Choice Based Credit System (CBCS)

Name of the Programme (UG): B.E/B.Tech

Syllabus for I - Semester and II - Semester

(With effect from 2016 - 2017)

Specializations/Branches

- Chemical Engineering
- Civil Engineering
- Electrical & Electronics Engineering
- Mechanical Engineering
- Production Engineering

Chaitanya Bharathi Institute of Technology (A)
Chaitanya Bharathi (P.O), Gandipet
Hyderabad-500075, Telangana State.

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)
Choice Based Credit System (with effect from 2016-17)
B.E (Civil, EEE, Mech. and Prod.) and B.Tech (Chemical)
SEMESTER - I

S.No	Course Code	Title of the Course	Scheme of Instruction		Scheme of Examination			Credits
			Hours per week		Duration of SEE in Hours	Maximum Marks		
			L/T	P/D		CIE	SEE	
THEORY								
1	16MT C01	Engineering Mathematics - I	3/1	-	3	30	70	4
2	16CY C01	Engineering Chemistry	3	-	3	30	70	3
3	16PY C02	Applied Physics	2	-	2	20	50	2
4	16CS C01	Programming and Problem Solving	3/1	-	3	30	70	4
5	16ME C01	Elements of Mechanical Engineering	3	-	3	30	70	3
6	16EC C01	Elements of Electronics and Communication Engineering	3	-	3	30	70	3
7	16CE C03	Professional Ethics and Human Values	1	-	2	-	50	1
PRACTICALS								
8	16CS C02	Programming Laboratory	-	2	2	15	35	1
9	16ME C03	Mechanical and IT Workshop	-	3	3	25	50	2
10	16PY C04	Applied Physics Laboratory	-	2	2	15	35	1
11	16CY C03	Engineering Chemistry Laboratory	-	2	2	15	35	1
TOTAL			**20**	**9**	**-**	**240**	**605**	**25**

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

Assessment Procedures for Awarding Marks

The distribution of marks is based on internal assessment (Sessional) by concerned teacher and the Semester end examination shall be as follows:

Course (in terms of credits)	CIE	Semester end Examination (Marks)	Remarks	Duration of Semester End Examination
Three(3) Credits/ Four(4) Credits	30*	70**	Theory Course/ Engg . Graphics	3 Hours
Two(2) Credits	20*	50***	Theory	2 Hours
Two(2) Credits	25	50	Lab Course/Workshop	3 Hours
One(1) Credit	15	35	Lab Course	2 Hours
Two(2) Credits	50	—	Project Seminar/Seminar	----
Six(6) Credits	50	100	Project	Viva
One(1) Credit	—	50***	Environmental Studies, Professional Ethics and Human values	2 Hours
One(1) Credit	50		Mini Project	-----

CIE: Continuous Internal Evaluation

* Out of 30/20 sessional marks(CIE), 10/5 marks are allotted for slip-tests(Three slips test will be conducted, each of 10/5 marks, best two average is considered) and the remaining 20/15 marks are based on the average of two tests, weightage for each test is 20/15 marks.

** The question paper will be in two parts, Part-A and Part-B. Part A is for Ten(10) questions and is compulsory, covers the entire syllabus, and carries 20 marks. Part-B carries 50 marks and covers all the units of the syllabus (student has to answer five out of seven questions)

***The question paper will be in two parts, Part-A and Part-B. Part A is for Ten(10) questions and is compulsory, covers the entire syllabus, and carries 15 marks. Part-B carries 35 marks and covers all the units of the syllabus (student has to answer five out of seven questions)

Note:A course that has CIE(sessional marks) but no semester end examination as per scheme, is treated as Pass/Fail for which pass marks are 50% of CIE.

A candidate has earned the credits of a particular course, if he/she secures not less than the minimum marks/ grade as prescribed. Minimum pass marks for theory course is 40% of total marks i.e., CIE plus semester end examinations where as for the lab course/project is 50%.

16MT CO1

ENGINEERING MATHEMATICS- I

Instruction	4 Hours per week
Duration of End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	4

Course Objectives:

1. To solve Linear System of Equations using Matrix Methods.
2. To Know the Partial Derivatives and use them to interpret the way a function of two variable behaves.
3. To analyse the Shape of the Graph of a given Curve.
4. To Evaluate Double and Triple integrals of various functions and their significance.
5. Formulate and solve the Differential Equations of First Order .
6. To know the methods to solve real life problems.

Course outcomes: On the successful completion of this course student shall be able to

1. Solve system of linear equations and identify the Eigen values and Eigen vectors in engineering problems.
2. Expand and find extreme values of functions of two variables.
3. Trace and interpret curve behaviour in physical systems.
4. Find the areas, volumes and surface area of solids of revolution.
5. Use-differential equations to model engineering phenomena such as circuit theory, networks.
6. An ability to solve the problems and interpret it in geometrical approach.

UNIT-I

Linear Algebra: Review of Rank & Consistency, Eigen values, Eigen vectors- properties (without proofs). Cayley- Hamilton Theorem (statement only) inverse and powers of a Matrix by Cayley-Hamilton Theorem. Reduction of Quadratic form to Canonical form by linear transformation, rank, positive, negative, definite, semi-definite, index and signature.

UNIT-II

Functions of several variables: Partial differentiations, Homogenous function, Euler's theorem, Implicit functions, Jacobian, Taylor's series in one and two variables, Maxima and Minima for function of two variables with and without constraints.

UNIT-III

Differential Calculus: Curvature and Radius of curvature centre of curvature, circle of curvature. Evolutes, involutes and Envelopes, Curve tracing-Cartesian, polar and parametric curves.

UNIT-IV

Multiple Integrals: Double Integrals, Triple Integrals, Change of order of Integration, Applications of integration, rectification, areas, volumes and surface area of solids of revolution in Cartesian coordinates, Centre of Gravity, PAPPUS theorem.

UNIT-V

First order differential equations and its application: Exact differential equations, Orthogonal trajectories, Electrical circuits, Newton's law of cooling.

Text Books:

1. B.S.Grewal, "Higher Engineering Mathematics", 43rd edition, Khanna Publishers, 2014.
2. R.K.Jain and S.R.K.Iyenger, "Advanced Engineering Mathematics", 3rd edition, Narosa Publications, 2007.
3. AlenJaffery, "Mathematics for Engineers and Scientists", 6th edition, CRC press, Taylor and Francis Group. (Elsevier), 2013.

Suggested Reading:

1. Kanti.B.Datta, "Mathematical Methods of science and engineering", Aided with MATLAB, Cengage Learning India Pvt.Ltd,Pratapgang, New Delhi, 2014.
2. William E.Boyce /Richard C.Dip, "Elementary differential equations", 9th Edition, wiley publishers, 2008.
3. Ervin Kreyszig ,"Advanced Engineering Mathematics",10th Edition, john wiley and sons - publishers, 2014.
4. Narayan Shanti and Mittal P.K., "Integral Calculus", S.Chand publishers, 2005.

16CY C01

ENGINEERING CHEMISTRY

Instruction	3Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives

The syllabus has sought to fulfill the objective of making the student of engineering and technology realize that chemistry is the real base of his profession and that therefore he must have a good understanding of chemistry before he can use it in his profession.

"The study of chemistry is profitable not only in as much as it promotes the material interest of mankind, but also because it furnishes us with insight into the wonders of creation, which immediately surround us and with which our existence, life and development are most closely connected."----- Justus Von Leibig (German Chemist).

The various units of the syllabus is so designed to fulfill the following objectives.

1. This syllabus helps at providing the necessary introduction of the chemical principles involved and devices in a comprehensive manner understandable to the students aspiring to become practicing engineers.
2. The aim of framing the syllabus is to impart intensive and extensive knowledge of the subject so that students can understand the role of chemistry in the field of engineering.
3. Thermodynamics and Electrochemistry units give conceptual knowledge about spontaneous processes and how can they be harnessed for producing electrical energy and efficiency of systems.
4. Fuels have been taught with a view to give awareness to materials which can be used as sources of energy.
5. To understand importance of analytical instrumentation for different chemical analysis.

Course Outcome

1. This syllabus gives necessary theoretical aspects required for understanding intricacies of the subject and also gives sufficient exposure to the chemistry aspects in different disciplines of engineering
2. The above knowledge also helps students to carry out inter disciplinary research such that the findings benefit the common man.

