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**Scheme of Instruction, Evaluation and Syllabi**  
**of**  
**B.Tech –I & II Semester**  
**ELECTRONICS AND COMMUNICATION ENGINEERING**  
**With effect from Academic Year 2023-24**  
**Regulation: R-23**



**UNIVERSITY COLLEGE OF ENGINEERING & TECHNOLOGY**  
**Mahatma Gandhi University**  
**Nalgonda- 500 254, TS, INDIA**

With effect from the academic year 2023

**UNIVERSITY COLLEGE OF ENGINEERING & TECHNOLOGY**  
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING (ECE)

Scheme of Instruction  
B.TECH., (CBCS) 4-YEARS (8-SEMESTERS)  
(REGULATION: R-23)

(Applicable from the batch admitted from the Academic Year 2023-24 onwards)

**SEMESTER-I**

S. NO	CODE	COURSE TITLE	Scheme of Instructions				Scheme of Examinations			Credits
			L	T	P/D	CONT ACT Hrs/Wk	Hrs	CIE	SEE	
Theory										
1	BS101MT	Engg. Mathematics-I	3	0	-	3	3	40	60	3
2	BS102PH	Engg. Physics	3	0	-	3	3	40	60	3
3	ES101CS	Programming for problem solving	3	0	-	3	3	40	60	3
4	ES 101 EE	Basic Electrical Engineering (ES)	3	0	-	3	3	40	60	3
5	PC101EC	Applied Python Programming (PC)	3	0	-	3	3	40	60	3
Practical										
6	BS 151PH	Engg. Physics lab	-	-	3	3	3	40	60	1.5
7	ES151CS	Programming for problem solving lab	-	-	2	2	3	40	60	1
8	ES 151 EE	Basic Electrical Engineering Lab (ES)	-	-	2	2	3	40	60	1
9	ES 152 ME	Workshop lab	-	-	6	6	3	40	60	3
TOTAL			15	-	13	28	27	360	540	21.5

L: Lectures

P: Practical's

SEE: Semester End Examination

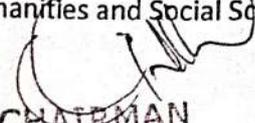
HS: Humanities and Social Sciences

T: Tutorials

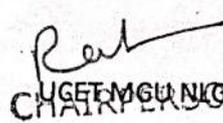
CIE: Continuous Internal Evaluation

BSC: Basic Science Course

ES: Engineering Science Course

  
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**SEMESTER-II**

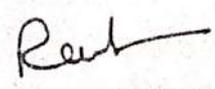
S.NO	CODE	COURSE TITLE	Scheme of Instructions				Scheme of Examinations			Credits
			L	T	P/D	CONTA CT Hrs/Wk	Hrs	CIE	SEE	
<b>Theory</b>										
1	BS 201 MT	Engg. Mathematics-II	3	0	-	3	3	40	60	3
2	BS 201 CH	Engg. Chemistry	3	0	-	3	3	40	60	3
	HS 201 EG	Communicative English	3	0	-	3	3	40	60	3
	PC 201 EC	Electronic Devices	3	0	-	3	3	40	60	3
<b>Practical</b>										
	BS 251 CH	Engg. Chemistry lab	-	-	3	3	3	40	60	1.5
	HS 251 EG	Communicative English lab	-	-	2	2	3	40	60	1
	ES 251 ME	Engineering Graphics	2	-	4	6	3	40	60	4
<b>TOTAL</b>			14	-	9	23	21	280	420	18.5

L: Lectures  
P: Practical's  
SEE: Semester End Examination  
HS: Humanities and Social Sciences

T: Tutorials  
CIE: Continuous Internal Evaluation  
BSC: Basic Science Course  
ESC: Engineering Science Course

  
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BS 101 MT	ENGINEERING MATHEMATICS – I					
Pre-requisites	Mathematical Knowledge of 12th / Intermediate level		L	T	P	C
			3	-	-	3
Evaluation	SEE	60 Marks	CIE		40 Marks	

**Course Objectives:**

- To Introduce the Concepts of Sequences, Series and their properties.
- To Study the Concepts of Mean Value Theorems.
- To Introduce the Concepts of Functions of Several Variables and its applications.
- To Introduce the Concepts of Multiple Integrals and its applications.
- To Study Vector Differential and Integral Calculus.

**Course Outcomes:**

On completion of this course, the student will be able to:

- Find the Nature of Sequences and Series.
- To Apply the Mean Value Theorem and to Find the Roots of Continuous Functions.
- To find the Maximum and Minimum Values of Multiple Variable Functions.
- Use the Knowledge of Multiple Integrals in Finding the Area and Volume of any Region Bounded by Given Curves.
- Apply the Knowledge of Vector Calculus to Find Line, Surface and Volume Integrals.

**UNIT – I**

**Sequences and Series:** Sequences, Series, General properties of series, Series of positive terms, Comparison tests, P- test, tests of Convergence, D'Alembert's ratio test, Cauchy's  $n^{\text{th}}$  root test, Raabe's test, Integral test, Alternating series, Series of positive and negative terms, Absolute convergence and Conditional convergence.

**UNIT – II**

**Calculus of one variable:** Rolle's Theorem, Lagrange's, Cauchy's mean value theorems (without proof) Taylor's series, Curvature, Radius of curvature, Circle of curvature, Envelope of a family of curves, Evolutes and Involutives

**UNIT- III**

**Multi variable Calculus (Differentiation):** Functions of two variables, Limits and continuity, Partial derivatives, Total differential and differentiability, Derivatives of composite and implicit functions(Chain rule), Change of variables, Jacobian Higher order partial derivatives, Taylor's series of functions of two variables, Maximum and minimum values of functions two variables, Lagrange's method of multipliers.

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**Multivariable Calculus (Integration):** Double integrals, Change of order of integration, Triple integrals, Change of variables in integrals and applications-areas and volumes, Beta and Gamma functions.

## UNIT –V

**Vector Calculus:** Scalar and vector fields, Gradient of a scalar field, Directional derivative, Divergence and Curl of a vector field, Line, Surface and Volume integrals , Green's theorem in a plane, Gauss's divergence theorem, Stoke's theorem(without proofs )and their verification.

