectangle on the Canvas.

Week– 9 (Inheritance)

1. Write a program to demonstrate the various types of Inheritances.

Week– 10(File Concepts)

1. Write a program to merge two given file contents into a third file.
2. Write a program to Read text from a text file, find the word with most number of occurrences
3. Write a program that reads a file *file1* and displays the number of words, number of vowels, and blank spaces.

Week – 11(Packages)

1. a) Install NumPy package with pip and explore it.
   b) Illustrate 1-D and 2-D vector processing and slicing.

2. Explore matplotlib with plotpy and visualize the data.

TEXT BOOKS:

1. "Python Programming- Using Problem Solving Approach", Reema Thareja, Oxford
2. "Python Programming-Problem Solving, Packages and Libraries", Anurag Gupta, G.P. Biswas, Mc Graw Hill