3. This syllabus imparts a sound knowledge on the principles of chemistry involving the different application oriented topics required for all engineering branches.

UNIT - I

Chemical Thermodynamics : Introduction and definition of the terms, the concept of reversible and irreversible processes, Work done in isothermal and adiabatic processes, Success and limitations of First law of thermodynamics, need for second law of thermodynamics, statements of second law of thermodynamics, Carnot cycle, heat engine and its efficiency, Carnot theorem, concept of Entropy - Entropy changes in reversible and irreversible processes, physical significance of entropy criteria of spontaneity in terms of entropy and Gibb's free energy function , Gibb's-Helmholtz equation and applications, Numericals.

UNIT - II

Phase rule & Chemical Equilibria

Phase rule : Statement, definition of the terms - phases, components, degrees of freedom with examples, Phase diagram - one component system (water system), two component system (siver-lead system), desilverisation of lead.

Chemical Equilibria - Homogenous and Heterogenous Equilibria - applications.

UNIT - III

Fuels: Classification, requirements of a good fuel, calorific value, types of calorific value, calculation of CV using Dulong's formula, Combustion - calculation of air quantities by weight and volume, Numericals.

Solid fuels: coal - analysis of coal - proximate and ultimate analysis - importance.

Liquid fuels: crude oil - fractional distillation, cracking - Fixed bed catalytic cracking, knocking, antiknocking agents (TEL, MTBE), octane number, cetane number, unleaded petrol.

Gaseous fuels: LPG, CNG - composition and uses.

UNIT - IV

Electrochemistry Introduction, construction of electrochemical cell, sign convention, cell notation, cell emf, SOP and SRP, electrochemical series and its applications, Nernst equation and applications, Types of Electrodes - Standard Hydrogen Electrode, Saturated Calomel Electrode, Quinhydrone electrode and Ion selective electrode (Glass electrode), construction, Numericals.

UNIT -V

Instrumental Techniques in Chemical Analysis: Principle, method and applications of Conductometry (acid-base titration), Potentiometry (acid-base, redox titration), pH- metry (acid - base titration), Colorimetry (Beer Lambert's law).

Green Chemistry - outlines and Principles.

Text Books:

1. P.C.Jain and Monica Jain, "Engineering Chemistry", DhanpatRai Pub, Co., New Delhi (2002).
2. B.R. Puri, L.R. Sharma and M.S. Pathania, "Principles of Physical Chemistry", Vishal Publishing Company, 2013.

Suggested Reading:

1. P.W. Atkin de Paul, "Principles of Physical Chemistry", Oxford University Press, 2010.
2. S. Glasstone, "Text book of Physical Chemistry", Macmillan and Co, London, 2010.

16PYC02

APPLIED PHYSICS

Instruction	2Hours per week
Duration of Semester End Examination	2 Hours
Semester End Examination	50 Marks
CIE	20 Marks
Credits	2

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

1. Learn the concepts of modern physics.
2. Gain knowledge of wave mechanics and statistical mechanics.
3. Know the different kinds of materials and their characterization techniques.

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

1. Understand the advances in laser physics, holography, optical fibers and apply them in engineering & technology.
2. Explain the importance of wave mechanics and band theory of solids.
3. Analyze and apply distributions of statistical mechanics for problem solving.
4. Identify the materials with semiconducting and superconducting properties for engineering applications.
5. Understand the role of novel materials and their characterization techniques in engineering and technology.

UNIT - I

Lasers & Holography: Characteristics of lasers - Spontaneous & stimulated emission of radiation - Einstein's coefficients - Population inversion - Lasing action - He-Ne laser - Semiconductor laser - Applications. Basic principle of Holography - Recording & Reconstruction of hologram - Applications.

Optical Fibers: Principle and Construction - Propagation of light through an optical fibre - Acceptance angle - Numerical aperture - Pulse dispersion - Classification of optical fibers: Single mode & Multi mode and Step-index & Graded-index optical fibers - Double crucible method - Applications.

UNIT - II

Wave Mechanics: Schrödinger time independent and time dependent wave equations - Physical significance of wave function - Infinite square well potential (particle in a box) - Potential barrier - Tunneling effect .

Band Theory of Solids: Origin of energy band formation - Electron in

periodic potential - Kronig-Penny model (qualitative) - Classification of solids.

UNIT - III

Elements of Statistical Mechanics: Maxwell-Boltzmann statistics - Bose-Einstein statistics - Fermi-Dirac statistics - Photon gas - Planck's' law of black body radiation - Wien's law and Rayleigh-Jean's law from Planck's law - Concept of electron gas (qualitative) - Fermi energy level.

UNIT - IV

Semiconductors: Intrinsic and extrinsic semiconductors - Carrier concentration in intrinsic semiconductors - Energy gap - Hall Effect - Construction & working of solar cell.

Superconductors: General properties of superconductors -Meissner's effect - Type I and Type II superconductors - BCS theory (qualitative) - Applications.

UNIT - V

Nanomaterials: Properties of materials at reduced size - Surface to volume ratio - Quantum confinement -Preparation of nanomaterials: Bottom-up approach (Sol-gel method) & Top-down approach (Ball milling method) - Elementary ideas of carbon nanotubes - Applications of nanomaterials.

Techniques for Characterization of Materials: X-ray fluorescence - Auger (OJ) process - Scanning electron microscope (SEM) - Tunneling electron microscope (TEM) - Atomic force microscope (AFM).

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 Engineering Physics", S. Chand Publications, 2014.
3. SatyaPrakash, "Statistical Mechanics", KedarNath Ram Nath Publications, 2008.
4. S.L. Gupta and Sanjeev Gupta, "Modern Engineering Physics", DhanpatRai Publications, 2011.

Suggested Reading:

1. R. Murugeshan and Kiruthiga Sivaprasath, "Modern Physics", S. Chand Publications, 2014.
2. M. Arumugam, "Materials Science", Anuradha Publications, 2015.
3. P.K. Palanisamy, "Engineering Physics", Scitech Publications, 2012.
4. Hitendra K Malik and A.K. Singh, "Engineering Physics", Tata McGraw Hill Education Publications, 2011.

16CS C01

PROGRAMMING AND PROBLEM SOLVING

Instruction	3L + 1T Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	4

Course Objective:

1. To acquire problem solving Skills.
2. To be able to write Algorithms.
3. To understand structured programming Approach.
4. To understand Memory structure.
5. To implement I/O Programming.
6. To be able to write program in C Language.

Course Outcomes: Student will be able to:

1. Develop algorithms for scientific problems.
2. Explore algorithmic approaches to problem solving.
3. Understand the components of computing systems.
4. Choose data types and structure to solve mathematical problem.
5. Develop modular programs using control structure, arrays and structures.
6. Write programs to solve real world problems using structured features.

UNIT - I

Introduction to Computers: Computer Systems, Computing Environments, Computer Languages, Creating and Running Programs, Software Development, Flow charts.

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

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 goto statements.

Functions: Function Basics, User-defined Functions, Inter Function Communication, Standard Functions, Parameter Passing: Call-by-value, Call-by-reference, Recursion.

UNIT - III

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

Arrays: Concepts, Using Arrays in C, Array Applications, Two-Dimensional Arrays, Multidimensional Arrays.

Searching and Sorting: Linear and Binary Search, Selection Sort and Bubble Sort.

UNIT -IV

Pointers: Introduction, Pointers to Pointers, Compatibility, 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, 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, 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

Preprocessors: Preprocessor Commands.

Text Books:

1. PradipDey and ManasGhosh, "Programming in C 2/e", Oxford University Press , 2nd Edition, 2011.
2. B. W. Kernighan and D.M. Ritchie, "The 'C' Programming Language", Prentice Hall India, 2nd Edition, 1990.
3. B.A.Forouzan and R.F. Gilberg, "A Structured Programming Approach in C", Cengage Learning, 2007.

Suggested Reading:

1. Rajaraman V., "The Fundamentals of Computers", 4th Edition, Prentice Hall of India, 2006.
2. R S Bichker "Programming in C", University Press, 2012.

16ME C01

ELEMENTS OF MECHANICAL ENGINEERING

Instruction	3Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. Student will understand different types of engineering materials and their applications.
2. Student will come to know working principles of Petrol & Diesel engines with basic knowledge of thermodynamics.
3. Student will understand various making processes.
4. Student will come to know various power transmission devices.
5. Student will understand the importance of principles of management in industry.
6. Student will come to know aspects of various quality control techniques.

