Scheme of Instruction and Syllabi

of

B.E. / B.TECH. I & II SEMESTERS

FOR

BIOTECHNOLOGY

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY
(An Autonomous Institution)
Kokapet Village, Gandipet Mandal, Hyderabad– 500 075. Telangana
E-Mail: principal@cbit.ac.in; Website: www.cbit.ac.in; Phone Nos.: 040-24193276 / 277 / 279

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (AUTONOMOUS)

B.TECH. – BIOTECHNOLOGY

INSTITUTE VISION AND MISSION

Vision: To be centre of excellence in technical education and research

Mission: To address the emerging needs through quality technical education and advanced research

DEPARTMENT VISION AND MISSION

Vision: To excel in education, research and entrepreneurship in various fields of Biotechnology for contribution to the evolving needs of the society

Mission:

- To provide an excellent educational experience to the undergraduate students of Biotechnology through quality teaching and advanced curriculum with roots into the fundamentals, that enables students to become leaders in their chosen field of Biotechnology
- To provide vibrant learning and research environment that enables students to focus on lifelong learning to transform into entrepreneurs, and renowned researchers
- To instil the spirit of innovation and creativity in young minds through participation in International and National level conferences/hackathons combined with a deep awareness of ethical responsibilities to profession and society

PROGRAM EDUCATIONAL OBJECTIVES (PEOS):

The Biotechnology department is dedicated to graduating engineers who,

- will demonstrate successful careers in industry through scientific thinking, interpreting, analysing experimental results and purse higher education and research in reputed national and international institutes.
- will demonstrate leadership and initiative to advance professional and organizational goals with commitment to ethical standards of profession, teamwork and respect for diverse cultural background
- will be involved in lifelong /self-learning to keep abreast with the constantly evolving technologies for establishing start-ups and becoming successful entrepreneurs.
- will be committed to creative practice of engineering and other professions in a responsible manner contributing to the socio-economic development of the society.

PROGRAM SPECIFIC OUTCOMES (PSOS):

Student should be able to

- Apply the concepts of Biotechnology in the fields of health care, agriculture, biofuels, food industry and other relevant areas
- Demonstrate adequate proficiency of good lab practices by adopting standard operating protocols and illustrate independent, safe and accurate handling of the biotechnology lab equipment

ABOUT THE DEPARTMENT:

The Department of Biotechnology is offering undergraduate program for students with an intake of 60. The department has grown in leaps and bounds, since its inception in the year 2005.The department has spawned brilliant chemical engineers, scientists and biotechnologists. Department keeps churning out talent on a regular basis, with its well designed curriculum and exceptionally qualified faculty catering the various needs viz. Research, Higher studies and Entrepreneurship of graduating students. The present curriculum being practised from current academic year 2020-21 is adopted from AICTE model curriculum prescribed for Biotechnology by AICTE in 2019. Inputs from stakeholders' viz. Alumni, Industry personnel are taken into consideration for including the thrust areas/topics that are required for the student to be industry ready.

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (AUTONOMOUS)

Scheme of Instructions of I Semester of B.Tech. – Biotechnology as per AICTE Model Curriculum 2022-23

DEPARTMENT OF BIOTECHNOLOGY

SEMESTER – I

S. No	Course Code	Title of the Course	Scheme of Instruction			Credits
			Hours per Week			
			L	T	P/D	
THEORY						
1	22MTC03/ 22BTC01	Mathematics-I/ Basics of Biology-I	3	1	0	4
2	22CYC01	Chemistry	3	0	0	3
3	22EEC01	Basic Electrical Engineering	2	1	0	3
4	22CSC01	Problem Solving and Programming	2	1	0	3
PRACTICAL						
5	22CYC02	Chemistry Lab	0	0	3	1.5
6	22MBC02	Community Engagement	0	0	3	1.5
7	22CSC02	Problem Solving and Programming Lab	0	0	3	1.5
8	22MEC37	Robotics & Drones Lab	0	2	2	3
9	22EEC02	Basic Electrical Engineering Lab	0	0	2	1
TOTAL			**10**	**5**	**13**	**21.5**

L:Lecture **T:Tutorial** **D:Drawing**
P:Practical **CIE-Continuous Internal Evaluation** **SEE-Semester End Examination**

With effect from Academic Year 2022-23

22MTC03

Mathematics-I
(Biotech- BiPC Stream)

Instruction:	3 L+1T Hours per week
Duration of SEE	3 Hours
SEE	60 Marks
CIE	40 Marks
Credits	4

Course Objectives:

1. To discuss elementary transformations of trigonometric functions.
2. To explain basics of limit and continuity of the functions.
3. To explain differentiation of the basic functions
4. To discuss matrix methods to solve system of linear equations.
5. To discuss the exact roots of Cubic and Bi-quadratic equations.

Course Out Comes:

Upon completing this course, students will be able to:

1. Calculate the elementary transformations of trigonometric functions.
2. Evaluate the limit and Continuity of the functions
3. Calculate the differentiation of functions.
4. Apply the matrix methods to solve the system of linear equations.
5. Solve the Cubic and Bi-quadratic equations.

UNIT-I

Trigonometry: Review of basics of Trigonometry, Compound angles and multiple and sub multiple angles, Transformations-sum and product rules, Hyperbolic and Inverse Hyperbolic functions.

UNIT-II

Function Limits and Continuity: Function $\sin x$, $\cos x$, e^x, $\log x$ intervals and neighborhoods, limits and concept of limit, standard limits and related problems

UNIT-III

Differentiation: Derivatives of a function, Elementary properties. Derivatives of Trigonometric, Inverse Trigonometric, Hyperbolic and inverse Hyperbolic functions, Methods of differentiation, second and higher order derivatives.

UNIT-IV

Matrices: Types of matrices, multiplication of matrices, scalar multiplication, Inverse of matrix-determinant, singular, non-singular, minor, cofactors, adjoint, Rank-Echelon form, consistency and inconsistency Solutions of simultaneous linear equations.

UNIT-V:

Theory of Equations: Relation between roots and the co-efficient in an equation, solution of the equation when two or more of its roots are connected by certain relations.

Text Books:

1. Shanti Narayan and Mittal P.K. ," Differential Calculus" , 30th edition, S Chand Publishers, 2005.
2. A.R.Vasistha, "Matrices", 43rd edition, Krishna's Educational Publishers, 2014.
3. Hall and Knight, "Higher Algebra", Arihant Publications, 2016.

Suggested Reading:

1. N P Bali and Manish Goyal, "A Text Book of Engineering Mathematics", 9th Edition, Laxmi Publishers, 2017.
2. Joseph Edwards, "Differential Calculus For Beginners", Arihant Publishers,2016.
3. Kanti B.Datta, "Mathematical Methods of Science and Engineering", Cengage Learning India Publishers, 2012.

With effect from the Academic Year 2022-23

22BTC01

BASICS OF BIOLOGY - I
(for MPC Stream of Bio-Tech)

Instruction:	3 L+1T Hours per week
Duration of SEE:	3 Hours
SEE:	60 Marks
CIE:	40 Marks
Credits:	4

Course Objectives:

1. To give understanding of fundamentals of origin of life and various theories of evolution.
2. To give an insight of plant cell and its organelles
3. To provide a knowledge on classification of plants and their propagation mode.
4. To impart theoretical knowledge on various physiological aspects of plants
5. To give the students an understanding of knowledge on microbes and their economic importance.