**Suggested Reading:**

1. R.K.Jain &S.R.KIyengar,*Advanced Engineering Mathematics*,Narosa Publications,4th Edition 2014.
2. Erwin Kreyszig, *Advanced Engineering Mathematics*, John Wiley, 9th Edition, 2012
3. B.S.Grewal, *Higher Engineering Mathematics*, Khanna Publications, 43rd Edition, 2014.
4. G.B.Thomas , Maurice Weir and Joel Hass, *Thomas' Calculus* , Peterson, 12<sup>th</sup> Edition,2010
5. B.V. Ramana, *Higher Engineering Mathematics*, 23rd reprint, 2015.
6. N.P.Bali and M. Goyal, A text book of Engineering Mathematics, Laxmi Publications 2010
7. H.K. Dass, Er. Rajnish Varma, Higher Engineering Mathematics, Schand Technical Third Edition

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BS 102 PH	ENGINEERING PHYSICS				
Pre-requisites		L	T	P	C
Evaluation	SEE	3	-	-	3
	60 Marks	CIE		40Marks	

**Course Objectives:**

The course is taught with the objectives of enabling the student to:

- Understand the basic concepts of matter waves and experimental implications. To understand Schrodinger's wave equation and its implications.
- Appraise significance of stimulated emission and laser light production. Subsequently propagation of laser light through waveguides.
- Understand the formation of energy bands and classification of the solids based on the band theory. To understand the concept of superconductors.
- Understand implications of basic laws of electricity and magnetism to know the significance of techniques of Modern Optics.
- Sensitize towards nanomaterial and appraise the various characterization techniques.

**Course Outcomes:**

On completion of this course, the student will be able to :

- Enrich and *understand* concepts and real time applications of matter waves and implications of matter waves as quantum mechanics evolution.
- Understand construction and working of the laser systems and *apply* them to Propagate through fiber optical cable as cutting edge application.
- *Analyze* semiconducting materials, superconducting materials, basic laws of electricity and magnetism to know the significance of techniques of Modern Optics.
- *Evaluate* the different material characterization techniques.
- Appreciate significance of nanomaterials and *create* desired properties by using various methods of synthesis processes.

**UNIT – I**

**Matter waves:** de-Broglie hypothesis – properties of matter waves – Davison and Germer's experiment – G.P. Thomson experiment – Uncertainty principle.

**Quantum Mechanics:** Physical significance of wave function–Schrodinger's time independent and time dependent wave equation– Particle in 1-D box– Wave function, Probability function, energy level

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## UNIT – II

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**Electromagnetic Theory:** Basic laws of electricity and magnetism – Derivation of Maxwell's equations in integral and differential forms - Conduction and displacement current –modification of Ampere's law - Relation between Displacement Current (D), Electric Intensity (E) and Polarization (P) - Equation of plane wave in free space – Poynting theorem.

**Modern Optics:** Interference – Newton's Rings by reflected light – Experimental arrangement. Types of diffraction – diffraction grating (Conditions of maxima and minima) – Resolving power of grating –Types of polarized light – Polarization by reflection – Malus law – Double refraction – Nicol's Prism. – Optical activity and polarimeter.

## UNIT- III

**Lasers:** Characteristics of lasers – Absorption of radiation, spontaneous and stimulated emission of radiation - Einstein's coefficients and their relation - Population inversion– Types of lasers - Ruby laser, Helium-Neon laser and Semiconductor laser – Applications of lasers

**FibreOptics:**Construction of an optical fiber–Propagation of light through an optical fiber-Acceptance angle - Numerical aperture – Types of optical fibers (Based on number of modes and refractive index profile) – Fibre drawing process (double crucible method)-Applications of optical fibers.

## UNIT- IV

**Semiconductor Physics:** Classification of materials based on band theory - Kronig-Penney model (qualitative treatment) - Energy band formation in solids - Intrinsic and Extrinsic semiconductors - Concept of a hole - Carrier concentration and conductivity in intrinsic semiconductors – Formation of P-N junction diode, Zenor diode, Light Emitting Diode and their I-V characteristics – Thermistor and its characteristics - Hall effect and its applications.

**Superconductivity:** Introduction - General properties of super conductors - Meissner effect Type -I and Type- II superconductors - BCS theory (qualitative) – Introduction to High  $T_c$  Super conductors - Applications of superconductors.

## UNIT – V

**Nanomaterials:** Introduction - Properties of materials at reduced size - Surface to volume ratio – Quantum confinement effect – Classification of nanomaterials - Preparation of nanomaterials: bottom-up methods (e.g., Sol Gel method and Chemical Vapor Deposition method), Top-down methods (e.g., Ball milling method) - Basic ideas of carbon nanotubes – Applications of nanomaterials and their health hazards.

**Techniques for Characterization:** Morphological studies of materials – X-ray Diffraction (XRD), Scanning Electron Microscopy (SEM). Spectroscopic studies of materials – Fourier Transform Infrared (FTIR), Beer's law, UV-Visible and Raman spectroscopy.

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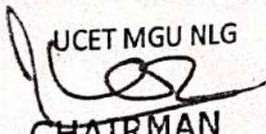
**Suggested Reading:**

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- M.S. Avadhanulu and P.G. Kshirasagar - Engg. Physics, S.Chand& Co.
- C.M. Srivastava and C. Srinivasan - Science of Engg. Materials, New Age International.
- R.K. Gour and S.L. Gupta – Engg. Physics, Dhanpat Rai Publications.
- B.K. Pandey and S.Chaturvedi – Engineering Physics, Cengage Learning.
- A.K Bhandhopadhya - Nano Materials, New Age International.
- S.K. Sharma, et al., Hand book of Material Characterization – Springer.

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## PROGRAMMING FOR PROBLEM SOLVING

<b>Pre-requisites</b>				
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Evaluation</b>	<b>SEE</b>	60 Marks	<b>CIE</b>	40 Marks
			3	-
			-	3

### Course Objectives:

- To introduce the basic concepts of Computing environment, number systems and flowcharts.
- To familiarize the basic constructs of C language – data types , operators and expressions.
- To understand modular and structured programming constructs in C.
- To learn the usage of structured data types and memory management using pointers.
- To learn the concepts of data handling using files.

### Course Outcomes:

On completion of this course, the student will be able to :

- Explain various functional components in computing environment
- Develop algorithmic solutions to problems and draw the flow charts
- Explain and use basic constructs of C in writing simple programs .
- Use standard library functions in C and develop modular programs using user defined functions and structured data types.

### UNIT – I

**Introduction to Computers:** Computer Systems, Computing Environments, Computer Languages, Creating and Running Programs, Software Development, Flow charts. **Number Systems:** Binary, Octal, Decimal, And Hexadecimal.

**Introduction to C Language -** Background, C Programs, Identifiers, Data Types, Variables, Constants, Input / Output Statements

**Arithmetic Operators and Expressions:** Evaluating Expressions, Precedence and Associativity of Operators, Type Conversions.

### UNIT – II

**Conditional Control Statements:** Bitwise Operators, Relational and Logical Operators, If, If-Else, Switch-Statement and Examples. **Loop Control Statements:** For, While, Do-While and Examples. Continue, Break and Go to statements

**Functions:** Function Basics, User-defined Functions, Inter Function Communication, Standard Functions, Methods of Parameter Passing. **Recursion-** Recursive Functions.