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

1. Select the material depending upon requirement.
2. Evaluate performance of Petrol & Diesel engines.
3. Demonstrate his/her knowledge in preparing process chart for various machining operations.
4. Estimate the power required for various power transmitting devices like belt and gear trains.
5. Become a successful entrepreneur after studying principles of management.
6. Apply various quality control techniques after studying principles of industrial engineering.

UNIT - I

Engineering Materials: Metals and their alloys, Ductile and brittle materials, Ceramics, Polymers, Composite materials.

Simple Stresses & Strains: Stress-strain diagram (for ductile and brittle materials), Poison's ratio, Young's Modulus, Rigidity modulus, Bulk modulus, Failure theories, factor of safety.

UNIT - II

Thermodynamics: Zeroth, First, Second and Third laws of thermodynamics and corollaries.

I.C. Engines: Working principle of Two stroke and Four stroke SI and CI

engines, Calculations of efficiencies.

Heat Transfer: Fourier law of conduction in single coordinates, Newton's law of cooling, Stefan - Boltzmann law of radiation.

UNIT - III

Basic Manufacturing Processes: Introduction to Welding, Brazing & Soldering, Principles of gas welding & arc welding processes, Casting, Principles of sand casting and die casting, Principles of Turning, Drilling, Milling, Grinding, Knurling, Tapping and Honing operations.

UNIT - IV

Kinematics: Definitions of kinematic link, pair, mechanism and machine

Gear Trains: Simple, Compound, Reverted and Epicyclic gear trains.

Belt Drives: Open and crossed belt drives, length of belts, ratio of belt tensions for flat belt, condition for maximum power transmission for flat belt

Fluid Mechanics: Definition and basic properties of fluids, types of fluids and fluid flows, stream lines, streak lines, stream function and velocity potential.

UNIT - V

Industrial Engineering & Management: Introduction to scientific management, basics and importance of work study, steps in conducting work study, time study, standard time, organization and types of organization, Quality definition and its importance, introduction to quality control, types of inspection.

Text Books:

1. Jonathan Wickert and Kemper E. Lewis, An Introduction to Mechanical Engineering, 3rd Ed, Cengage learning, USA, 2013.
2. Mahesh M Rathore, Thermal Engineering, Tata McGrw Hill Eduation Pvt. Ltd., 2010.

Suggested Reading:

1. Michael Geoffrey Stevenson, Industrial Engineering, University of N.S.W., Division of Postgraduate Extension Studies, 1972.
2. PN Rao, Manufacturing Technology, Volume-I, 3rd Edition, Tata McGraw-Hill, Education, 2009.
3. S S Ratan, Theory of Machines, 4th Edition, Tata McGraw-hill, Education, 2014.
4. P. N. Modi, S. M. Seth, Hydraulics and Fluid Mechanics: Including Hydraulic Machines, Standard Book House, 2011.

16EC C01

ELEMENTS OF ELECTRONICS AND COMMUNICATION ENGINEERING

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. To understand the elementary concepts of electronic devices.
2. To study basics of Boolean algebra and working of digital circuits.
3. To understand basic operations of AM, FM, filters and multiplexing .
4. To enable the students to understand the working of commonly used communication systems.
5. To give an exposure to the selected applications.

Course Outcomes: The students will be able to

1. Familiar with the basic electronic devices and simple circuits
2. Work with Boolean algebra principles, build the simple combinational and sequential circuits
3. Appreciate the need for modulation, filtering and multiplexing
4. Understand the working principles of a few communication systems
5. Familiar to the selected applications

UNIT - I

Basics of Passive and Active devices

Classification of passive and active devices and their symbols; current flow in a semiconductor; Operating principle of a diode, its application as a rectifier; Operating principle of a transistor (BJT and JFET), Principle and use of Zener diode, Photo diode and LED.

UNIT-II

Introduction to Digital Electronics

Number systems, Binary addition and subtraction, ASCII code, Boolean algebra (Theorems and properties), Logic gates, Combinational circuits such as Half adder, Full adder and Half subtractor, Introduction to sequential logic, Basic Flip flop, Evolution of ICs, block diagram description of Microprocessor and Microcontroller.

UNIT - III

Principles of Communication Engineering (Elementary treatment only)

Basic Communication system components; Concept of Modulation, Introduction to AM, FM and comparisons; Introduction to wired and wireless communication; Concepts of filtering, LPF, HPF, BPF and BSF; concept of multiplexing, TDM and FDM.

UNIT-IV

Overview of Communication systems

Radio spectrum and applications, Modes of propagation;

Basic cellular network and concepts of a cell, frequency reuse, hand-off and cross-talk.

Basic Radar block diagram and applications; Introduction to communication satellite, Geostationary satellites and subsystems, Applications of satellites, GPS, DTH, Remote Sensing.

UNIT -V

Basic operating principles of selected applications:

Block diagram of CRO and application; Software Defined Radio (SDR)-Definition and it's block diagram; Smart phone-features; Introduction to Wireless sensor networks (Bluetooth and ZigBee), RFID-and its types, basic functions; Introduction to Modem.

Text Books:

1. "Electronic Principles" by Albert Malvino and David J Bates, 7th Edition, 2006.
2. "Digital Priniciples and Applications", by Donald P Leach, Albert Paul Malvino, Gauthamsaha, Tata McGraw Hill, 6th Edition, 2009.
3. "Electronic Communication Systems", by Kennedy and Davis, Tata Megra Hill Publications, 4th Edition, 2008.

16CE C03

PROFESSIONAL ETHICS AND HUMAN VALUES

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

Course Objectives:

1. To develop the critical ability among students to distinguish between what is of value and what is superficial in life
2. To enable the students, understand the values, the need for value adoption and prepare them meet the challenges
3. To enable the students, develop the potential to adopt values, develop a good character and personality and lead a happy life
4. To motivate the students, practice the values in life and contribute for the society around them and for the development of the institutions /organisation around they are in.
5. To make the students understand the professional ethics and their applications to engineering profession

Course Outcomes:

1. Students develop the capability of shaping themselves into outstanding personalities, through a value based life.
2. Students turn themselves into champions of their lives.
3. Students take things positively, convert everything into happiness and contribute for the happiness of others.
4. Students become potential sources for contributing to the development of the society around them and institutions/ organisations they work in.
5. Students shape themselves into valuable professionals, follow professional ethics and are able to solve their ethical dilemmas.

UNIT-I

Concepts and Classification of Values -Need and challenges for value Adoption -Definition of Values - Concept of Values - Classification of Values - Hierarchy of Values - Types of Values - Interdependence of Values Need for value education - Lack of education in values - Benefits of value education- Challenges for Value adoption - Cultural, Social, Religious, Intellectual and Personal challenges

UNIT - II: Personal Development and Values in Life

Personal Development: - Accountability and responsibility - Desires and weaknesses - Character development - Good relationships, self-restraint, Spirituality and Purity - Integrating values in everyday life

UNIT - III: Practicing Values for the development of Society

Resentment Management and Self-analysis - Positive Thinking and Emotional Maturity - The importance of Women , Children and Taking care of them - Helping the poor and needy - Fighting against addictions and atrocities - Working for the Sustainable development of the society Principles of Integrity-Institutional Development - Vision for better India.

UNIT - IV: Basic Concepts of Professional Ethics

Ethics, Morals and Human life , Types of Ethics, Personal Ethics, Professional Ethics, Ethical dilemmas, Science - Religion - Ethics, Case Studies on Professional Ethics, Exemplary life sketches of prominent Indian personalities like Sri.M.Visweshwarayya, Dr.APJ Abdul Kalam and JRD Tata

UNIT-V: Ethics in Engineering Profession

Engineering Profession-Technology and Society- Ethical obligations of Engineering Professionals-Role and responsibility of Engineers - A few Case Studies on Risk management safety and Risk Management Plagiarism-Self plagiarism- -Ethics Standards and Bench Marking

Text Books:

1. Subramanian R, " Professional Ethics " , Oxford University Press , 2013
2. Nagarajan R S, " A Text Book on Human Values and Professional Ethics " New Age Publications , 2007
3. Dinesh Babu S, " Professional Ethics and Human Values " , Laxmi Publications , 2007

Suggested Reading:

1. SantoshAjmera and Nanda Kishore Reddy , "Ethics , Integrity and Aptitude",McGrawhill Education Private Limited, 2014
2. GovindaRajan M, Natarajan S, Senthil Kumar V S,"Professional Ethics and Human Values", Prentice Hall India, Private Limited,2012
3. Course Material for Post Graduate Diploma In "Value Education & Spirituality" Prepared by Annamalai University in Collaboration with Brahma Kumaris, 2010

16CS C02

PROGRAMMING LABORATORY

Instruction	2 Hours per week
Duration of Semester End Examination	2 Hours
Semester End Examination	35 Marks
CIE	15 Marks
Credits	1

1. Demonstration of Control structures.
2. Demonstration of Switch case (menu driven).
3. Demonstration of Parameter passing Methods.
4. Demonstration of Functions using Recursion.
5. Demonstration of Array Operations on Matrix.
6. Implementation of Aubble sort.
7. Implementation of Aelection sort.
8. Implementation of Linear and Binary Search.
9. Implementation of String manipulation operations with and without library function.
10. Demonstration using Pointers.
11. Demonstration of Array of Structures.
12. Sequential file operations.