Course Outcomes:

At the end of the course student will be able to

1. Explain the theories behind the origin of life and evolution studies (BL2).
2. Describe the structure and functions of plant cell and its organelles (BL2)
3. Relate the plants based on the habit and habitat and mechanism of seed development in plants (BL2).
4. Describe the basic physiological processes in plants and various methods of crop improvement (BL2).
5. Demonstrates characteristics of bacteria, fungi, virus and explains virus related diseases and economic importance of microbes (BL3)

UNIT-I

History of Life and Evolution: History of earth, Evolutionary theories of origin of life. Experimental verification of chemical origin of life. Darwinism, Natural selection, Sexual selection, Artificial selection, Mendelism, Hugo Vries mutation theory, Neo-Darwinism. Introduction and importance of classification-five kingdoms (Monera, Protista, Fungi, Plantae and Animalia).

UNIT-II

Cell Structure and Internal Organization of Plants: Cell as basic unit of life, overview of the plant cell, cell cycle, cell division, mitosis and meiosis. Concept of Growth, meristems (apical, intercalary and lateral) their functions. Simple tissue (parenchyma, collenchyma and sclerenchyma), complex tissues (xylem and phloem). Tissue systems (epidermal, ground and vascular)

UNIT-III

Plant Systematic and Reproduction: Plant kingdom, salient features of classification. Alternation of generation of the plants. Type studies of Algae (Spirogyra), Bryophytes (Moss), Pteridophyta (Pteris),Gymnosperms (Cycas) and general characteristics and life cycle of Angiosperms. Overview of modes of reproduction-Asexual: vegetative propagation, budding, sporulation, binary fission; Sexual reproduction: pollination, fertilization, development of embryo, endosperm, fruit and seed formation. Apomixes, parthenocarpy, polyembryony type of reproduction.

UNIT-IV

Plant Physiology and Concepts in Plant Biotechnology: Absorption of water soil water, water potential, diffusion, imbibitions, osmosis, plasmolysis, absorption of water, ascent of sap, transportation. Crop improvement - Heterosis and mutation breeding. Plant tissue culture techniques and their applications. Plant growth regulators.

UNIT-V

Introduction to Microbial World: General account of prokaryotes: structure & function of Bacterial cell. Concept of species and strains. Salient properties of Fungi and type study of Rhizopus.General characteristics of Virus. Study of Bacterial viruses - T4, plant viruses TMV, animal viruses HIV. Structure Reproduction in bacteria (asexual- binary fission and sexual - conjugation) and viruses (lytic and lysogenic). Economic importance of beneficial bacteria (agriculture, industry, medicine and biotechnology).

Text Books:

1. Ray F. Evert, Susan E. Eichhorn Biology of Plants W. H. Freeman 2012. Tata McGraw Hill Publishing Co. Pvt. Ltd 9th edition, (2010).
2. Campbell, N.A., Reece, J.B., Urry, Lisa, Cain, ML., Wasserman, S.A., Minorsky, P.V., Jackson, R.B.Biology: A Global 11th edition, Pearson Education Ltd. (2017)

Suggested Reading:

1. Willey, J. M., Sherwood, L., Woolverton, C. J., Prescott, L. M., & Willey, J. M New York: McGraw-Hill. 6th Edition (2011).

With effect from the Academic Year 2022-23

22CYC01

CHEMISTRY

(Common to All Branches)

Instruction:	3L Hours per Week
Duration of SEE:	3 Hours
SEE	60 Marks
CIE:	40 Marks
Credits:	3

Course Objectives

1. This syllabus helps at providing the concepts of chemical bonding and chemical kinetics to the students aspiring to become practicing engineers
2. Thermodynamic and Electrochemistry units give conceptual knowledge about processes and how they can be producing electrical energy and efficiency of systems.
3. To teach students the value of chemistry and to improve the research opportunities knowledge of stereochemistry and organic reactions is essential.
4. Water chemistry unit impart the knowledge and understand the role of chemistry in the daily life.
5. New materials lead to discovering of technologies in strategic areas for which an insight into Polymers, nanomaterials and basic drugs of modern chemistry is essential.

Course Outcomes

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

1. Identify the microscopic chemistry in terms of molecular orbitals, intermolecular forces and rate of chemical reactions.
2. Discuss the properties and processes using thermodynamic functions, electrochemical cells and their role in batteries and fuel cells.
3. Illustrate the major chemical reactions that are used in the synthesis of organic molecules.
4. Classify the various methods used in treatment of water for domestic and industrial use.
5. Outline the synthesis of various Engineering materials & Drugs.

UNIT-I

Atomic and molecular structure and Chemical Kinetics:

Atomic and molecular structure: Molecular Orbital theory - atomic and molecular orbitals. Linear combination of atomic orbitals (LCAO) method. Molecular orbitals of diatomic molecules. Molecular Orbital Energy level diagrams (MOED) of diatomic molecules & molecular ions (H_2 , He_2^+ ,N_2 , O_2 , O_2^- , CO, NO). Pi- molecular orbitals of benzene and its aromaticity.

Chemical Kinetics: Introduction, Terms involved in kinetics: rate of reaction, order & molecularity; First order reaction-Characteristics: units of first order rate constant & its half-life period, second order reaction-Characteristics: units of second order rate constant & its half- life period. Numericals.

UNIT-II

Use of free energy in chemical equilibria

Use of free energy in chemical equilibria: Thermodynamic functions: Internal energy, entropy and free energy. Significance of entropy and free energy (criteria of spontaneity). Free energy and emf (Gibbs Helmholtz equations and its applications). Cell potentials, electrode potentials, – Reference electrodes (NHE, SCE)-electrochemical series. Nernst equation and its applications. Determination of pH using combined Glass & Calomel electrode. Potentiometric Acid base & Redox Titrations. Numericals.

Battery technology: Rechargeable batteries & Fuel cells.

Lithium batteries: Introduction, construction, working and applications of Li-MnO_2 and Li-ion batteries.
Fuel Cells: Introduction, difference between conventional cell and fuel cell, limitations & advantages. Construction, working & applications of methanol-oxygen fuel cell.

UNIT- III

Stereochemistry and Organic reactions

Stereochemistry: Representations of 3 dimensional structures, Types of stereoisomerism- Conformational isomerism – confirmations of n-butane (Newman and sawhorse representations), Configurational isomerism -Geometrical (cis-trans) isomerism & Optical isomerism- optical activity, Symmetry and chirality: Enantiomers (lactic acid)&Diastereomers (Tartaric acid), Absolute configurations, Sequence rules for R&S notation.

Types of Organic reactions: Substitution Reactions- Electrophilic substitution (Nitration of Benzene); Nucleophilic Substitution (S_N1& S_N2); Free Radical Substitution (Halogenation of Alkanes)

Addition Reactions: Electrophilic Addition – Markonikoff's rule, Free radical Addition - Anti Markonikoff's rule (Peroxide effect), Nucleophilic Addition – (Addition of HCN to carbonyl compounds)

Eliminations-E1 and E2 (dehydrohalogenation of alkyl halides)

Cyclization (Diels - Alder reaction)

UNIT–IV

Water Chemistry:

Hardness of water – Types, units of hardness, Disadvantages of hard water, Alkalinity and Estimation of Alkalinity of water, Boiler troubles - scales & sludge formation, causes and effects, Softening of water by lime soda process (Cold lime soda process),ion exchange method and Reverse Osmosis. Specifications of potable water & industrial water. Disinfection of water by Chlorination; break point chlorination, BOD and COD definition, Estimation (only brief procedure) and significance, Numericals.