**Storage Classes:** Auto, Register, Static, Extern, Scope Rules, and Type Qualifiers

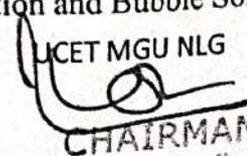
### UNIT– III

**Preprocessors:** Preprocessor Commands

**Arrays -** Concepts, Using Arrays in C, Inter-Function Communication, Array Applications, Two-Dimensional Arrays, Multidimensional Arrays, Linear and Binary Search, Selection and Bubble Sort

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## UNIT – IV

**Pointers** - Introduction, Pointers for Inter-Function Communication, Pointers to Pointers, Compatibility, L -value and R-value, Arrays and Pointers, Pointer Arithmetic and Arrays, Passing an Array to a Function, Memory Allocation Functions, Array of Pointers, Programming Applications, Pointers to void, Pointers to Functions, Command-line Arguments.  
**Strings** - Concepts, C Strings, String Input/Output Functions, Arrays of Strings, String Manipulation Functions

## UNIT –V

**Structures:** Definition and Initialization of Structures, Accessing Structures, Nested Structures, Arrays of Structures, Structures and Functions, Pointers to Structures, Self Referential Structures, Unions, Type Definition (typedef), Enumerated Types.  
**Input and Output:** Introduction to Files, Modes of Files, Streams, Standard Library Input/Output Functions, Character Input/Output Functions.

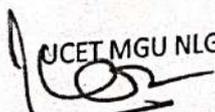
### Suggested Reading:

B.A. Forouzan and R.F. Gilberg, "A Structured Programming Approach in C" ,Cengage Learning, 2007  
Kernighan BW and Ritchie DM, "The C Programming Language", 2nd Edition,Prentice Hall of India, 2006.

Rajaraman V, "The Fundamentals of Computer", 4th Edition, Prentice-Hall of India, 2006  
Dromey " How to Solve it By Computer , Pearson education, 2006

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ES 101 EE	<b>BASIC ELECTRICAL ENGINEERING</b>				
(Engineering Science)					
Pre-requisites		L	T	P	C
		3	-	-	3
Evaluation	SEE	60 Marks	CIE	40 Marks	

**Course Objectives:**

- To understand the fundamentals of DC and AC electrical circuits.
- To understand the working principles of DC motor, DC generator, Transformers and single phase induction motors.
- To understand working principles of protection devices used in electrical circuits.

**Course Outcomes:**

On completion of this course, the student will be able to:

- Analyze the performance of simple electrical circuits exciting with DC and AC excitations.
- Apply different theorems to solve complicated electrical circuits to obtain the current, voltage and power.
- Understand the main components, Characteristics, applications of different DC and AC electrical machines used in industry.
- Understand the importance of protective devices and their rating used in electrical circuits.
- Obtain the overall understanding of basic electrical circuits and appliances required for any industry.

**UNIT – I**

**DC Circuits :** Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems.

**UNIT – II**

**AC Circuits:** Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, and RL, RC, RLC combinations (series only). Three phase balanced circuits, voltage and current relations in star and delta connections.

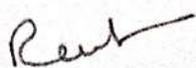
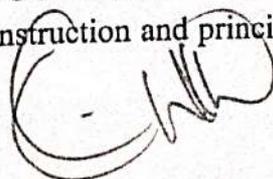
**UNIT– III****Transformers and 3-ph Induction Motors**

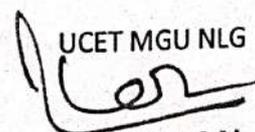
**Transformers :** Electromagnetic induction, Faradays laws, Statically induced emf, Lenz law, BH characteristics, ideal and practical transformer, losses and efficiency, Auto-transformer and three-phase transformer connections.

**Three Phase Induction motor:** Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, squirrel cage IM, slip-ring IM, Applications.

**UNIT – IV****Single-phase induction motor & DC Machines**

**Single-phase induction motor:** Construction and principle of operation, Capacitor start & capacitor run motor, applications.

  
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DC Generators: Dynamically induced emf, Flemming's Right hand and Left hand rules, Construction and principle of operation of DC generator, EMF equation, Types of DC Generators, OCC characteristics, applications.

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## UNIT - V

**Electrical Installations:** Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery back.

### Suggested Reading:

1. J.B.Gupta, "Fundamentals of Electrical Engineering and Electronics" S.K.Kataria & Sons Publications, 2002.
2. J.B.Gupta, "Utilization of Electric Power and Electric Traction" S.K.Kataria & Sons Publications, 2010
3. Abhijit Chakrabarti, Sudipta Nath, Chandan Kumar Chanda, " Basic Electrical Engineering" Tata Mc Graw Hill, Publications, 2009
4. Hughes, "Electrical Technology", VII Edition, International Student -on, Addison Welsey Longman Inc., 1995.

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PC 101 EC		APPLIED PYTHON				
Pre-requisites	-		L	T	P	C
			3	-	-	3
Evaluation	SEE	60 Marks	CIE		40 Marks	

### Course Objectives

- Acquire programming skills in core Python.
- Acquire Object-oriented programming skills in Python.
- Develop the skill of designing graphical-user interfaces (GUI) in Python.
- Develop the ability to write database applications in Python.
- Acquire Python programming skills to work into various Specializations such as Data Science,
- Machine Learning, Artificial Intelligence etc.

### Course Outcomes:

- After completion of this course, the students shall be able to:
- Develop Python programs with conditional statements and loops.
- Write programs using functions, strings and lists
- Construct Python data structures programs using tuples, dictionaries
- Write programs using files, OOPS concept, regular expressions
- To perform transactions using database

### UNIT-I

**INTRODUCTION TO PYTHON:** Introduction to Python: Features of Python, History and Future of Python, Working with Python – interactive and script mode, Identifiers and Keywords, Comments, Indentation and Multi-lining, Data types – built-in data types, Operators and Expressions, Console Input/Output, Formatted printing, Built-in Functions, Library Functions.

### UNIT-II

**DECISION CONTROL STATEMENTS:** Selection/Conditional Branching Statements: if, if-else, nested if, if-elif-else statement(s), Basic Loop Structures/ Iterative Statements – while and for loop, Nested loops, break and continue statement, pass Statement, else Statement used with loops.

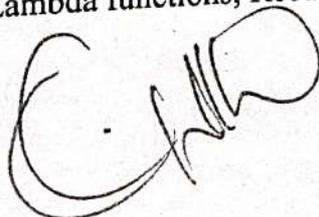
### UNIT-III

**CONTAINER DATA TYPES:** Lists: Accessing List elements, List operations, List methods, List comprehension; Tuples: Accessing Tuple elements, Tuple operations, Tuple methods, Tuple comprehension, Conversion of List comprehension to Tuple, Iterators and Iterables, zip() function. Sets: Accessing Set elements, Set operations, Set functions, Set comprehension; Dictionaries: Accessing Dictionary elements, Dictionary operations, Dictionary Functions, Nested Dictionary, Dictionary comprehension.