Text Books:

1. PradipDey and ManasGhosh, "Programming in C 2/e", Oxford University Press , 2nd Edition 2011.
2. B. W. Kernighan and D.M. Ritchie, "The 'C' Programming Language", Prentice Hall India, 2nd Edition, 1990.

16ME C03

MECHANICAL AND IT WORKSHOP

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	50 Marks
CIE	25 Marks
Credits	2

MECHANICAL WORK SHOP

Trades for Practice 1.Fitting 2.Tin Smithy 3.Carpentry 4.House Wiring

Exercises in Fitting

1. To make a perfect rectangular MS flat.
2. To do parallel cuts using Hack saw.
3. To drill a hole and tap it.
4. To make male and female fitting using MS flats-Assembly1.
5. To make male and female fitting using MS flats-Assembly2.

Exercises in Tin smithy

1. To make a square tray from the given sheet metal.
2. To make a rectangular box from the given sheet metal with base and top open. Solder the corners.
3. To make a scoop.
4. To make a dust pan from the given sheet metal.
5. To make a pamphlet box.

Exercises in Carpentry

1. To plane the given wooden piece to required size.
2. To make a cross lap joint on the given wooden piece according to the given dimensions.
3. To make a Tee lap joint on the given wooden piece according to the given dimensions.
4. To make a dove tail-joint on the given wooden piece according to the given dimensions.
5. To make a bridle joint on the given wooden piece according to the given dimensions.

Exercises in House Wiring

1. Wiring of one light point controlled by one single pole switch, a three pin socket controlled by a single pole switch, and wiring of one buzzer controlled by a bell push.
2. Wiring of two light points connected in series and controlled by single pole switch. Verify the above circuit with different bulbs.

3. 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. Go-down wiring.

Demonstration of plumbing and welding trades.

Note: *A minimum of 12 exercises from the above need to be done.*

References:

1. Workshop Practice Manual, K. Venkata Reddy, B.S. Publications. Sixth Edition, 2008.

IT WORKSHOP

List of Tasks:

Task 1: MS Word: Formatting text, inserting images, tables, equations and hyperlinks.
Document Management: Page layout techniques and printing.

Task 2: MS Excel: Functions and formulas and graph plotting.

Task 3: MS Power point presentation: Guidelines for effective presentation, inserting objects, charts, hyperlinks and navigation between slides.

Task 4: Essentials Search Engines & Net etiquette, Plagiarism, Open source tools and other utility tools.

Suggested Reading:

1. Scott Mueller's Upgrading and Repairing PCs, 18/e, Scott. Mueller, QUE, Pearson, 2008.
2. The Complete Computer upgrade and repair book, 3/e, Cheryl A Schmidt, Dreamtech.

16PY C04

APPLIED PHYSICS LABORATORY

Instruction	2 Hours per week
Duration of Semester End Examination	2 Hours
Semester End Examination	35 Marks
CIE	15 Marks
Credits	1

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

1. Acquire knowledge in experiments of modern physics.
2. Understand the characteristics of various semiconductor devises.
3. Work with lasers and optical fibers.

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

1. Understand the various applications of semiconductor devices and their suitability in engineering.
2. Demonstrate the working of lasers and optical fibers and their applications in the field of communication.
3. Analyze the electrical properties of a given solid based on its energy band gap.
4. Verify the resistance and thermoelectric power properties with temperature variation.
5. Demonstrate the concept of electron and its charge experimentally.

List of Experiments:

1. Planck's Constant - Determination of Planck's Constant using photo cell.
2. Solar Cell - Study of I-V characteristics of given solar cell and calculation of fill factor, efficiency and series resistance.
3. Hall Effect- Determination of Hall coefficient, carrier concentration & mobility of charge carriers of given semiconductor specimen.
4. P-N Junction Diode - Study of V-I characteristics and calculation of resistance of given diode in forward and reverse bias.
5. Laser - Determination of wavelength of given semiconductor red laser.
6. Fibre Optics - Determination of NA and power losses of given optical fibre.
7. Energy Gap - Determination of energy gap of given semiconductor.
8. Thermistor - Determination of temperature coefficient of resistance of given thermistor.
9. e/m of an Electron by Thomson's Method.
10. Thermoelectric Power - Determination of thermoelectric power of given sample.

Note: *A student must perform a minimum of eight experiments.*

Suggested Reading:

1. "Applied Physics" - Manual by Department of Physics, CBIT, 2016.
2. S.K. Gupta, "Engineering Physics Practical", Krishna's Educational Publishers, 2014.
3. O.P. Singh, V. Kumar and R.P. Singh, "Engineering Physics Practical Manual", Ram Prasad & Sons Publications, 2009.

16CY C03

ENGINEERING CHEMISTRY LABORATORY

Instruction	2 Hours per week
Duration of Semester End Examination	2 Hours
Semester End Examination	35 Marks
CIE	15 Marks
Credits	1

Course Objectives

1. To impart fundamental knowledge in handling the equipment / glassware and chemicals in chemistry laboratory
2. For practical understanding of theoretical concept of chemistry

Course Outcomes:

1. This syllabus helps the student to understand importance of analytical instrumentation for different chemical analysis.
2. The above knowledge also helps students to carry out inter disciplinary research such that the findings benefit the common man.

List of Experiments:

1. Introduction to chemical analysis.
2. Preparation of standard solution of oxalic acid and Standardization of NaOH.
3. Estimation of amount of Fe^{+2} in the given solution using Mohr's salt and $KMnO_4$.
4. Estimation of amount of Fe^{+2} in the given solution using Mohr's salt and $K_2Cr_2O_7$.
5. Estimation of amount of copper in the given solution using hypo solution.
6. Estimation of amount of HCl pH metrically using NaOH solution
7. Estimation of amount of CH_3COOH pH metrically using NaOH solution.
8. Determination of concentration of given $KMnO_4$ solution Colorimetrically.
9. Determination of concentration of given $K_2Cr_2O_7$ solution Colorimetrically.
10. Distributionof acetic acid between n-butanol and water.
11. Distribution of benzoic acid between benzene and water.
12. Preparation of urea - formaldehyde / phenol- formaldehyde resin.

Suggested Reading:

1. Vogel' S text book of quantitative chemical analysis by J. Mendham and Thomas,Person education Pvt.Ltd. New Delhi ,6th ed. 2002.
2. Laboratory Manual on Engineering Chemistry by Dr. Subdharani (DhanpatRai Publishing), 2012.
3. A Textbook on experiment and calculation in engineering chemistry by S.S. Dara, S.Chand and comnpany,9th revised edition, 2015.