UNIT-V

Engineering Materials and Drugs:

Introduction, Terms used in polymer science; Thermoplastic polymers (PVC) &Thermosetting polymers (Bakelite); Elastomers (Natural rubber). Conducting polymers- Definition, classification and applications.

Polymers for Electronics: Polymer resists for integrated circuit fabrication, lithography and photolithography.

Nano materials-Introduction to nano materials and general applications, basic chemical methods of preparation- Sol-gel method. Carbon nanotubes and their applications. Characterisation of nanomaterials by SEM and TEM (only Principle).

Drugs-Introduction, Synthesis and uses of Aspirin (analgesic), Paracetamol (Antipyretic), Atenolol (antihypertensive).

Text Books:

1. P.C. Jain and M. Jain, "Engineering Chemistry", Dhanpat Rai Publishing Company Ltd.,New Delhi,16th edition (2015).
2. W.U. Malik, G.D.Tuli and R.D.Madan, "Selected topics in Inorganic Chemistry", S Chand & Company Ltd, New Delhi, reprint (2009).
3. R.T. Morrison, R.N. Boyd and S.K. Bhattacharjee, "Organic Chemistry", Pearson,Delhi, 7th edition(2019).
4. A Textbook of Polymer Science and Technology , Shashi Chawla,Dhanpat Rai & Co. (2014)
5. T. Pradeep, Nano: The Essentials, Tata McGraw-Hill Education, Delhi, 2012
6. G.L. David Krupadanam, D. Vijaya Prasad, K. Varaprasad Rao, K.L.N. Reddy and C.Sudhakar, "Drugs", Universities Press (India) Limited, Hyderabad (2007).

Suggested Readings:

1. B. H. Mahan, "University Chemistry", Narosa Publishing house, New Delhi, 3rd edition (2013).
2. B.R. Puri, L.R. Sharma and M.S. Pathania, "Principles of Physical Chemistry", S. Nagin Chand & Company Ltd., 46thedition(2013).
3. T.W. Graham Solomons, C.B. Fryhle and S.A. Snyder, "Organic Chemistry", Wiley,12th edition (2017).
4. P.W. Atkins, J.D. Paula, "Physical Chemistry", Oxford, 8th edition (2006).

With effect from the Academic Year 2022-2023

22EEC01

BASIC ELECTRICAL ENGINEERING

Instruction	2L + 1T Hours per week
Duration of SEE	3 Hours
SEE	60 Marks
CIE	40 Marks
Credits	3

Course Objectives:

1. To understand the behaviour of different circuit elements R, L & C, and the basic concepts of electrical AC circuit analysis
2. To comprehend the basic principle of operation of AC and DC machines
3. To infer about different types of electrical wires and cables, domestic and industrial wiring. safety rules and methods of earthing.

Course Outcomes: After the completion of this course, the student will be able to

1. Understand the concepts of Kirchhoff's laws and their application various theorems to get solution of simple dc circuits.
2. Predict the steady state response of RLC circuits with AC single phase/three phase supply.
3. Infer the basics of single phase transformer
4. Describe the construction, working principle of DC machine and 3-phase Induction motor.
5. Acquire the knowledge of electrical wires, cables, earthing, Electrical safety precautions to be followed in electrical installations and electric shock and its safety and energy calculations.

UNIT-I

DC Circuits: Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff current and voltage laws, analysis of simple circuits with dc excitation, Superposition, Thevenin's and Norton's 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, series RL and RC. Three phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-III

Single Phase Transformer: Construction, Working principle, EMF Equation, Ideal and Practical transformer, Equivalent circuit of Transformer, OC and SC tests on a transformer, Efficiency and Regulation

UNIT-IV

DC and AC Machines: DC Generators: Construction, Principle of operation, EMF equation, Classification, Characteristics of shunt generators. DC Motors: Classification, Torque Equation,

Characteristics and Speed control of DC Shunt and Series Motors, Losses and efficiency Three - Phase Induction Motors: Principle of operation, Applications

UNIT-V

Electrical Installations: Electrical Wiring: Types of wires and cables, Electrical Safety precautions in handling electrical appliances, electric shock, first aid for electric shock, safety rules. Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, Earthing (Elementary Treatment only), Elementary calculations for energy consumption

Text Books:

1. L. S. Bobrow, Fundamentals of Electrical Engineering, Oxford University Press, 2011.
2. E. Hughes, Electrical and Electronics Technology, Pearson, 2010.

Suggested Reading:

1. D. P. Kothari & I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 2010.
2. V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989
3. D.C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009
4. P.V. Prasad, S. Sivanagaraju, R. Prasad, "Basic Electrical and Electronics Engineering" Cengage Learning, 1st Edition, 201

With effect from the Academic Year 2022-23

22CSC01

PROBLEM SOLVING AND PROGRAMMING

Instruction	2L+1T Hours per week
Duration of SEE	3 Hours
SEE	60 Marks
CIE	40 Marks
Credits	3

Course Objectives: The objectives of this course are to:

1. Develop logical skills and basic technical skills so that students should be able to solve basic computational problems.
2. Learn any basic programming language.

Course Outcomes: After completion of course, students would be able to:

1. Understand real world problems and develop computer solutions for those problems.
2. Understand the basics of Python.
3. Apply Python for solving basic programming solutions.
4. Create algorithms/flowcharts for solving real-time problems.
5. Build and manage dictionaries to manage data
6. Handle data using files

UNIT I:

Introduction to Programming - *Evolution of languages*: Machine, Assembly and High-level languages. *Software requirements for programming*: OS, compiler, linker, loader, editor. Design specification: Algorithms and Flowcharts.

UNIT II:

Data Types and Operators, Variable, Sequences and Iteration - Data types, Expressions, Precedence Rules, Operators: arithmetic, relational, logical, bit-wise and miscellaneous operators; local variable, global variables, List, String, Tuples, Sequence mutation and accumulating patterns.

UNIT III:

Conditional Statement, Loops, Arrays and Strings, user-defined Data Types -if..else, for, while, nested iteration, Concept and use of arrays, declaration and usage of arrays, 2-dimensional arrays, different types of user defined data types.

UNIT IV:

Dictionaries and Dictionary Accumulation, Functions/Methods - Dictionary basics, operations, methods, accumulation, advantages of modularizing program into functions, function definition and function invocation. Positional parameters passing arrays to functions, recursion, library functions.

UNIT V:

File Handling and Memory Management - Concepts of files and basic file operations, writing/reading data to/from a .csv file, Memory Management Operations.

Text Books and References:

1. R.S. Salaria, Khanna , “Programming for Problem Solving”, Book Publishing Co., Delhi.
2. Jeeva Jose, Khanna , “Taming Python by Programming”, Book Publishing Co., Delhi.
3. Mark Lutz, “Learning Python”, 5th Edition, , O'Reilly Media, Inc.,
4. Python Crash Course: A Hands-On, Project-Based Introduction to Programming by No Starch Press.
5. Eric Matthes,, “Programming in Python”, R.S. Salaria, Khanna Book Publishing Co., Delhi.
6. https://www.coursera.org/specializations/python-3-programming.

NPTEL/SWAYAM Course:

1. Introduction to Problem Solving and Programming, Video Lectures, Prof. D Gupta , IIT Delhi.
2. Problem Solving Aspects and Python Programming, Dr. S Malinga, Dr Thangarajan, Dr. S V Kogilavani, Kongu Engineering College.