### UNIT-IV

**STRINGS AND FUNCTIONS:** Strings: Accessing String elements, String properties, String operations. Functions: Communicating with functions, Variable Scope and lifetime, return statement, Types of arguments, Lambda functions, Recursive functions.

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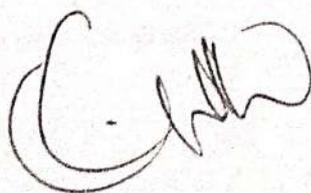
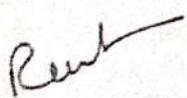
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**UNIT – V**

**CLASSES AND OBJECTS:** Classes and Objects – Defining Classes, Creating Objects, Data Abstraction and Hiding through Classes, Class Method and self Argument, Class variables and Object variables, init() and del () method, Public and private data members, Built-in Class Attributes, Garbage Collection. OOPs Features: Abstraction, Encapsulation, Inheritance, and Polymorphism.

**SUGGESTED READING:**

- 1 Reema Thareja, "Python Programming - Using Problem Solving Approach", Oxford Press, 1st Edition, 2017.
- 2 Dusty Philips, "Python 3 Object Oriented Programming", PACKT Publishing, 2nd Edition, 2015.
- 3 Yashavant Kanetkar, Aditya Kanetkar, "Let Us Python", BPB Publications, 2nd Edition, 2019.
- 4 Martin C. Brown, "Python: The Complete Reference", Mc. Graw Hill, Indian Edition, 2018.
- 5 R Nageswar Rao, "Core Python Programming", Dreamtech Press, 2018.



  
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BS 151 PH	ENGINEERING PHYSICS LAB				
Pre-requisites		L	T	P	C
		-	-	3	1.5
Evaluation	SEE	60 Marks	CIE		40 Marks

### Course Objectives:

- Demonstrate an ability to make physical measurements and understand the limits of precision in measurements.
- Demonstrate the ability to use experimental statistics to determine the precision of a series of measurements.
- Demonstrate the ability to understand optical / Semiconducting / dielectric properties of materials.
- Demonstrate the ability to understand the construction and working of different experiments

### Course Outcomes :

On completion of this course, the student will be able to :

- Recognize the transformation concepts into practical's.
- Use a best fit to create a graph from a series of data points. Students can extrapolate and interpolate.
- Appreciate the mathematical abilities to meaningful physical conclusions.
- Develop skills to impart practical knowledge in real time solution and learn to design new instruments with practical knowledge.
- Understand the link between theory and practicals

#### Experiment - I

To calculate the Numerical aperture (NA), acceptance angle of a given optical fibre

#### Experiment - II

Determination of wavelength of LASER using diffraction grating.

#### Experiment - III

Determination of planks constant by PHOTO CELL.

#### Experiment - IV

To determine specific rotatory power of a given solution by using Laurent's Half shade polarimeter.

#### Experiment - V

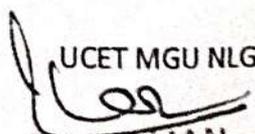
To Estimate Radius of curvature of given lens by forming Newton's rings.

#### Experiment - VI

To determine resolving power of plane grating.

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**Experiment - VII**

Determination of carrier concentration, Mobility and Hall Coefficient of Ge Crystal using Hall Effect Experiment.

**Experiment - VIII**

To draw the I-V Characteristics of P-N Junction diode and to evaluate the value of potential barrier of the diode.

**Experiment - IX**

To find the values of Electrical conductivity and energy gap of Ge crystal by Four probe method.

**Experiment - X**

To determine the constants of A, B and  $\alpha$  of given Thermistor.

**Experiment - XI**

To study characteristics of Solar Cell

**Experiment - XII**

To draw the I-V characteristics of Zenor diode.

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ES 151 CS	PROGRAMMING FOR PROBLEM SOLVING LAB					
Pre-requisites		L	T	P	C	
Evaluation	SEE	60 Marks	-	-	2	1
			CIE		40 Marks	

**Course Objectives:**

- To use tools available under LINUX for C programming.
- To gain hands-on experience on basic constructs of C programming.
- To formulate problems and implement algorithmic solutions in C.
- To write modular programs in C using structure programming techniques and data files.

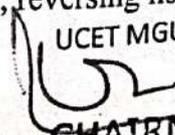
**Course Outcomes:**

On completion of this course, the student will be able to:

- Write, compile and debug C programs in Linux environment.
- Write simple programs using control structures, user defined functions and data manipulation using arrays.
- Use standard C library functions to develop modular programs in C.
  1. Write programs using arithmetic, logical, bitwise and ternary operators.
  2. Write programs simple control statements :
    - Roots of a Quadratic Equation, extracting digits of integers, reversing digits ,finding sum of digit ,printing multiplication tables, Armstrong numbers, checking for prime, magic number,
  3. Sin x and Cos x values using series expansion
  4. Conversion of Binary to Decimal, Octal, Hexa and Vice versa
  5. Generating a Pascal triangle and Pyramid of numbers
  6. Recursion: Factorial, Fibonacci, GCD
  7. Finding the maximum, minimum, average and standard deviation of given set of numbers using arrays
  8. Reversing an array ,removal of duplicates from array
  9. Matrix addition , multiplication and transpose of a square matrix .using functions
  10. Bubble Sort, Selection Sort ,
  11. Programs on Linear Search and Binary Search using recursion and iteration
  12. Functions of string manipulation: inputting and outputting string , using string functions such as strlen( ),strcat( ),strcpy( ).....etc
  13. Writing simple programs for strings without using string functions.
  14. Finding the No. of characters, words and lines of given text file
  15. File handling programs : student memo-printing
  16. Create linked list, traverse a linked list, insert a node, delete a node, reversing list

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ES 152 ME		WORKSHOP LAB			
Pre-requisites		L	T	P	C
		-	-	6	3
Evaluation	SEE	60 Marks		CIE	40 Marks

**Course Objectives :**

- To learn about different tools used in workshop.
- To understand the different manufacturing processes.
- To learn about fabrication of components using different materials.

**Course Outcomes :**

On completion of this course, the student will be able to :

- Study and practice on tools and their operations of different trades.
- Practice on manufacturing of components using workshop trades including carpentry, fitting, foundry, smithy, sheet metal & welding
- Select suitable tools for machining process including facing, turning & knurling
- Attain basic electrical knowledge for house wiring practice.