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)
Choice Based Credit System (with effect from 2016-17)
B.E (Civil, EEE, Mech. and Prod.) and B.Tech (Chemical)

SEMESTER - II

S.No	Course Code	Title of the Course	Scheme of Instruction		Scheme of Examination			Credits
			Hours per week		Duration of SEE in Hours	Maximum Marks		
			L/T	P/D		CIE	SEE	
THEORY								
1	16MT C03	Engineering Mathematics - II	3	-	3	30	70	3
2	16PY C01	Engineering Physics	3	-	3	30	70	3
3	16CY C02	Applied Chemistry	2	-	2	20	50	2
4	16EE C01	Elements of Electrical Engineering	3	-	3	30	70	3
5	16CE C01	Engineering Mechanics	3	-	3	30	70	3
6	16EG C01	Professional Communication in English	3	-	3	30	70	3
7	16CE C02	Environmental Studies	1	-	2	-	50	1
PRACTICALS								
8	16ME C02	Engineering Graphics	1	3	3	30	70	3
9	16PY C03	Engineering Physics Laboratory	-	2	2	15	35	1
10	16CY C04	Applied Chemistry Laboratory	-	2	2	15	35	1
11	16EG C02	Professional Communication Laboratory	-	2	2	15	35	1
TOTAL			**19**	**9**	-	**245**	**625**	**24**

One extra hour may be permitted in the timetable for Engineering Mathematics - II

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

Assessment Procedures for Awarding Marks

The distribution of marks is based on internal assessment (Sessional) by concerned teacher and the Semester end examination shall be as follows:

Course (in terms of credits)	CIE	Semester end Examination (Marks)	Remarks	Duration of Semester End Examination
Three(3) Credits/ Four(4) Credits	30*	70**	Theory Course/ Engg . Graphics	3 Hours
Two(2) Credits	20*	50***	Theory	2 Hours
Two(2) Credits	25	50	Lab Course/Workshop	3 Hours
One(1) Credit	15	35	Lab Course	2 Hours
Two(2) Credits	50	—	Project Seminar/Seminar	----
Six(6) Credits	50	100	Project	Viva
One(1) Credit	—	50***	Environmental Studies, Professional Ethics and Human values	2 Hours
One(1) Credit	50		Mini Project	-----

CIE: Continuous Internal Evaluation

* Out of 30/20 sessional marks(CIE), 10/5 marks are allotted for slip-tests(Three slips test will be conducted, each of 10/5 marks, best two average is considered) and the remaining 20/15 marks are based on the average of two tests, weightage for each test is 20/15 marks.

** The question paper will be in two parts, Part-A and Part-B. Part A is for Ten(10) questions and is compulsory, covers the entire syllabus, and carries 20 marks. Part-B carries 50 marks and covers all the units of the syllabus (student has to answer five out of seven questions)

***The question paper will be in two parts, Part-A and Part-B. Part A is for Ten(10) questions and is compulsory, covers the entire syllabus, and carries 15 marks. Part-B carries 35 marks and covers all the units of the syllabus (student has to answer five out of seven questions)

Note:A course that has CIE(sessional marks) but no semester end examination as per scheme, is treated as Pass/Fail for which pass marks are 50% of CIE.

A candidate has earned the credits of a particular course, if he/she secures not less than the minimum marks/ grade as prescribed. Minimum pass marks for theory course is 40% of total marks i.e., CIE plus semester end examinations where as for the lab course/project is 50%.

16MT CO3

ENGINEERING MATHEMATICS- II

Instruction	3 Hours per week+1(extra hour)
Duration of End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. To know the relevant methods to solve higher order differential equations.
2. To learn the Laplace and Inverse Laplace transforms for solving engineering problems.
3. To know improper integrals such as Beta, Gamma functions..
4. To learn Vector Differential Operator and its physical interpretations.
5. To evaluate vector line ,surface& volume integrals.
6. Learn to apply all the above mathematical methods/ techniques to interpret the results in physical and technical terms.

Course outcomes:

1. Solve the solutions of Differential Equations which arise in electrical circuits, vibrations and other linear systems.
2. Able to solve solutions of differential equations with initial and boundary value problems.
3. Evaluating definite integrals using Beta, Gamma functions.
4. Understating the significance of gradient, divergent and Curl.
5. Use Greens, Gauss and Stoke's theorems to find the surface and volume integrals.
6. Able to solve and analyse the Engineering problems.

UNIT- I

Ordinary differential Equations: Linear Differential equations of higher order with constant coefficients, complementary function and particular integrals when RHS is of the forms e^ax,sin?ax,cos?ax,x^m,e^ax (v),x^m (v),where v-is a function of x, Cauchy's equation, electrical circuits of second order.

UNIT- II

Laplace Transforms: Laplace transforms of standard functions, Laplace transforms of piecewise continuous functions, first shifting theorem, multiplication by 't', division by 't'. Laplace transforms of derivatives and integrals of functions-Unit step function- Periodic functions (without

proofs). Inverse Laplace transforms-by partial fractions (Heaviside method), Convolution Theorem, Solving Ordinary differential equations by Laplace Transforms.

UNIT- III

Beta and Gamma Functions: Definitions of Beta and Gamma functions-elementary Properties of both Beta and Gamma functions, Relation between Beta and gamma functions, differentiation under the integral sign.

UNIT- IV

Vector Differentiation: Scalar and vector fields- directional derivative-Gradient of a scalar-Divergence and Curl of a vector point function. Properties of gradient, divergence and curl, Solenoidal and Irrotational vectors.

UNIT-V

Vector Integration: Evaluation of Vector Line integrals, surface integrals and volume integrals, Greens, Gauss divergence and Stokes theorems (without proofs) and its applications.

Text Books:

1. B.S.Grewal, "Higher Engineering Mathematics", 43rd edition, Khanna Publishers, 2014.
2. R.K.Jain and S.R.K.Iyenger, "Advanced Engineering Mathematics" 3rd edition, Narosa Publications, 2007.
3. AlenJaffery, "Mathematics for Engineers and Scientists", 6th edition, CRC press, Taylor and Francis Group, 2013.

Suggested Reading:

1. Erwin Kreyszig, "Advanced Engineering Mathematics",10th edition, John Wiley and Sons publishers, 2014.
2. Loius Pipes, "Applied Mathematics for engineers and physicists", Dover publishers, 2014.
3. Kanti.B.Datta, "Mathematical Methods of Science and Engg", Aided with MATLAB, Cengage Learning India Pvt.Ltd, 2014.
4. AR Collar and Alan Simpson, "Matrices and Engineering Dynamics", John Wiley and Sons publishers, 1987.

16PY C01

ENGINEERING PHYSICS

Instruction	3Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

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

1. Understand the general concepts of physics.
2. Acquire knowledge of different kinds of waves and their behavior.
3. Familiar with crystal physics and materials.
4. To introduce the general concepts of physics.

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

1. Describe the types of oscillations and analyze them.
2. Demonstrate the wave nature of the light.
3. Develop the concepts related to electromagnetic behavior.
4. Identify the various crystal systems and defects.
5. Explain the origin of magnetism and dielectric polarization and applications of these materials in the field of engineering & technology.

UNIT - I

Waves and Oscillations: Review of free oscillations - Superposition of two mutually perpendicular linear SHMs of same frequency and 1:2 ratio frequency - Lissajous figures - Damped vibrations - Differential equation and its solution - Logarithmic decrement - Relaxation time - Quality factor - Forced vibrations - Differential equation and its solution - Amplitude resonance- Torsional pendulum.

Ultrasonics: Production of ultrasonics by piezoelectric and magnetostriction methods - Detection of ultrasonics- Determination of ultrasonic velocity in liquids - Applications.

UNIT - II

Interference: Division of amplitude - Interference in thin films (reflected light) - Newton's rings - & division of wavefront - Fresnel's biprism.

Diffraction: Distinction between Fresnel and Fraunhoffer diffraction - Diffraction at single slit - Diffraction grating (N Slits) - Resolving power of grating.

UNT - III

Polarization: Malus'slaw - Double refraction - Nicol's prism - Quarter & Half wave plates - Optical activity - Laurent's half shade polarimeter.

Electromagnetic Theory: Review of steady and varying fields - Conduction and displacement current - Maxwell's equations in differential and integral forms - Electromagnetic wave propagation in free space, dielectric and conducting media - Poynting theorem.

UNIT - IV

Crystallography: Space lattice - Crystal systems and Bravais lattices - Crystal planes and directions (Miller indices) - Interplanar spacing - Bragg's law - Lattice constant of cubic crystals by powder diffraction method.

Crystal Imperfections: Classification of defects - Point defects - Concentration of Schottky and Frenkel defects - Line defects - Edge dislocation - Screw dislocation - Burger's vector.

UNIT - V

Magnetic Materials: Classification of magnetic materials - Langevin theory of paramagnetism - Weiss molecular field theory - Domain theory - Hysteresis curve - Structure of ferrites (spinel & Inverse spinel) - Soft and hard magnetic materials.