With effect from the Academic Year 2022-23

22CYC02

CHEMISTRY LAB

(Common to All Branches)

Instruction:	3P Hours per Week
Duration of SEE	3 Hours
SEE:	50 Marks
CIE	50 Marks
Credits:	1.5

Course Objectives

1. To impart fundamental knowledge in handling the equipment / glassware and chemicals in chemistry laboratory.
2. To provide the knowledge in both qualitative and quantitative chemical analysis
3. The student should be conversant with the principles of volumetric analysis
4. To apply various instrumental methods to analyse the chemical compounds and to improve understanding of theoretical concepts.
5. To interpret the theoretical concepts in the preparation of new materials like drugs and polymers.

Course Outcomes

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

1. Identify the basic chemical methods to analyse the substances quantitatively & qualitatively.
2. Estimate the amount of chemical substances by volumetric analysis.
3. Determine the rate constants of reactions from concentration of reactants/ products as a function of time.
4. Calculate the concentration and amount of various substances using instrumental techniques.
5. Develop the basic drug molecules and polymeric compounds.

Chemistry Lab

1. Introduction: Preparation of standard solution of oxalic acid and standardisation of NaOH.
2. Estimation of metal ions (Co^{+2}& Ni^{+2}) by EDTA method.
3. Estimation of temporary and permanent hardness of water using EDTA solution
4. Determination of Alkalinity of water
5. Determination of rate constant for the reaction of hydrolysis of methyl acetate. (first order)
6. Determination of rate constant for the reaction between potassium per sulphate and potassium Iodide. (second order)
7. Estimation of amount of HCl Conductometrically using NaOH solution.
8. Estimation of amount of HCl and CH_3COOH present in the given mixture of acids Conductometrically using NaOH solution.
9. Estimation of amount of HCl Potentiometrically using NaOH solution.
10. Estimation of amount of Fe^{+2} Potentiometrically using $KMnO_4$ solution
11. Preparation of Nitrobenzene from Benzene.
12. Synthesis of Aspirin drug and Paracetamol drug.
13. Synthesis of phenol formaldehyde resin.

Text Books:

1. J. Mendham and Thomas , "Vogel's text book of quantitative chemical analysis", Pearson education Pvt.Ltd. New Delhi ,6th ed. 2002.
2. Senior practical physical chemistry by B.D.Khosla, V.C.Garg&A.Gulati,; R. Chand & Co. : New Delhi (2011).

Suggested Readings:

1. Dr.Subdharani , "Laboratory Manual on Engineering Chemistry", Dhanpat Rai Publishing, 2012.
2. S.S. Dara , "A Textbook on experiment and calculation in engineering chemistry", S.Chand and Company, 9th revised edition, 2015.

With effect from the Academic Year 2022-23

22MBC02

COMMUNITY ENGAGEMENT

Instruction	3P Hours per week
SEE	Nil
CIE	50 Marks
Credits	1.5

Course Objectives: The main Objectives of this Course are to:

1. Develop an appreciation of Rural culture, life-style and wisdom among the Students.
2. Learn about the various livelihood activities that contribute to Rural economy.
3. Familiarize the Rural Institutions and the Rural Development Programmes in India.

Course Outcomes: After the completion of this Course, Student will be able to:

2. Gain an understanding of Rural life, Culture and Social realities.
3. Develop a sense of empathy and bonds of mutuality with Local Communities.
4. Appreciate significant contributions of Local communities to Indian Society and Economy.
5. Exhibit the knowledge of Rural Institutions and contributing to Community's Socio-Economic improvements.
6. Utilise the opportunities provided by Rural Development Programmes.

Module IAppreciation of Rural Society

Rural life style, Rural society, Caste and Gender relations, Rural values with respect to Community, Nature and Resources, elaboration of 'soul of India lies in villages' (Gandhi), Rural Infrastructure.

Module II Understanding Rural Economy and Livelihood

Agriculture, Farming, Landownership, Water management, Animal Husbandry, Non-farm Livelihood and Artisans, Rural Entrepreneurs, Rural markets, Rural Credit Societies, Farmer Production Organization/Company.

ModuleIII Rural Institutions

Traditional Rural organizations, Self-Help Groups, Panchayati Raj Institutions (Gram Sabha), Gram Panchayat, Standing Committees, Local Civil Society, Local Administration.

ModuleIV Rural Development Programmes

History of Rural Development in India, Current National Programmes: SarvaShikshaAbhiyan, BetiBhachao, BetiPadhao, Ayushman, Bharat, Swachh Bharat, PM AwasYojana, Skill India, Gram Panchayat Decentralised Planning, NRLM, MNREGA etc.

Text Books:

1. Singh, Katar, Rural Development: Principles, Policies and Management, Sage Publications, New Delhi, 2015.
2. A Hand book on Village Panchayat Administration, Rajiv Gandhi Chair for Panchayati Raj Studies, 2002.
3. United Nations, Sustainable Development Goals, 2015, un.org/sdgs
4. M.P Boraia, Best Practices in Rural Development, Shanlax Publishers, 2016.

Journals:

1. Journal of Rural development (published by NIRD & PR, Hyderabad).
2. Indian Journal of Social Work, (by TISS, Bombay).
3. Indian Journal of Extension Educations (by Indian Society of Extension Education).
4. Journal of Extension Education (by Extension Education Society).
5. Kurukshetra (Ministry of Rural Development, GOI).
6. Yojana (Ministry of Information & Broadcasting, GOI).

With effect from the Academic Year 2022-23

22CSC02

PROBLEM SOLVING AND PROGRAMMING LAB

Instruction	3P Hours per week
Duration of SEE	3 Hours
SEE	50 Marks
CIE	50 Marks
Credits	1.5

Course Objectives: The objectives of this course are to:

1. Master the fundamentals of writing Python scripts
2. Learn Python elements such as variables, flow controls structures, and functions
3. Discover how to work with lists and sequence data, and files

Course Outcomes: After completion of course, students would be able to:

1. Understand various Python program development Environments
2. Demonstrate the concepts of Python.
3. Implement algorithms/flowcharts using Python to solve real-world problems.
4. Build and manage dictionaries to manage data.
5. Write Python functions to facilitate code reuse.
6. Use Python to handle files and memory.

Laboratory / Practical Experiments:

1. Explore various Python Program Development Environments.
2. Demonstration of input/output operations
3. Demonstration of operators
4. Demonstration of selective control structures
5. Demonstration of looping control structures
6. Demonstration of Python Dictionaries.
7. Implementation of searching and sorting techniques.
8. Implementation of string manipulation operations
9. File handling and memory management operations

Text Books and References:

1. R.S Salaria, Khanna, (Programming for Problem Solving", Book Publishing Co., Delhi
2. Jeeva Jose, Khanna,, "Taming Python by Programming", Book Publishing Co., Delhi

With effect from the Academic Year 2022–23

22 MEC37

ROBOTICS AND DRONES LAB

(Common to All Branches)

Instruction	2T + 2P Hours per week
CIE	100
Credits	3

Objectives: The objectives of this course are to:

1. To develop the students' knowledge in various robot and drone structures and their workspace.
2. To develop multidisciplinary robotics that have practical importance by participating in robotics competitions
3. To develop students' skills in performing spatial transformations associated with rigid body motions, kinematic and dynamatic analysis of robot systems.
4. Through projects done in lab, increase the true hands-on student learning experience and enhance their conceptual understanding, increase students' ability, competence and teamwork skills on dealing with real-life engineering problems

Outcomes: After completion of course, students would be able to:

1. Demonstrate knowledge of the relationship between mechanical structures of robotics and their operational workspace characteristics
2. Understand mechanical components, motors, sensors and electronic circuits of robots and build robots.
3. Demonstrate knowledge of robot controllers.
4. Use Linux environment for robotic programming.
5. Write Python scripts to control robots using Python and Open CV.