**LIST OF EXPERIMENTS:**

**Carpentry shop**

- Making of Cross lap joint with Wood,
- Making of End Lap/Tee Lap Joint with wood

**Fitting shop**

- Making of Step cut with Mild Steel flat,
- Making of semicircular and V-cut with Mild Steel flat

**Sheet metal shop**

- Making of Funnel with GI Sheet,
- Making of Rectangular box with GI Sheet

**House wiring**

- Making of Cleat wiring,
- Making of casing wiring

**Welding shop**

- Making of Butt joint using Arc Welding,
- Making of Lap Joint using Arc Welding

**Machine shop**

- Making of Step turning on MS cylindrical rod,
- Making of Taper turning on MS cylindrical rod

**Foundry shop**

- Preparation of casting using single piece pattern,
- Preparation of casting using core pattern

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With effect from the academic year 2023

Smithy shop

- Forging of square shape peg from cylindrical work piece,
- Forging of square shape L- bend peg from cylindrical work piece

Suggested Reading:

- Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop Technology", Vol.I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai

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**UNIVERSITY COLLEGE OF ENGINEERING & TECHNOLOGY**  
 DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING (ECE)

Scheme of Instruction  
 B.TECH., (CBCS) 4-YEARS (8-SEMESTERS)  
 (REGULATION: R-23)

(Applicable from the batch admitted from the Academic Year 2023-24 onwards)

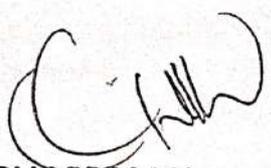
**SEMESTER-II**

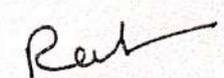
NO	CODE	COURSE TITLE	Scheme of Instructions				Scheme of Examinations			Credits
			L	T	P/D	CONTACT Hrs/Wk	Hrs	CIE	SEE	
<b>Theory</b>										
	BS 201 MT	Engg. Mathematics-II	3	0	-	3	3	40	60	3
	BS 201 CH	Engg. Chemistry	3	0	-	3	3	40	60	3
	HS 201 EG	Communicative English	3	0	-	3	3	40	60	3
	PC 201 EC	Electronic Devices	3	0	-	3	3	40	60	3
<b>Practical</b>										
	BS 251 CH	Engg. Chemistry lab	-	-	3	3	3	40	60	1.5
	HS 251 EG	Communicative English lab	-	-	2	2	3	40	60	1
	ES 251 ME	Engineering Graphics	2	-	4	6	3	40	60	4
TOTAL			14	-	9	23	21	280	420	18.5

L: Lectures  
 P: Practical's  
 SEE: Semester End Examination  
 HS: Humanities and Social Sciences

T: Tutorials  
 CIE: Continuous Internal Evaluation  
 BSC: Basic Science Course  
 ESC: Engineering Science Course

  
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 Computer Science & Engineering

BS 201 MT	ENGINEERING MATHEMATICS-II					
Pre-requisites	SEE	60 Marks	L	T	P	C
			3	-	-	3
Evaluation			CIE		40 Marks	

**Course Objectives:**

- To study Matrix Algebra and its use in solving System of Linear Equations and solving Eigen Value Problems.
- To study the First Order Linear and Non-Linear Ordinary Differential Equations.
- To study the Higher Order Linear Ordinary Differential Equations with Variable and Constant Coefficients.
- To introduce the Concept of Functions of Complex Variable and their Properties.
- To study the Values of Improper Integrals using Residue Theorem.

**Course Outcomes:**

On completion of this course, the student will be able to:

- Solve System of Linear Equations and Eigen Value Problems.
- Find the solution of First Order Ordinary Differential Equations.
- Identify the solution of Higher Order Ordinary Differential Equations.
- Determine the Analyticity and Integrals of Complex Functions.
- Evaluate Complex and Real Integrals Using Residue Theorem.

**UNIT - I**

**Objectives:**

Elementary row and column operations, Rank of a matrix, Echelon form, System of linear equations, Linearly independence and independence of vectors, Linear transformation, Orthogonal transformation, Eigen values, Eigenvectors, Properties of Eigen values, Cayley-Hamilton theorem, Quadratic forms, Diagonalization of Matrices, Reduction of quadratic form to canonical form by orthogonal transformation, Nature of quadratic forms.

**UNIT - II**

**First Order Ordinary Differential Equations:**

Exact first order differential equations, Integrating factors, Linear first order equations, Bernoulli's, Riccati's and Clairaut's differential equations, Orthogonal trajectories of a given family of curves.

**UNIT - III**

**Differential Equations of Higher Orders:** Linear Independence and Dependence, Solutions of Second and Higher Order Linear Homogeneous Equations with Constant Coefficients, Method of Reduction of order for the Linear Homogeneous Second Order Differential Equations with Variable Coefficients, Solutions of Non-Homogeneous Linear Differential Equations, Method of Variation of Parameters, Solution of Euler-Cauchy Equation, Simultaneous Linear Differential Equations.

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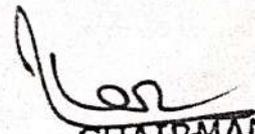
**UNIT - IV**  
**Functions of a Complex Variable:** Limits and Continuity of a Function, Differentiability and Analyticity, Elementary Analytic Functions, Necessary and Sufficient Conditions for a Function to be Analytic, Cauchy-Riemann conditions in Polar form, Harmonic Functions, Complex Integration, Cauchy's Integral Theorem, Extension of Cauchy's Integral Theorem for multiply connected regions, Cauchy's Integral Formula, Cauchy's Formula for derivatives

**UNIT - V**  
**Residue Calculus:** Power Series, Taylor's Series, Laurent's Series, Zeros and Singularities, Residues, Residue theorem, Evaluation of Real Integrals Using Residue Theorem, Bilinear Transformations (All Theorems without proof).

**Suggested Reading:**

- R.K. Jain & S.R.K. Iyengar, *Advanced Engineering Mathematics*, Narosa Publications, 4th Edition, 2014.
- Erwin Kreyszig, *Advanced Engineering Mathematics*, John Wiley, 9th Edition, 2012.
- Dr.B.S.Grewal, *Higher Engineering Mathematics*, Khanna Publications, 43rd Edition, 2014.
- Dr.M.D.Raisinghania, *Ordinary and Partial differential equations*, S.CHAND, 17th Edition 2014.
- James Brown, R.V Churchill, *Complex Variables and applications*, Mc Graw Hill 9th Edition 2013
- N. Bali, M.Goyal, *A text book of Engineering Mathematics*, Laxmi publications, 2010
- H.K. Dass, Er. Rajnish Varma, *Higher Engineering Mathematics*, Schand Technical Third Edition

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BS 202 CH	ENGINEERING CHEMISTRY				
Pre-requisites		L	T	P	C
Evaluation	SEE	3	-	-	3
	60 Marks	CIE		40 Marks	

**Course Objectives:**

- Understand the fundamentals of application of water chemistry in industry and applications of principles of corrosion to minimize corrosion and associated problems.
- Gain the knowledge of application of Electrochemical principles to construct the electrodes for various purposes and the criterion for determination of feasibility of processes.
- Analyze and interpret the structure of molecules by applying basic principles of spectroscopy.
- Acquire knowledge of biopolymers used for medical purposes with various applications.
- Grasp the latest application of nanotechnology in various industries and Manufacturing different kinds of batteries.