Dielectric Materials: Dielectric polarization - Types of dielectric polarization: electronic, ionic, orientation and space-charge polarization (Qualitative) - Frequency and temperature dependence of dielectric polarization - Determination of dielectric constant (Schering bridge method) - Ferroelectricity - Barium titanate - Applications of ferroelectrics.

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 Engineering Physics", S. Chand Publications, 2014.
3. M. Arumugam, "Materials Science", Anuradha Publications, 2015.
4. S.L. Gupta and Sanjeev Gupta, Modern Engineering Physics, DhanpatRai Publications, 2011.

Suggested Reading:

1. R. Murugeshan and KiruthigaSivaprasath, "Modern Physics", 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 Ltd., 6th Revised edition, 2015.

16CY C02

APPLIED CHEMISTRY

Instruction	2 Hours per week
Duration of Semester End Examination	2 Hours
Semester End Examination	50 Marks
CIE	20 Marks
Credits	2

Course Objectives:

Applied chemistry is a fascinating area with the profound implications for engineers as well as biologists. Materials fabricated and used in our daily life are derived from chemicals, both natural and synthetic and their range of utility are growing day by day. It is imperative that engineers of different disciplines acquire sufficient knowledge of the materials and their characteristics for making proper selection of their end -use application.

The various units of the syllabus is so designed to fulfill the following objectives.

1. To impart technological aspects of modern chemistry and to lay foundation for the application of chemistry in engineering and technology disciplines.
2. The student should be conversant with the
   i. Principles of water characterization and treatment of water for potable and industrial purposes.
   ii. Principles of polymer chemistry and engineering applications of polymers in domestic and engineering areas.
3. Knowledge to prevent corrosion of machinery and metallic materials and water chemistry which require serious attention in view of increasing pollution has been included in the syllabus.
4. Study of polymers is insisted as it gives better insight to industrial personnel by being exposed to wider aspects of polymer science.
5. Study of fuel cells is given importance as fuel cells are the alternate energy sources for generating electrical energy on spot and portable applications.
6. Newer materials lead to discovering of technologies in strategic areas like defense and space research. Recently modern materials synthesized find applications in industry and technology and in order to emphasize them, topics like composite materials, polymers, conducting polymers and nano materials have been incorporated in the curriculum.
7. To enable students to apply the knowledge acquired in improving the properties of engineering materials.

8. To give an insight into nano materials and composite materials aspect of modern chemistry.

Course Outcomes:

1. At the end of the course, students will be familiar with the fundamentals of water technology, corrosion and its control, applications of polymers in domestic and engineering areas, nano materials and their applications.
2. The engineer who has the above background can effectively manage the materials in his designing applications and for discovering & improving the systems for various uses in industry, agriculture, health care, technology, telecommunications and electronics.
3. The above knowledge also helps students to carry out inter disciplinary research such that the findings benefit the common man.
4. Study of nano related materials helps to update the knowledge necessary to launch into the demands of the world.

UNIT -I

Water Chemistry: Hardness of water - Types, units of hardness, Disadvantages of hard water - Boiler troubles - scales & sludge formation - causes and effects, softening of water by ion exchange method and Reverse Osmosis. Specifications of potable water & industrial water, disinfection of water by chlorination, Ozonization, UV radiation.

UNIT -II

Corrosion Science : Introduction, chemical corrosion - oxidation corrosion, electro chemical corrosion and its mechanism, Galvanic corrosion and types of differential aeration corrosion (waterline corrosion), Factors affecting corrosion (position of the metals in galvanic series, relative areas of anode and cathode, nature of corrosion product - solubility and volatility of corrosion product, nature of corroding environment - temperature, humidity and pH. Corrosion control methods - cathodic protection, sacrificial anodic protection.

UNIT - III

High Polymers: Definition of polymer, degree of polymerization. Thermo plastics and thermo sets. Preparation, properties and uses of plastics (Polyvinyl chloride, Bakelite), fibers (Kevlar, polyurethane), Rubbers - natural rubber and its chemical structure, vulcanization and its significance. Preparation, properties and uses of silicone rubber, conducting polymers - definition, classification and applications.

UNIT - IV

Battery Technology: Types of batteries - Primary batteries - Dry cell, Lithium battery; Secondary batteries - lead acid storage cell , Lithium ion battery ; Fuel cell - H2-O2 fuel cell, methanol-oxygen fuel cell - its advantages and applications.

Solar cells - photo voltaic cells.

UNIT-V

Engineering Materials: Nano materials - Introduction to nano materials and general applications, basic chemical methods of preparation - Sol-gel method. Carbon nanotubes and their applications.

Composite materials - definition, types of composites, fibre reinforced, glass fibre reinforced and carbon fibre reinforced composites and applications.

Text Books:

1. P.C.Jain and Monica Jain, "Engineering Chemistry", DhanpatRai Pub, Co., New Delhi (2002).
2. ShasiChawla, "Text Book of Engineering Chemistry", DhanpatRai Publishing Company, NewDelhi (2008).
3. S.S. Dara "A text book of engineering chemistry" S.Chand&Co.Ltd., New Delhi (2006).

Suggested Reading:

1. B.K.Sharma, "Engineering chemistry", Krishna Prakasan Media (P) Ltd., Meerut (2001).
2. A textbook of Polymer Science: Fred, Billmeyer John Wiley & Sons, India Third edition, 2007.
3. T. Pradeep, "Nano: The Essentials", McGraw-Hill Professional, 2008.

16EE C01

ELEMENTS OF ELECTRICAL ENGINEERING

Instruction	3Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. To understand the basic concepts of electrical circuits.
2. To understand the principles of electromagnetic induction.
3. To know about different types of batteries, charging and discharging of batteries and types of fuel cells etc.
4. To know about different types of electrical wires and cables, domestic and industrial wiring.
5. To understand safety rules and methods of earthing.

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

1. Acquire the knowledge of basic concepts of electrical circuits such as Ohm's law, Kirchhorff's laws etc.
2. Acquire the knowledge of basic Faraday's laws of electromagnetic induction.
3. Acquire the knowledge to solve the problem of AC circuits.
4. Acquire the knowledge of specifications of batteries, types of cells and sources of renewable energy.
5. Acquire the knowledge of electrical wiring and cables and their types and electrical equipment and their specification.
6. Acquire the knowledge of safety precautions in handling electrical appliances, importance of grounding and methods of earthing.

UNIT-I : DC Circuits

Current, voltage, power and energy, sources of electrical energy, independent and dependent sources, source conversion, circuit elements, Resistor, Inductor, Capacitor Ohm's law, Kirchhoff's laws, analysis of series, parallel and series-parallel circuits, star-delta conversion, Node and Mesh analysis (with independent sources only).

UNIT-II : Electromagnetism & AC Circuits

Electric charge, electric field, lines of force, electric field intensity, electric flux and flux density, Faraday's laws of electromagnetic induction, static and dynamically induced EMF.

A.C. Circuits: Generation of alternating voltage and current, equation of alternating voltage and current, average and rms values of sinusoidal quantities, form and peak factors, phasor representation of sinusoidal quantities, AC through pure resistance pure Inductance, pure capacitance, RL,RC,RLC circuits.

UNIT-III: Batteries and Fuel Cell

Introduction to batteries, simple cell, EMF and internal resistance of a cell, primary and secondary cells, cell capacity, types and specifications of batteries, charging and discharging of battery, safe disposal of batteries, fuel cell, principle and types of fuel cell, different sources of renewable energy.

UNIT-IV:Electrical Wiring

Types of wires and cables, types of connectors and switches, system of wiring, domestic and industrial wiring, simple control circuit in domestic installation, electrical equipment and their specifications

UNIT-V: Safety & Protection

Safety precautions in handling electrical appliances, electric shock, first aid for electric shock, other electrics hazards, safety rules, importance of grounding and earthing of electrical equipment, methods of earthing, circuit protection devices: Fuses, MCB, ELCB and Relays.

Text Books:

1. Edward Hughes, "Electrical and Electronics Technology", 10th Edition, Peasson Publishers 2010.
2. V.K. Mehta & Rohit Mehta, "Principles of Electrical Engineering", S.Chand Company Limited 2008
3. B.L. Theraja & A.K. Theraja, "Electrical Technology", Vol.I, S. Chand Company Limited 2008.