Lab Experiments:

1. Assembling of robot mechanical components, mounting of motors, sensors, electronic circuits to the chassis.
2. Connecting to electronic circuitry: motor drivers, incremental encoders proximity sensors, micro controller,
3. Different types of batteries, selection of suitable battery for application, safety precaution.
4. Introduction to Linux Command Line Interface: basic file and directory management and other useful commands
5. Controlling robot using Python: i) Move robot using Python code, ii) Make robot move in patterns using Python
6. Robot programming with Sensor inputs:i) Read sensor data using Python, ii) Visualize sensor data using Python, iii) Code robot to avoid obstacles by using sensor data
7. Open CV: i) Create an Image and display an image; ii) Read and change pixel values; iii) Create colored shapes and save image; iv) Extract the RGB values of a pixel; v) Reading and Writing Videos
8. Open CV: i) Extraction of Regions of Interest; ii) Extraction of RGB values of a pixel
9. Coding robot to work with colors, follow colored objects, identifying shape of the object-oriented
10. Projects: i)Making a line follower robot using a Camera; ii) Writing code for a complex function
11. Assembly of a drone

Suggested readings

1. https://www.geeksforgeeks.org/robotics-introduction/
2. https://www.ohio.edu/mechanical-faculty/williams/html/PDF/IntroRob.pdf
3. https://www.idtechex.com/en/research-report/new-robotics-and-drones-2018-2038-technologies-forecasts-players/584
4. https://dronebotworkshop.com/

With effect from the Academic Year 2022-2023

22EEC02

BASIC ELECTRICAL ENGINEERING LAB

Instruction	2P Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	50 Marks
CIE	50 Marks
Credits	1

Course Objectives:

1. To acquire the knowledge on different types of electrical elements and to verify the basic electrical circuit laws and theorems.
2. To determine the parameters and power factor of a coil, calculate the time and frequency responses of RLC circuits and to familiarize with measurement of electric power & energy.
3. To determine the characteristics of Transformers, dc, ac machines and switch gear components

Course Outcomes: At the end of the course, the students are expected to

1. Comprehend the circuit analysis techniques using various circuital laws and theorems.
2. Analyse the parameters of the given coil and measurement of power and energy in AC circuits
3. Determine the turns ration/performance parameters of single-phase transformer
4. Infer the characteristics of DC shunt motor different tests.
5. Illustrate different parts and their function of electrical components, equipment and machines.

List of Laboratory Experiments/Demonstrations:

1. Verification of KCL and KVL.
2. Verification of Thevenin's theorem.
3. Verification of Norton's theorem.
4. Charging and discharging of Capacitor.
5. Determination of parameters of a choke or coil by Wattmeter Method.
6. Power factor improvement of single-phase AC System.
7. Active and Reactive Power measurement of a single-phase system using
   (i) 3-Ammeter method (ii) 3-Voltmeter method
8. Measurement of 3-Phase Power in a balanced system
9. Calibration of single-phase energy meter.
10. Verification of Turns/voltage ratio of single-phase Transformer.
11. Open Circuit and Short Circuit tests on a given single phase Transformer
12. Brake test on DC Shunt Motor
13. Speed control of DC Shunt Motor
14. Demonstration of Measuring Instruments and Electrical Lab components.
15. Demonstration of Low-Tension Switchgear Equipment/Components
16. Demonstration of cut - out section of Machines like DC Machine, Induction Machine etc.

Note: TEN experiments to be conducted to cover all five Course Outcomes.

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (AUTONOMOUS)

Scheme of Instructions of II Semester of B.Tech. - Biotechnology as per AICTE Model Curriculum 2022-23

B.TECH. - BIOTECHNOLOGY

SEMESTER – II

S. No	Course Code	Title of the Course	Scheme of Instruction			Credits
			Hours per Week			
			L	T	P/D	
THEORY						
1	22MTC06/ 22BTC02	Mathematics-II/Basics of Biology-II	3	1	0	4
2	22PYC07	Physics	3	0	0	3
3	22CEC01	Engineering Mechanics	3	1	0	4
4	22EGC01	English	2	0	0	2
PRACTICAL						
5	22PYC10	Physics Lab	0	0	3	1.5
6	22EGC02	English lab	0	0	2	1
7	22MEC01	CAD AND DRAFTING	0	1	3	2.5
8	22MEC38	Digital Fabrication Lab	0	0	3	1.5
TOTAL			**11**	**3**	**11**	**19.5**

L:Lecture **T:Tutorial** **D:Drawing**

P:Practical **CIE-Continuous Internal Evaluation** **SEE-Semester End Examination**

With effect from Academic Year 2022-23

22MTC06

Mathematics-II
(Biotech BiPC Stream)

Instruction:	3 L+1T Hours per week
Duration of SEE	3 Hours
SEE	60 Marks
CIE	40 Marks
Credits	4

Course Objectives:

1. To discuss the basic operations in Vector Algebra.
2. To discuss Physical interpretations on Scalars and vector functions.
3. To explain various methods of partial fractions.
4. To explain various techniques of integration.
5. To discuss the solutions of first order differential equations.

Course Outcomes:

Upon completing this course, students will be able to:

1. Apply the basic operations on Scalar and Vectors.
2. Apply the vector differential operators to Scalars and Vector functions.
3. Solve partial fractions by various methods.
4. Evaluate definite and indefinite Integral.
5. Solve the first order ordinary differential equations.

UNIT-I:

Vector Algebra

Addition of vectors, scalar multiplication, angle between two non-zero vectors, linear combination of vectors, component of vectors in three dimensions, scalar product geometrical interpretations, orthogonal projections, properties of dot product, angle between two vectors, vector product of two vectors and properties, scalar triple product, vector triple product.

UNIT-II:

Vector Differential Calculus

Definitions, scalar and vector point functions, vector differential operator, Gradient, Divergence and Curl, Solenoidal and Irrotational vectors, properties of gradient, divergence and curl (vector identities)

UNIT- III

Partial Fractions: Resolving $f(x)/g(x)$ into partial fractions, $g(x)$ contains non repeated linear factors, $g(x)$ contains repeated and non-repeated linear factors, $g(x)$ contains non repeated irreducible factors, $g(x)$ contains repeated and not repeated irreducible factors.

UNIT - IV

Integration: Simple integrations of algebraic, trigonometric and exponential functions. Methods of integration, integration by parts, integration of rational, irrational and Trigonometric functions, definite integrals.

UNIT- V

Differential Equations: Formation of Differential equations, Solutions of first order and first degree differential Equations, Variable Separable, Homogeneous, Linear, Bernoulli and Exact differential Equations.

Text Books:

1. Shanti Narayan, "Vector Calculus", S.Chand Publishers, 2003.
2. B.S.Grewal, "Higher Engineering Mathematics", 43rd edition, Khanna Publishers, 2014.

Suggested Reading:

1. William E. Boyce, Richard C. Diprima, "Elementary differential equations", 9th Edition, Wiley Publishers, 2008.
2. Joseph Edwards, "Differential Calculus For Beginners", Arihant publishers, 2016.