**Course Outcomes:**

On completion of this course, the student will be able to :

- Attains knowledge about the disadvantages of hard water for domestic and industrial purposes. Also teaches the techniques of softening of hard water and treatment of water for drinking purpose and throws light on prevention of corrosion.
- Rationalize bulk properties and processes using thermodynamic considerations.
- Distinguishes the ranges of electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.
- Analyze the basic methods of reactions of organic molecules and study their properties.
- Knowing about different batteries, fuel cells and their applications of nanomaterials.

**T - I**

**WATER CHEMISTRY AND CORROSION (10L):**

**Water chemistry:** Hardness of water-Types and units of hardness, estimation of temporary and permanent hardness of water by EDTA method. Alkalinity of water and its determination Water softening by Ion exchange and Reverse Osmosis methods. Boiler troubles-scales and sludge formation-causes, effects and prevention. Specifications of potable water. Water treatment for drinking purpose-coagulation, sedimentation, filtration, sterilization by Chlorination.

**Corrosion-** causes and its effects. Types of corrosion-Dry or Chemical corrosion and Wet or Electrochemical corrosion and their mechanism. Electrochemical corrosion and its types. Factors influencing rate of corrosion.

**Corrosion control methods:** Cathodic protection methods- Sacrificial anodic and impressed current methods.

**Protective coating methods:** Hot dipping- Galvanizing and Tinning.

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**NIT - II**

**THERMODYNAMICS AND ELECTRO CHEMISTRY(10L):**

**Thermodynamics:** Terminology of Thermodynamics, thermodynamic processes, Work done in Reversible isothermal and adiabatic processes, concept of entropy, physical significance of entropy, Work function, Gibbs free energy and their significance, variation of free energy with temperature and pressure, criteria of spontaneity in terms of entropy and free energy-Numerical

**Electrochemistry:** Electrochemical cells- Electrolytic and Galvanic cells-notation, cell reaction and cell potentials. Types of electrodes-Calomel, Quinhydrone and Glass electrodes. Determination of  $P^H$  of a solution using Quinhydrone electrode. Thermodynamics of emf of cells-Nernst equation and its derivation. Application of Nernst equation to electrode potential and emf of cells. Numericals. Principles and applications of Potentiometric titrations.

**NIT- III**

**MOLECULAR STRUCTURES AND SPECTROSCOPY(10L):**

**Molecular Orbital Theory.** Linear Combination of Atomic Orbitals (LCAO). Molecular Orbital energy level diagrams of diatomic molecules- $O_2$ ,  $N_2$  and  $NO$ .

**Description of Electromagnetic spectrum.**

**Principles of UV-Visible Spectroscopy: Statement of Beer-Lambert Law.** Absorption and intensity shifts: bathochromic, Hypsochromic, Hyper chromic and Hypo chromic shifts with one example each. Principle and applications of UV Sensors.

**Infrared Spectroscopy:** Principle of IR Spectroscopy. IR active and IR inactive molecules (two examples each). Principle and applications of IR Sensors.

**NMR Spectroscopy:** Principle of  $H^1$ -NMR Spectroscopy. Multiplicity, Chemical Shift. Principle and applications of MRI.

**NIT - IV**

**Polymers:** Introduction, Classification of polymers-Plastics, Fibres and Elastomers. Preparation, properties and engineering applications of the following polymers: Plastics: PVC and Bakelite Fibers: Nylon 6:6, and Acrylonitrile. Elastomers: Buna Sand Butyl Rubber.

**Conducting polymers:** Introduction. Mechanism of conduction in polymers. Intrinsic conducting polymers: Polyacetylene and poly-aniline. Applications of conducting polymers

**NIT -V**

**Energy Sources and Nanomaterials (8L)**

**Batteries:** Primary batteries-Zn carbon battery. Secondary batteries-Pb- Acid battery and Ni- Cd battery. Lithium-ion batteries- advantages and applications.

With effect from the academic year 2023

cells: Concept of fuel cells and their advantages. Construction and working of H<sub>2</sub>-O<sub>2</sub> and methanol-fuel cells.

cells: Concept of solar energy conversion, photovoltaic cells.

materials: Introduction Properties of nanomaterials. Synthesis of nanomaterials-Top down, Bottom up and Sol-gel method. Applications of nanomaterials.

**Suggested Reading:**

1. P. C. Jain, *Engineering chemistry*, Dhanpat Rai publishing Co., 16th Edition

2. J. K. Tembe, Kamaluddin and M.S. Krishnan, *Engineering Chemistry* (NPTEL Web-book)

3. P. C. Shanth Rath, *Engineering Chemistry*, Cengage Learning.

4. J. Sienko and R.A. Plane, *Chemistry: Principles and Applications*, MGH Publishers.

5. I. Mahan, *University Chemistry*, Pearson Publishing Co., 4th Edition.

6. J. Banwell, *Fundamentals of Molecular Spectroscopy*, TMH

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HS 201 EG	COMMUNICATIVE ENGLISH			
Pre-requisite	English proficiency above B1 level as per the CEFR (Common European Framework of Reference) for languages			
	L	T	P	C
Evaluation	SEE	60 Marks	CIE	40Marks

**Course Objectives:**

- Communicate clearly, accurately and appropriately
- Know and use verbal and non-verbal communication appropriately
- Infer information from texts
- Learn basic grammar of the English language
- Use appropriate idiomatic expressions, one word substitutes etc.

**Course Outcomes:**

On completion of this course the student will be able:

- Heighten the awareness of correct usage of English Grammar and vocabulary in writing and speaking besides improving their fluency and comprehensibility.
- Develop their ability as critical readers and writers and will produce paragraphs independently on any context with coherence
- Draft effective business letters and emails
- Exercise critical reading skills by enhancing the quality of life and support lifelong learning.
- Will produce short reports using the drafting process.

**UNIT-I**

Importance of listening, Types of listening, Importance of communication, types of communication, styles of communication, Communication barriers, listening for specific purposes, Do's and Don'ts of Listening, Discourse markers & linking words.

**UNIT-II**

Homonyms, Homophones, Homographs, Synonyms and Antonyms, Concord, one-word substitutes, tenses. Auxiliary Verbs, Question Tags, Root words, Active and Passive voice.