Suggested Reading:

1. P.V.Prasad& S. Siva Nagraju, "Electrical Engineering: Concepts & Applications", Cengage Learning, 2012.
2. S. Rao, "Electrical Safety, fire safety engineering & Safety Management", Khanna publications, 1998.
3. Surjit Singh & Ravi Deep Singh, "Electrical Estimating and Costing", Dhanapath Rai & Co., 1997.

16CE C01

ENGINEERING MECHANICS

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives: During this course, students should develop the ability to:

1. Work comfortably with basic engineering mechanics concepts required for analyzing static structures
2. Identify an appropriate structural system to study a given problem and isolate it from its environment.
3. Analyze and model the problem using free-body diagrams and equilibrium equations
4. Apply pertinent principles to the system to solve and analyze the problems subjected to frictional forces.
5. Understand the meaning of centroid/ centers of gravity and moments of Inertia using integration methods.
6. Communicate the solution to all problems in an organized and coherent manner and elucidate the meaning of the solution in the context of the problem.

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

1. Solve problems dealing with forces in planar force systems
2. Draw free body diagrams to analyze the forces in the given structure
3. Understand the concept of moments and couples in plane systems.
4. Understand the mechanism of friction and can solve friction problems
5. Determine the centroid of plane areas and centers of gravity of bodies using integration methods
6. Determine moments of inertia, product of inertia for all areas and mass moments of inertia for bodies,

UNIT - I

Force Systems: Resolution of coplanar and non-coplanar force systems (both concurrent and non-concurrent), Determining the resultant of planar force systems. Moment of force and its applications and couples

UNIT - II

Equilibrium of force system: Free body diagrams, equations of

equilibrium of planar force systems and its applications. Problems on general case of force systems.

UNIT - III

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

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 for elementary and composite bodies.

UNIT - V

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

Text Books:

1. K. Vijay Kumar Reddy and J. Suresh Kumar, Singer's Engineering Mechanics, B S 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 Bhattacharya, Engineering Mechanics, Oxford University Press, New Delhi, 2008.
5. A K Tayal, Engineering Mechanics, Umesh Publications, New Delhi, 2010.

16EG C01

PROFESSIONAL COMMUNICATION IN ENGLISH

Instruction	3Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. To enable the students to understand the role and importance of communication and to develop their basic communication skills in English.
2. To strengthen the students' usage of grammar and to develop their vocabulary.
3. To improve the students' listening skills and introduce them to different reading strategies.
4. To equip the students with appropriate writing skills.
5. To enhance imaginative and critical thinking through literary texts and book review.

Course Outcomes: The students will

1. Understand the nature, process and types of communication and will communicate effectively without barriers.
2. Understand the nuances of listening and will learn to make notes.
3. Read different texts, comprehend and draw inferences and conclusions.
4. Write effective paragraphs, letters and reports.
5. Critically analyze texts and write book reviews.

UNIT- I

Understanding Communication in English: Introduction, Nature and Importance of communication. Process of communication, Basic types of communication - Verbal and Non Verbal. One way vs. Two way communication. Barriers to communication. Intrapersonal and interpersonal communication. Johari Window.

Grammar & Vocabulary: Parts of speech, Figures of speech - Euphemism, Hyperbole, Irony, Metaphor, Onomatopoeia, Oxymoron, Paradox, Personification, Pun & Simile.

UNIT- II

Developing Listening Skills: Exposure to recorded and structured talks, class room lectures- problems in comprehension and retention. Types of listening, barriers to listening, effective listening strategies. Note -taking.

Grammar & Vocabulary: Articles, Prepositions, Phrasal verbs, Idioms.

UNIT- III

Developing Writing Skills: Sentence structure. Brevity and clarity in writing, Cohesion and Coherence, Paragraph writing. Letter writing - form and structure, style and tone. Kinds of Letters -Apology and Request letters. Email etiquette. Report writing.

Grammar & Vocabulary: Tenses, Conditionals, Homonyms, Homophones.

UNIT - IV

Developing Reading Skills: The Reading process, purpose, different kinds of texts.

Reading comprehension: Techniques of comprehension - skimming, scanning, drawing inferences and conclusions. Note-making

Grammar &Vocabulary: Concord, Connectives, Active and Passive voice, Words often confused.

UNIT- V: Reading for Enrichment

1. The Road Not Taken	Robert Frost
2. Goodbye Party For Miss Pushpa T. S	Nissim Ezekiel
3. The Open Window	Saki
4. The Romance Of A Busy Broker	O. Henry

Book reviews - Oral and written review of a chosen / novel/ play - a brief written analysis including summary and appreciation. Oral presentation of the novel/play

Grammar & Vocabulary: Indianisms, Common errors, Parallelisms.

Text Books:

1. Vibrant English, Orient Blackswan Ltd,

Suggested Reading:

1. M .Ashraf Rizvi, Effective Technical Communication, Tata McGraw- Hill, New Delhi
2. Meenakshi Raman and Sangeetha Sharma, Technical Communication - Principles and Practice, Oxford Univ. Press, New Delhi.
3. Sunil Solomon, English for Success, Oxford University Press, 2015
4. Krishna Mohan, MeeraBanerji, Developing Communication Skills, McMillan India Ltd.
5. Michael McCarthy, English Vocabulary in Use.
6. Brikram K Das, Kalyani Samantray, An Introduction to Professional English and Soft Skills Cambridge Univ. Press, New Delhi.

16CE C02

ENVIRONMENTAL STUDIES

Instruction	1Hour per week
Duration of Semester End Examination	2 Hours
Semester End Examination	50 Marks
CIE	-
Credits	1

Course Objectives:

1. To equip the students with inputs on the environment, natural resources and their conservation.
2. To study the interrelationship between the living organisms and the natural environment and also to enable the students to understand the structure and functioning of the ecosystems.
3. To understand the importance of biodiversity and create awareness on its threats and conservation strategies.
4. To enable the students become aware of pollution of various environmental segments including their causes, effects and control measures.
5. To create awareness about environmental legislations in the context of national conventions.

Course Outcomes: At the end of the course, the student should have learnt

1. To understand the scope and importance of environmental studies, identify the natural resources and ecosystems and contribute for their conservation.
2. To understand the ecological services of biodiversity and contribute for their conservation.
3. To develop skills to solve the problems of environmental pollution and contribute for the framing of legislation for protection of environment.
4. To relate the social issues and the environment and contribute for the sustainable development.
5. To understand the essence of the ethical values of the environment for conserving depletable resources and pollution control.

UNIT - I

Environmental Studies: Definition, Scope and importance, need for public awareness.

Natural resources: Water resources- hydrological cycle, use and over utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. Food resources- Changes caused by modern agriculture, fertilizers-pesticide problems, water logging and

salinity. Forest resources- use and over exploitation, deforestation.Mineral resources- Use and exploitation, effects of mining. Energy resources- Growing energy needs, various renewable and non-renewable energy sources. Land resources- land as a resource, land degradation- causes and effects, Role of individuals in conservation of natural resources.

UNIT - II

Ecosystems: Concept of an ecosystem, structure and function of an ecosystem, concept of food chains, food webs, ecological pyramids.

UNIT - III

Biodiversity: Types/classification of biodiversity, India as a mega diversity nation, values of biodiversity, threats to biodiversity, Conservation of biodiversity.

UNIT - IV

Environmental Pollution: Cause, effects and control measures of air pollution, water pollution, Soil pollution, Noise pollution and Thermal pollution.

Environmental Legislations: Environment protection act, Air, Water, Forest & Wild life acts.

UNIT - V

Social issues and the environment: Water conservation methods: Rain water harvesting and watershed management, Environmental ethics, Sustainable development, Population explosion and Climate change: Global warming, Acid rain, Ozone layer depletion.

Text Books:

1. P. D.Sharma, "Ecology & Environment", Ashish publications, 1994
2. Y. Anjaneyulu, "Introduction to Environmental Science", B S Publications, 2004

Suggested Reading:

1. Dr. Suresh K. Dhameja, "Environmental Studies", S. K. Kataria& Sons, 2009
2. C. S. Rao, "Environmental Pollution Control Engineering", Wiley, 1991
3. S. S. Dara, "A Text Book of Enviromental Chemistry &Polution Control", S. Chand Limited, 2006

16ME C02

ENGINEERING GRAPHICS

Instruction	1L + 3DHour per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. To provide an exposure in understanding the drawings during a multidisciplinary approach towards a problem
2. To train up in perception and imagination of a three dimensional scenario.