With effect from the Academic Year 2022-23

22BTC02

BASICS OF BIOLOGY -II
(for MPC Stream of Bio-Tech)

Instruction:	3 L+1T Hours per week
Duration of SEE:	3 Hours
SEE:	60 Marks
CIE:	40 Marks
Credits:	4

Course Objectives:

1. To impart theoretical knowledge on animal cell, tissues their types and level organization
2. To provide knowledge on basic concepts of Biology and basis of animal kingdom classification.
3. To provide knowledge on various parasites, lifecycle and diseases caused by them.
4. To impart knowledge on ecology, environment and biotic interactions in nature
5. To give an insight on genes, chromosome, blood grouping system, and gene expression

Course Outcomes:

By the end of the course students be able to

1. Identify the basic structure, function of various animal cell organelles, level of organization and types of tissues in animals (BL 2).
2. Explains nomenclature and the animal kingdom classification with its characteristic features. (BL 2).
3. Explain and identify the lifecycles, diseases, treatment and preventive measures of human pathogens (BL 3)
4. Outline population ecology, various biotic and abiotic environmental factors of ecosystem. (BL 2).

UNIT-I

Animal Cell, Tissues and Level of Organization: Structure of animal cell and its organelles. Differences between plant and animal cell. Level of organization, multicellularity, diploblastic and triploblastic conditions. Asymmetry, symmetry: radial symmetry and bilateral symmetry. Acoelomates, pseudo coelomates and coelomates in brief. Animal tissues structure and functions. Different types of animal tissues and their functions. Epithelial, Connective, Muscular and Nervous tissues in brief

UNIT-II

Animal Kingdom Classification: Classification of animal kingdom. Phylogeny of invertebrate and vertebrate phyla. Salient features of non-chordates up to phyla, and chordates up to class level. Binomial and trinomial nomenclature. Concept of species and genus.

UNIT-III

Parasitology: Parasitism and Parasitic Adaptation: Health and disease: introduction, life cycle, pathogenicity, treatment and prevention; Entamoebahistolytica, Plasmodium vivax, Ascarislumbricoides

and Wuchereriabancrofti. Brief account of pathogenicity, treatment and prevention of typhoid, pneumonia, common cold and ring worm.

UNIT -IV

Ecology and Environment: Levels of biological hierarchy, Organism and environment, habitat and niche. Abiotic environmental factors light, temperature, water and soil. Population and ecological adaptations, population attributes: growth, birth and death rate, sex ratio, age distributions, Population density. Population growth models, Biotic environmental factor & interactions-competition, mutualism, commensalism, parasitism, predation & ammensalism.

UNIT V

Genetics: Structure and Functions of DNA, Chromosome; Concept of gene and alleles, multiple alleles, ABO blood groups. Sex chromosomes, Sex linked inheritance. Central Dogma, Characteristics of genetic code, Gene expression and regulation: transcription, translation and regulation in prokaryotes (lac operon)and eukaryotes.

Text Books:

1. Campbell, N.A., Reece, J.B., Urry, Lisa, Cain, ML., Wasserman, S.A., Minorsky, P.V., Jackson, R.B. Biology: A Global 11th edition, Pearson Education Ltd. (2017)
2. Beginning Science: Biology. B.S. Beckett. Oxford University Press.1st edition, 1983.

Suggested Reading

1. Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. & J.I., Spicer Invertebrates: A New Edition, Blackwell Science(2002)
2. K Vaidhyanath, K Pratap Reddy and K Sathya Prasad, to Applied Biology and BS Publications, India, 2004.

With effect from the Academic Year 2022-23

22PYC07

PHYSICS
(Biotech & Chemical)

Instruction	3L Hours per week
Duration of SEE	3Hours
SEE	60Marks
CIE	40Marks
Credits	3

Course Objectives: The objectives of the course is to make the student

1. Learn the basic concepts of wave nature of light
2. Know about the properties of magnetic and dielectric materials
3. Understand the basics of nanomaterials
4. Familiarize with fundamental ideas of quantum mechanics

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

1. Demonstrate the physical properties of the light.
2. Find the applications of lasers and optical fibers in engineering and technology.
3. Identify different types of magnetic and dielectric materials.
4. Recall the fundamentals of nanomaterials.
5. Apply the ideas of quantum mechanics for related problems

UNIT-I

Wave Optics: Huygens' principle –Superposition of waves –Interference of light by splitting of wavefront and amplitude –Fresnel's biprism –Interference in thin films (reflected light) – Newton's rings –Fraunhofer diffraction from a single slit – Double slit diffraction–Concept of N-slits–Diffraction grating and its resolving power. Polarization: Introduction–Malus's law–Double refraction –Nicol's prism– Quarter-wave plate and half-wave plate–Optical activity– Laurent's half shade polarimeter.

UNIT-II

Lasers: Characteristics of lasers– Einstein's coefficients–Amplification of light by population inversion– Ruby laser– He-Ne laser– Semiconductor laser–Applications of lasers in engineering and medicine.

Fiber Optics: Introduction –Construction –Principle –Propagation of light through an optical fiber – Numerical aperture and acceptance angle – Step-index and graded-index fibers –Pulse dispersion –Fiber losses –Fiber optic communication system –Applications.

UNIT-III

Dielectric Materials: Introduction–Dielectric polarization–Types of dielectric polarization: electronic & ionic polarizations (quantitative); orientation & space-charge polarizations (qualitative)–Frequency and temperature dependence of dielectric polarization–Determination of dielectric constant (Schering bridge method)–Ferroelectricity–Barium titanate–Applications of ferroelectrics.

Magnetic Materials: Origin of magnetism –Magnetic moment - Bohr magneton –Classification of magnetic materials: dia, para, ferro, anti-ferro and ferrimagnetic materials– Weiss molecular field theory– Domain theory–Hysteresis curve–Soft and hard magnetic materials–Applications.

UNIT-IV

Nanomaterials: Properties of materials at reduced size–Surface to volume ratio–Quantum confinement–Preparation of nanomaterials: bottom-up approach (sol-gel method) and top-down approach (ball milling method)–Elementary ideas of carbon nanotubes–Applications of nanomaterials.

UNIT-V

Quantum Mechanics: Introduction–Planck's' law of black body radiation – Wien's law and Rayleigh-Jean's law from Planck's law – Photoelectric effect – Compton effect –de-Broglie hypothesis –Wave-particle duality –Physical significance of ψ –Born's interpretation of the wave function –Verification of matter waves by Davisson-Germer's experiment –Uncertainty principle – Schrodinger wave equation (time-dependent and time-independent) –Particle in infinite square well potential.

TEXT BOOKS:

1. B.K. Pandey and S. Chaturvedi, *Engineering Physics*, Cengage Publications, 2012.
2. M.N. Avadhanulu and P.G. Kshirsagar, *A Text Book of Engineering Physics*, S. Chand Publications, 2014.
3. M. Arumugam, *Materials Science*, Anuradha Publications, 2015.
4. S.L. Gupta and Sanjeev Gupta, *Modern Engineering Physics*, Dhanpat Rai Publications, 2011.

SUGGESTD READING:

1. R. Murugeshan and Kiruthiga Sivaprasath, *Modern Physics*, S. Chand Publications S. Chand Publications, 2014.
2. V. Rajendran, *Engineering Physics*, McGraw-Hill Education Publications, 2013.
3. P.K. Palanisamy, *Engineering Physics*, Scitech Publications, 2012.
4. V. Raghavan, *Materials Science and Engineering*, Prentice Hall India Learning Private Limited; 6th Revised edition, 2015.