**UNIT- III**

Importance of reading, reading Comprehensions, Types of Comprehension questions, reading skills-skimming, scanning, intensive and extensive reading, critical reading passages,

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#### UNIT-IV

Letter writing (Official Letter writing), Email Writing & Email Etiquette, Principles of Good Writing, (How to write Introduction and Conclusions for different types of writings) Paragraph and precise writing, Essay writing

#### UNIT-V

Redundancy. Listening to various texts-continued... (In language Lab Inferential passages) Effective presentation, Proverb Expansion through JAM, Idioms and Phrases, Common Errors- I, Common Errors-II

#### Suggested Reading:

- 1. Ashraf, M. Rizvi. Effective Technical Communication. Tata McGrail, 2006.
- 2. Language and Life Skills Approach, Orient Black Swan, 2018.
- 3. Michael Swan Practical English Usage. OUP, 1995.
- 4. Meenakshi Ramanan and Sangeetha Sharma. Technical Communication: Principles and Practice-II, Oxford Uni. Press, 2011.
- 5. Sprignger. F. L. (1975). Engineering Mechanics Statics and Dynamics, III Edition, Harper Collings International Edition.

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PC 201 EC	ELECTRONIC DEVICES					
Pre-requisites	-		L	T	P	C
			3	-	-	3
Evaluation	SEE	60 Marks	CIE		40 Marks	

**Course Objectives:**

- The course is taught with the objectives of enabling the student to:
- Study and analyze the behavior of Semiconductor diodes in Forward and Reverse bias.
- Develop half wave and Full wave rectifiers with L, C, LC & CLC Filters
- Explain V-I characteristics of Bipolar Junction Transistor in CB, CE & CC configurations and study DC Biasing techniques using BJT
- Explore V-I characteristics of FETs, MOSFETs
- Study the characteristics various diodes (Tunnel Diode, Varactor Diode, Schottky Diode, Light Emitting Diode, Photo Diode), UJT & SCR

**Course Outcomes :**

- On completion of this course, the student will be able to :
- Interpret the characteristics and apply diode models to analyze various applications of diodes.
- Identify the merits and demerits of various filters, formulate and design rectifier circuits with filters
- Calculate ripple factor, efficiency and % regulation of rectifier circuits.
- Discriminate the BJT configurations to recognize appropriate transistor configuration for any given application and design the biasing circuits with good stability
- Distinguish the working principles of BJT and FET also between FET & MOSFET
- Interpret the characteristics various diodes(Tunnel Diode, Varactor Diode, Schottky Diode, Light Emitting Diode, Photo Diode) and analyze various applications of these diodes

**Unit – I**

**Semiconductor Diodes:** Qualitative Theory of P-N Junction, P-N Junction as a Diode, Diode Equation, Volt-ampere Characteristics, Temperature dependence of V-I characteristic, Ideal versus Practical – Resistance Levels (Static and Dynamic), Transition and Diffusion Capacitances, Diode Equivalent Circuits, Load Line Analysis, Breakdown Mechanisms in Semiconductor Diodes, Zener Diode Characteristics and Applications

**Unit – II**

**Semiconductor Diode Applications:** Half wave, Full wave and Bridge rectifiers – their operation, performance characteristics and analysis. Filters (L, C, LC and CLC filters) used in power supplies and their ripple factor calculations, Design of Rectifiers with and without Filters

**Unit – III**

**Bipolar Junction Transistor:** Transistor Junction formation (collector-base, base-emitter Junctions), transistor biasing – band diagram for NPN and PNP transistors, current components and current flow in BJT, BJT V-I characteristics in CB, CE, CC configurations, BJT biasing techniques for operating point stabilization against temperature and device variations, Bias stabilization and Compensation techniques, Biasing circuits design.

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Unit – IV  
N Junction Field Effect Transistors (JFET): JFET (Construction, principal of Operation and Volt – Ampere characteristics). Pinch-off voltage of JFET, FET as Voltage variable resistor, Comparison of BJT and FET  
MOSFETs: Device Structure and Operation of MOSFETs, Current-Voltage Characteristics, MOSFET Circuits at DC, Enhancement & Depletion mode MOSFETs, DC-biasing

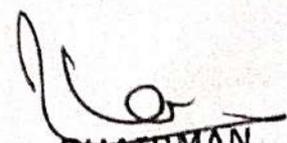
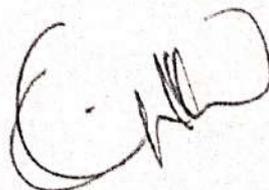
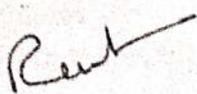
Unit – V  
Special Diodes (Qualitative Treatment only): Tunnel Diode, Varactor Diode, Schottky Diode, Light Emitting Diode, Photo Diode, UJT construction-working, V-I characteristics of UJT & Structure and Working of SCR, Characteristics of SCR

**Suggested Reading:**

Jacob Millman, Christos C. Halkias, and Satyabrata Jit, "Electronic Devices and Circuits", 3rd ed., McGraw Hill Education, 2010.

Robert Boylestad and Louis Nashelsky, Electronic Devices and Circuit Theory, 11th ed., Pearson India Publications, 2015.

Salivahanan.S, Suresh Kumar.N "Electronic Devices and circuits", 3rd edition, Tata McGraw- Hill, 2012.



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BS 251 CH	ENGINEERING CHEMISTRY LAB					
Pre-requisites			L	T	P	C
			-	-	3	1.5
Evaluation	SEE	60 Marks	CIE		40 Marks	

**Course Objectives:**

- Determination of hardness of water by Complexometry.
- Determination of Alkalinity of water.
- Estimation of Acid by conductometry,  $P^H$  and Potentiometry.
- Verification of Beers law and estimation of  $KMnO_4$  by colorimetry.
- To determine the rate constant of reactions from concentration as a function of Time

**Course Outcomes:**

On completion of this course, the student will be able to :

- Estimate the strength of acids and ions present in unknown solution by conductometry,  $P^H$  metry and potentiometry.
- Estimate the concentration of ions present in unknown solution from the absorbance by colorimetric analysis.
- Conduct experiment to estimate hardness of industrial water.
- Conduct experiment to estimate alkalinity of sample water.
- Estimate the rate constants of reactions from concentration of reactants/products as a function of time.

**SYLLABUS:****Experiment - I**

Estimation of HCL by Conductometry.

**Experiment – II**

Estimation of Acetic Acid by Conductometry.

**Experiment - III**

Estimation of HCL by Potentiometry.

**Experiment - IV**

Estimation of  $KMnO_4$  by Potentiometr

**Experiment – V**

Estimation of HCL by  $P^H$  metry.

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**Experiment – VI**

Estimation of Acetic acid by P<sup>H</sup> metry

**Experiment - VII**

Verification of Beer's law and Estimation of KMnO<sub>4</sub> by colorimetry.

**Experiment - VIII**

Verification of Beer's law and Estimation of CuSO<sub>4</sub> by colorimetry.