Course Outcomes:

1. To understand theory of projections
2. Ability to improve visualization skills
3. Ability to sketch Engineering Objects

UNIT - I

Introduction to Engineering Drawing: Drawing Instruments and their uses, types of lines, use of pencils, Lettering, Rules of dimensioning

Conic Sections: Ellipse, Parabola, Hyperbola including the Rectangular Hyperbola (General method only)

Cycloidal curves: Construction of cycloid, epi-cycloid, hypo-cycloid & involutes

UNIT - II

Orthographic Projections: Principles of Orthographic Projections - Conventions , Projection of Points, Projection of Lines - inclined to both planes.

UNIT - III

Projections of Planes: Projections of regular Planes - Perpendicular planes and Oblique planes.

UNIT - IV

Projections of Solids: Projections of Regular Solids - Regular Polyhedra, solids of revolution, (Simple position only)

Sections of Solids: Types of cutting planes - their representation - sections of solids in simple position.

UNIT - V

Introduction to Graphic packages: Getting started, Basic drawing and editing commands, creating lines, planes and solids.

Note: *Syllabus for external examination will be from unit 1 to unit 4 only & unit-5 is exempted from external examination. Unit 5 is for internal examination only.*

Text Books:

1. N.D.Bhatt," Elementary Engineering Drawing", Charotar Publishers, 2014.
2. Basanth Agrawal and C M Agrawal "Engineering Drawing 2e ", McGraw-Hill Education(India) Pvt. Ltd.
3. K.Venugopal, "Engineering Drawing and Graphics + Autocad", New Age International Pvt. Ltd, 2011.

Suggested Reading:

1. Shaw M.B and Rana B.C., "Engineering drawing", Pearson, 2nd edition, 2009.
2. P I Varghees, " Engineering Graphics ",Tata McGraw-Hill publications, 2013.
3. Bhattacharya. B, "Engineering Graphics", I. K. International Pvt. Ltd, 2009.
4. Dhawan R.K., "Principles of Engineering Graphics and Drawing", S. Chand, 2011.

16PYC03

ENGINEERING PHYSICS LABORATORY

Instruction	2Hours per week
Duration of Semester End Examination	2 Hours
Semester End Examination	35 Marks
CIE	15 Marks
Credits	1

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

1. Apply theoretical physics knowledge in doing experiments
2. Understand the behavior of the light experimentally
3. Analyze the behavior of magnetic and dielectric materials

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

1. Understand the concept of errors and find the ways to minimize the errors
2. Demonstrate interference and diffraction phenomena experimentally
3. Distinguish between polarized and unpolarized light
4. Determine the loss of energy of a ferromagnetic material and its uses in electrical engineering
5. Understand the suitability of dielectric materials in engineering applications

List of Experiments:

1. Error Analysis - Estimation of errors in the determination of time period of a torsional pendulum
2. Newton's Rings - Determination of wavelength of given monochromatic source
3. Single Slit Diffraction - Determination of wavelength of given monochromatic source
4. Diffraction Grating - Determination of wavelengths of two yellow lines of mercury light
5. Malus's Law - Verification of Malus's law
6. Double Refraction - Determination of refractive indices of O-ray and E-ray of given calcite crystal
7. Polarimeter - Determination of specific rotation of glucose
8. B-H Curve - Determination of hysteresis loss of given specimen
9. Dielectric Constant - Determination of dielectric constant of given PZT sample
10. Ultrasonic Interferometer - Determination of velocity of ultrasonics in given liquid

Note: *A student must perform a minimum of eight experiments.*

Suggested Reading:

1. "Engineering Physics" - Manual by Department of Physics, CBIT, 2016
2. S.K. Gupta, "Engineering Physics Practical", Krishna's Educational Publishers, 2014
3. O.P. Singh, V. Kumar and R.P. Singh, "Engineering Physics Practical Manual", Ram Prasad & Sons Publications, 2009

16CY C04

APPLIED CHEMISTRY LABORATORY

Instruction	2Hours per week
Duration of Semester End Examination	2 Hours
Semester End Examination	35 Marks
CIE	15 Marks
Credits	1

Course Objectives:

1. To impart fundamental knowledge in handling the equipment / glassware and chemicals in chemistry laboratory.
2. For practical understanding of theoretical concept of chemistry.
3. The student should be conversant with the principles of water characterization and treatment of water for potable and industrial purposes.

Course Outcomes:

1. This syllabus helps the student to understand importance of analytical instrumentation for different chemical analysis.
2. The above knowledge also helps students to carry out inter disciplinary research such that the findings benefit the common man.

LIST OF EXPERIMENTS

1. Introduction to chemical analysis .
2. Preparation of standard solution of oxalic acid and Standardization of NaOH.
3. Estimation of amount of oxalic acid in the given solution using Mohr's salt and $KMnO_4$.
4. Estimation of total hardness of water using EDTA solution.
5. Estimation of temporary hardness and permanent hardness of water using EDTA solution.
6. Estimation of amount of carbonate in the given solution using HCl link solution.
7. Estimation of amount of carbonate and bicarbonate in the given solution using HCl link solution.
8. Estimation of amount of HCl conductometerically using NaOH solution .
9. Estimation of amount of CH_3COOH conductometerically using NaOH solution .
10. Estimation of amount of HCl and CH_3COOH present in the mixture of acids conductometerically using NaOH solution .
11. Estimation of amount of HCl potentiometrically using NaOH solution.

12. Estimation of amount of Fe^{+2} potentiometrically using $KMnO_4$ solution.

Suggested Reading:

1. Applied Chemistry: Theory and Practice (Latest ed.), By O.P. Vermani & A.K. Narula, Wiley Eastern Limited,1989.
2. Vogel's Textbook of Quantitative Chemical Analysis, Revised by G.H. Jeffery, J. Bassett, J. Mendham & R.C. Denney, Pearson Education India, 2009..
3. Instrumental methods of Chemical Analysis, MERITT & WILLARD, Wads worth Publishing Co. Inc., 1988.

16EG C02

PROFESSIONAL COMMUNICATION LABORATORY

Instruction	2Hours per week
Duration of Semester End Examination	2 Hours
Semester End Examination	35 Marks
CIE	15 Marks
Credits	1

Course Objectives:

1. To introduce students to phonetics and the Language Learning different sounds in English.
2. To familiarize the students with the software and give them sufficient practice in correct pronunciation.
3. To enable students to speak English correctly with focus on stress, rhythm and intonation.
4. To help students overcome their inhibitions while speaking in English and to build their confidence. The focus shall be on fluency rather than accuracy.
5. To understand team work, role behavior and to develop the ability to analyze, evaluate, construct and refute arguments.

Course Outcomes:

1. The students will understand the speech sounds in English and the nuances of pronunciation.
2. The students will understand tone, intonation and rhythm and apply stress correctly.
3. The students will be able to participate in group discussions with clarity and confidence.
4. The students will speak confidently on stage with appropriate body language.
5. The students will debate on various issues and learn to work in teams.

Exercises

1. **Introduction to English Phonetics:** Introduction to Auditory, Acoustic and Articulatory Phonetics. Organs of speech: 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. **Aspects of connected speech:** Strong forms, weak forms, contracted forms, elision.

4. **Word stress:** Primary stress, secondary stress, functional stress, rules of word stress.
5. **Rhythm & Intonation:** Introduction to Rhythm and Intonation. Major patterns, intonation of English with semantic implications.
6. **Listening skills:** practice with IELTS and TOEFL material.
7. **Situational dialogues and Role play.**
8. **Public speaking** is to be shown by incorporating narrative examples and extracts from speeches.
9. **Group Discussions:** Videos sessions and practice sessions.
10. **Poster making:** Preparation and presentation.
11. **Debate:** Differences between a debate and a group discussion. Essentials of a debate, conducting a debate.

Suggested Reading:

1. E Suresh kumar et al, English for Success (with CD), Cambridge University Press India Pvt Ltd. 2010.
2. Aruna Koneru, Professional Speaking Skills, Oxford University Press, 2016.
3. T Balasubramanian. A Textbook of English Phonetics for Indian Students, Macmillan, 2008.
4. J Sethi et al, A Practical Course in English Pronunciation (with CD), Prentice Hall India, 2005.
5. Edgar Thorpe. Winning at Interviews, Pearson Education, 2006.
6. Priyadarshi Patnaik. Group Discussions and Interviews, Cambridge University Press Pvt. Ltd ., 2011.