With effect from the Academic Year 2022-23

22CEC01

ENGINEERING MECHANICS

Instruction	3L+1T Periods per week
Duration of End Examination	3 Hours
End Examination	60 Marks
Sessional	40 Marks
Credits	4

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

1. Calculate the components and resultant of coplanar forces system and Draw free body diagrams to analyze the forces in the given structure
2. Understand the mechanism of friction and can solve friction problems
3. Analyse simple trusses for forces in various members of a truss.
4. Determine the centroid of plane areas, composite areas and centres of gravity of bodies.
5. Determine moments of inertia, product of inertia of plane and composite areas and mass moments of inertia of elementary bodies,

UNIT – I

Resolution and Resultant of Force System: Basic concepts of a force system. Components of forces in a plane. Resultant of coplanar concurrent force system. Moment of a force, couple and their applications. Resultant of coplanar non-concurrent force system

Equilibrium of force system: Free body diagrams, equations of equilibrium of planar force systems and its applications. Problems on general case of coplanar force systems.

UNIT – II

Theory of friction: Introduction, types of friction, laws of friction, application of friction to a single body & connecting systems. Wedge and belt friction

UNIT – III

Analysis of Simple Trusses: Introduction to trusses, Assumptions, analysis of simple trusses using method of joints and method of sections.

UNIT– IV

Centroid: Significance of centroid, moment of area, centroid of line elements, plane areas, composite areas, theorems of Pappus & its applications. Center of gravity of elementary and composite bodies

UNIT – V

Moment of Inertia: Definition of MI, Area MI. Polar Moment of Inertia, radius of gyration, transfer theorem, Moment of Inertia of elementary & composite areas, and Product of inertia. Mass moments of inertia of elementary bodies.

Text Books:

1. K. Vijay Kumar Reddy and J. Suresh Kumar, Singer's Engineering Mechanics, BS Publications, Hyderabad, 2011.
2. Ferdinand L Singer, Engineering Mechanics, Harper and Collins, Singapore, 1904.

Suggested Reading:

1. A. Nelson, Engineering Mechanics, Tata McGraw Hill, New Delhi, 2010.
2. S. Rajashekaran & G. Sankarasubramanyam, Engineering Mechanics, Vikas publications, Hyderabad, 2002.
3. S.B. Junarkar and H.J Shah, Applied Mechanics**,** Charotar publishers, New Delhi, 2001.
4. Basudeb Bhattacharyya, Engineering Mechanics, Oxford University Press, New Delhi, 2008.
5. A K Tayal, Engineering Mechanics, Umesh Publications, New Delhi, 2010

With effect from the Academic Year 2022-23

22EGC01

ENGLISH

(Common to All Branches)

Instruction	2L Hours per week
Duration of SEE	3Hours
SEE	60 Marks
CIE	40 Marks
Credits	2

Course Objectives: This course will introduce the students:

1. To the role and importance of communication while developing their basic communication skills in English.
2. To basics of writing coherent paragraphs and formal emails.
3. To techniques of writing a précis and formal letters by using acceptable grammar and appropriate vocabulary.
4. To description, definition and classification of processes while enabling them to draft formal reports following a proper structure.
5. To gaining adequate reading comprehension techniques.

Course Outcomes: After successful completion of the course the students will be able to:

1. Illustrate the nature, process and types of communication and communicate effectively without barriers.
2. Construct and compose coherent paragraphs, emails and adhering to appropriate mobile etiquette.
3. Apply techniques of precision to write a précis and formal letters by using acceptable grammar and appropriate vocabulary.
4. Distinguish formal from informal reports and demonstrate advanced writing skills by drafting formal reports.
5. Critique passages by applying effective reading techniques

UNIT-I

Understanding Communication in English:

Introduction, nature and importance of communication; Process of communication; Types of communication - verbal and non-verbal; Barriers to communication; Intrapersonal and interpersonal communication; Understanding Johari Window.

Vocabulary &Grammar: The concept of Word Formation; Use of appropriate prepositions and articles.

UNIT-II

Developing Writing Skills I:

Paragraph writing. – Structure and features of a paragraph; Cohesion and coherence. Rearranging jumbled sentences. Email and Mobile etiquette.

Vocabulary & Grammar: Use of cohesive devices and correct punctuation.

UNIT-III

Developing Writing Skills II:

Précis Writing; Techniques of writing precisely. Letter Writing – Structure, format of a formal letter; Letter of request and the response

Vocabulary and Grammar: Subject-verb agreement. Use of prefixes and suffixes to form derivatives. Avoiding redundancies.

UNIT-IV

Developing Writing Skills III:

Report writing – Importance, structure, elements of style of formal reports; Writing a formal report.

Vocabulary and Grammar: Avoiding ambiguity - Misplaced modifiers. Use of synonyms and antonyms.

UNIT-V

Developing Reading Skills:

The reading process, purpose, different kinds of texts; Reading comprehension; Techniques of comprehension – skimming, scanning, drawing inferences and conclusions.

Vocabulary and Grammar: Words often confused; Use of standard abbreviations.

Text Books:

1. Language and Life: A Skills Approach, Board of Editors, Orient Black Swan,2017.
2. Swan Michael, Practical English Usage.OUP.1995.

Suggested Readings:

1. Wood F.T, Remedial English Grammar,Macmillan,2007
2. Zinsser William, On Writing Well, Harper Resource Book, 2001
3. Sanjay Kumar and PushpLata, Communication Skills. Oxford University Press,2011.

With effect from the Academic Year 2022-23

22PYC10

PHYSICS LAB
(Biotech & Chemical)

Instruction	3P Hours per week
Duration of SEE	3Hours
SEE	50Marks
CIE	50Marks
Credits	1.5

Course Objectives: The objectives of the course is to make the student

1. Apply theoretical physics knowledge in doing experiments
2. Understand the behaviour of the light experimentally
3. Analyze the physical properties of magnetic and dielectric materials
4. Familiarize with motion of electrons in electric and magnetic fields

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

1. Interpret the errors in the results of an experiment.
2. Demonstrate the wave nature of light experimentally
3. Utilize physical properties of magnetic and dielectric materials for various applications
4. Make use of lasers and optical fibers for engineering applications
5. Explain light induced phenomenon and motion of electrons in electric and magnetic fields

Experiments

1.	Error Analysis	:	Estimation of errors in the determination of time period of a torsional pendulum
2.	Fresnel's Biprism	:	Determination of wavelength of given monochromatic source
3.	Newton's Rings	:	Determination of wavelength of given monochromatic source
4.	Single Slit Diffraction	:	Determination of wavelength of given monochromatic source
5.	Diffraction Grating	:	Determination of wavelengths of two yellow lines of light of mercury lamp
6.	Malus's Law	:	Verification of Malus's law
7.	Double Refraction	:	Determination of refractive indices of O-ray and E-ray of given calcite crystal
8.	Polarimeter	:	Determination of specific rotation of glucose
9.	Laser	:	Determination of wavelength of given semiconductor laser
10.	Optical Fiber	:	Determination of numerical aperture and power losses of given optical fiber
11.	Dielectric constant	:	Determination of dielectric constant of given PZT sample
12.	M & H Values	:	Determination of magnetic moment M of a bar magnet and absolute value H of horizontal component of earth's magnetic field

13.	B-H curve	:	Determination of hysteresis loss of given specimen
14.	Planck's constant	:	Determination of Planck's constant using photo cell
15.	e/m of an Electron	:	Determination of specific charge of an electron by J.J. Thomson method

NOTE: A minimum of TWELVE experiments should be done.