**Experiment - IX**

Determination of Partition Coefficient of Acetic acid in BuOH and water.

**Experiment – X**

Estimation of Total hardness of water by Complexometry.

**Experiment - XI**

Estimation of Permanent and Temporary hardness of water by Complexometry.

**Experiment - XII**

Determination of Order of Acid catalysed Hydrolysis of Methyl acetate reaction.

**Suggested Reading:**

1. Senior practical Physical chemistry by BD Khosla, A.Ghulati, VC.Garg., ,R.Chand and Co., New Delhi 10<sup>th</sup> ed. 2001.
2. Laboratory Manual in Engineering Chemistry, S.K. Bhasin and Sudha Rani Dhanpath Rai Publishing Co.,

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HS 251 EG	COMMUNICATIVE ENGLISH LAB				
Pre-requisites	English proficiency above B1 level as per the CEFR (Common European Framework of Reference) for languages.	L	T	P	C
		-	-	2	1
Evaluation	SEE	60 Marks	CIE	40 Marks	

### Course Objectives:

- Learn IPA and transcription, using dictionary, Decode Phonetic Transcription, overcome the difficulties with the sounds of English, self-learning through CALL.
- Demonstrate Use of English, Speech sounds, Stress and Intonation in day-to-day situations/ conversations/interactions.
- Introducing one self in various context: Social, Academic and Professional
- Improve listening and understand various accent- GIE, RP and GenAm.
- Learn to participate in various contexts: Extempore, Group Discussions and presentation.

### Course Out comes:

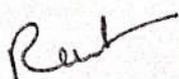
- On completion of this course the students will be able to
- Sensitize the nuances of English Speech Sounds with computer – Assisted Individualized and independent Language learning.
- Use Better pronunciation and right accent and Intonation.
- Use functional English.
- Listen and speak effectively by understanding various accents.
- Increase possibilities of job prospects and communicate confidently.

### UNIT-I

English Sound system: Sounds of English, Vowels, consonants, Using Dictionary to decode phonetic transcription, Transcription exercises with the help CALL (Computer aided language Lab)

### UNIT-II

Stress and Intonation: Syllable, word stress and its importance, intonation-falling falling and rising tones.





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Introduction and presentation skills: In social, formal, Academic and Professional context, JAM, Picture description/Prescription, Role plays: Use of Dialogues in various situations and settings, Occasions to give various presentations with emphasis on visual aids and body language.

**UNIT-IV**

Listening comprehension: Listening to various accents, Listening practice and Exercises, Resume/CV writing

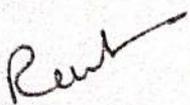
**UNIT-V**

Group discussions: Types of group discussions, case studies, Do's and Don'ts of group discussion- Intensive practice., Interview skills- Mock Interviews

**Suggested reading/ software:**

1. T. Balasubramanian. A Text Book of English Phonetics for Indian students, McMillan, 2008.
2. J. Sethi et al. A Practical Course in English pronunciation (With CD) prentice Hall of India, 2005.
3. Hari Mohan Prasad. How to prepare for Group Discussions and Interviews, TATA McGraw-Hill, 2006.
4. English for Engineers and Technologists (Combined edition Vol. I & II) Orient Black swan, 2010.
5. Software

1. Sky pronunciation Suit.
2. Study Skills
3. English Pronunciation Dictionary-CALD



		ENGINEERING GRAPHICS			
Pre-requisites		L	T	P	C
Evaluation	SEE	2	-	4	4
	60 Marks	CIE		40 Marks	

**Course Objectives:**

- Introduction to fundamentals and need of AUTOCAD software drawings.
- Knowledge about various 2D command of AUTOCAD drawing applicable for drawing and printing options.
- Inputs on basic concepts of engineering drawing, lettering formats for analyzing various topics via. Conic Sections, Involutives.
- Awareness towards the various types of projections and the drawings of 2D and 3D views.
- Introduction to fundamentals and need of AUTOCAD software drawings.

**Course Outcomes:**

On completion of this course, the student will be able to :

- Knowledge on the fundamentals of AUTOCAD 2D commands
- Application of basic principles of drawing and scales for representation of prototype objects.
- Relate the logic of projections to points, straight lines and various views of 2D and 3D objects.
- Capability to imagine and project the developed surface and truncated portion of 3D solids.
- Assimilation of visualization process to efficiently communicate ideas graphically and provide editable solutions.

**UNIT – I**

Introduction to Engineering Drawing covering, Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering. Geometrical Constructions (General method only), Conic sections (General and special method); Cycloid, Epicycloid, Hypocycloid and Involute (line, triangle, square, circle, Regular Polygons), Construction of Tangent and Normal to all General methods of Conic sections, Cycloid, Epicycloid, Hypocycloid and Involutives.

**UNIT – II**

Overview of Computer Graphics: Listing the computer technologies that impact on graphical communication, demonstrating knowledge of the theory of CAD software, setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning, Snap to objects manually and automatically; Drawings straight lines using various coordinate input entry methods, Applying various ways of drawing circles.

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### UNIT – III

Commands, initial settings, Drawing basic entities, Modify commands, Text and Dimensioning, Blocks Applying dimensions to objects, applying annotations to drawings. Setting up and use of Layers, Create, edit and use customized layers; Changing line lengths through modifying existing lines (Extend/Lengthen); Printing Options

### UNIT – IV

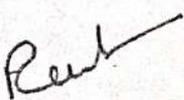
Scales – Reduced and Enlarged scales, Representative Fraction, Problems - Plain, Diagonal and Vernier Scales, Projections of Points – projection when placed in different quadrants Projection of Straight lines– Projections when parallel to one plane, perpendicular to one plane, inclined to one plane and inclined to both planes.

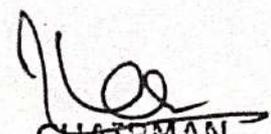
### UNIT – V

Projections of Planes – Projections when parallel to one plane, perpendicular to one plane, inclined to one plane and inclined to both planes. Projections of Regular Solids –Projections covering those parallel to one plane, perpendicular to one plane, inclined to one plane and inclined to both planes. Sections of Solids - sectional Views of Right regular solids covering Prism, Cylinder, Pyramid, and Cone Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone.

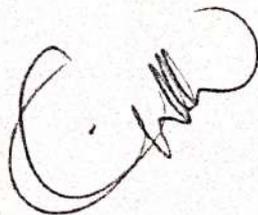
### Suggested Reading:

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
3. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
4. Jeyapooan T. (2015). *Engineering Graphics Using Autocad*, Vikas Publishing House Pvt. Ltd., Noida, 7<sup>th</sup> Edition
5. S.N. Lal., Engineering Drawing (2018), M/S. Cengage Learning India Pvt. Ltd., Pratap Gunj, Delhi



  
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With effect from the academic year 2023



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