With effect from the Academic Year 2022-23

22EGC02

ENGLISH LAB

(Common to All Branches)

Instruction	2P Hours per week
Duration of SEE	3 Hours
SEE	50 Marks
CIE	50 Marks
Credits	1

Course Objectives: This course will introduce the students:

1. To nuances of Phonetics and give them sufficient practice in correct pronunciation.
2. To word stress and intonation.
3. To listen to listening comprehension material for honing their listening skills.
4. To activities enabling them overcome their inhibitions while speaking in English with the focus being on fluency rather than accuracy.
5. To team work, role behavior while developing their ability to discuss in groups and making oral presentations.

Course Outcomes: After successful completion of the course the students will be able to:

1. Define the speech sounds in English and understand the nuances of pronunciation in English
2. Apply stress correctly and speak with the proper tone, intonation and rhythm.
3. Analyze listening comprehension texts to enhance their listening skills.
4. Determine the context and speak appropriately in various situations.
5. Design and present effective posters while working in teams, and discuss and participate in Group discussions.

Exercises

1. **Introduction to English Phonetics**: Introduction to auditory, acoustic and articulatory phonetics, organs of speech: the respiratory, articulatory and phonatory systems.
2. **Sound system of English**: Phonetic sounds and phonemic sounds, introduction to international phonetic alphabet, classification and description of English phonemic sounds, minimal pairs . The syllable: types of syllables, consonant clusters.
3. **Word stress**: Primary stress, secondary stress, functional stress, rules of word stress.
4. **Rhythm & Intonation** : Introduction to Rhythm and Intonation. Major patterns, intonation of English with the semantic implications.
5. **Listening skills** – Practice with Software available in (K-van solutions)
6. **Public speaking –** Speaking with confidence and clarity in different contexts on various issues.
7. **Group Discussions -** Dynamics of a group discussion, group discussion techniques, body language.
8. **Pictionary –** weaving an imaginative story around a given picture.
9. **Information Gap Activity –** Writing a brief report on a newspaper headline by building on the hints given
10. **Poster presentation –** Theme, poster preparation, team work and representation.

Suggested Reading

1. T Balasubramanian. A Textbook of English Phonetics for Indian Students, Macmillan,2008.
2. J Sethi et al. A Practical Course in English Pronunciation (with CD), Prentice Hall India,2005.
3. PriyadarshiPatnaik. Group Discussions and Interviews, Cambridge University Press Pvt Ltd2011
4. ArunaKoneru, Professional Speaking Skills, Oxford University Press,2016

With effect from the Academic Year2020-21

22MEC01

CAD AND DRAFTING

Instruction	1 T + 3 D Hours per week
Duration of SEE	3Hours
SEE	50Marks
CIE	50Marks
Credits	2.5

Course Objectives:

1. To get exposure to a cad package and its utility.
2. Understanding orthographic projections.
3. To visualize different solids and their sections in orthographic projection
4. To prepare the student to communicate effectively by using isometric projection.
5. To prepare the student to use the techniques, skills, and modern tools necessary for practice.

Outcomes: At the end of the course, the Students are able to

1. Become conversant with appropriate use of CAD software for drafting.
2. Recognize BIS, ISO Standards and conventions in Engineering Drafting.
3. Construct the projections of points, lines, planes, solids
4. Analyse the internal details of solids through sectional views
5. Create an isometric projections and views

List of Exercises:

1. Introduction to CAD package: Settings, draw, modify tools, dimensioning and documentation
2. Construction of Conic Sections by General method
3. Orthographic projection: Principles, conventions, Projection of points
4. Projection of straight lines: Simple position, inclined to one plane
5. Projection of straight lines inclined to both the planes (without traces and mid-point)
6. Projection of planes: Perpendicular planes
7. Projection of planes: Oblique planes
8. Projection of solids: Simple position
9. Projection of solids: Inclined to one plane
10. Sections of solids: Prism, pyramid in simple position
11. Sections of solids: Cone and cylinder in simple position
12. Isometric projections and views
13. Conversion of isometric views to orthographic projections and vice-versa.

Text Books:

1. N.D.Bhatt, “Elementary Engineering Drawing”, Charotar Publishers,2012.
2. K.Venugopal, “Engineering Drawing and Graphics + AutoCAD”,New Age International Pvt.Ltd,2011.
3. Basanth Agrawal and C M Agrawal, “Engineering Drawing”, 2/e, McGraw-Hill Education (India) Pvt.Ltd.

Suggested Reading:

1. Shaw M.B and Rana B.C., “Engineering Drawing”, 2/e, Pearson,2009.

K.L. Narayana and P.K. Kannaiah, “Text Book of Engineering Drawing”, Scitech Publications,2011.

With Effect from the Academic Year 2022–23

22MEC38

DIGITAL FABRICATION LAB

Instruction	3P Hours per week
Duration of SEE	3 Hours
SEE	50 Marks
CIE	50 Marks
Credits	1.5

Objectives: The objectives of this course are to:

1. Give a feel of Engineering Practices & develop holistic understanding of various Engineering materials and Manufacturing processes.
2. Develop skills of manufacturing, safety, precision, quality, intelligent effort, optimization, positive &team work attitude to get things right the first time.
3. Provide basic knowledge of Steel, Plastic, Composite and other materials for suitable applications.
4. Study of Principle and hands on practice on techniques of fabrication, welding, casting, manufacturing, metrology, and allied skills.
5. Advance important hard & pertinent soft skills, productivity, create skilled manpower which is cognizant of industrial workshop components and processes and can communicate their work in a technical, clear and effective way.

Outcomes: After completion of course, students would be able to:

1. Understand safety measures to be followed in workshop to avoid accidents.
2. Identify various tools used in fitting, carpentry, tin smithy, house wiring, welding, casting and machining processes.
3. Make a given model by using workshop trades including fitting, carpentry, tinsmithy and House wiring.
4. Perform various operations in welding, machining and casting processes.
5. Conceptualize and produce simple device/mechanism of their choice.

List of exercises:

Group-1

1. To make a lap joint on the given wooden piece according to the given dimensions.
2. To make a dove tail-joint on the given wooden piece according to the given dimensions.
3. a)Wiring of one light point controlled by one single pole switch, a three pin socket controlled by a single pole switch
   b) Wiring of two light points connected in series and controlled by single pole switch. Verify the above circuit with different bulbs. Wiring of two light points connected in parallel from two single pole switches and a three pin socket
4. Stair case wiring-wiring of one light point controlled from two different places independently using two 2- way switches.
5. To make external threads for GI pipes using die and connect the GI pipes as per the given diagram using taps, couplings & bends.
6. To connect the GI pipes as per the given diagram using, couplings, unions, reducer & bends.
   To connect the GI pipes as per the given diagram using shower, tap & valves and Demonstrate by giving water connection

Group- 2

1. To Study the method of Additive Manufacturing process using a 3D printer
2. To create a 3D CAD model of a door bracket using a modeling software
3. To Print a door bracket using an extruder type 3D Printer.
4. To create a 3D CAD model by reverse Engineering
5. To Design an innovative component using the CAD software
6. To Print the selected innovative component by the students using a 3D printer

Text Books:

1. Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., Elements of Workshop Technology, Vol. I, 2008 and Vol. II, Media promoters and publishers private limited, Mumbai, 2010.
2. Kalpakjian S. And Steven S. Schmid, Manufacturing Engineering and Technology, 4th edition, Pearson Education India Edition, 2002.
3. Sachidanand Jha , 3D PRINTING PROJECTS: 200 3D Practice Drawings For 3D Printing On Your 3D Printer , June 7, 2019.

Suggested Reading:

1. Gowri P. Hariharan and A. Suresh Babu, Manufacturing Technology – I, Pearson Education, 2008.
2. Oliver Bothmann , 3D Printers: A Beginner's Guide , January 1, 2015