

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)

II - Semester						
S.No	Code	Subject	L	Т	P/D	Credits
1	16MT C02	Engineering Mathematics - II	3*	-	0	3
2	16PY C01	Engineering Physics	3	-	0	3
3	16CY C02	Applied Chemistry	2	-	0	2
4	16EE C01	Elements of Electrical Engineering	3	-	0	3
5	16CE C01	Engineering Mechanics	3	-	0	3
6	16EG C01	Professional Communication in English	3	-	0	3
7	16CE C02	Environmental Studies	1	-	0	1
8	16ME C02	Engineering Graphics	1	-	3	3
9	16PY C03	Engineering Physics Laboratory	0	-	2	1
10	16CY C04	Applied Chemistry Laboratory	0	-	2	1
11	16EG C02	Professional Communication Laboratory	0	-	2	1
TOTAL 19 09 24						

L - Lecture (clock hours) T - Tutorial (clock hours) P/D - Practical / Drawing (clock hours)

* One extra hour may be permitted in the timetable

16 MT C02

ENGINEERING MATHEMATICS – II

Instruction Duration of End Examination End Examination Sessional Credits

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 divergence, 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. Erwin Kreyszig "Advanced Engineering Mathematics," 10th edition, John Wiley & Sons -Publishers.
- 2. R.K.Jain & S.R.K.Iyenger "Advanced Engineering Mathematics", 3rd edition, Narosa Publications
- 3. Alen Jaffery "Mathematics for Engineers & Scientists", 6thed 2013 CRC press, Taylor & Francis Group. (Elsevier)
- 4. Dr.B.S.Grewal "Higher Engineering Mathematics", 43rd edition, Khanna Publishers.

Suggested Reading: (for further reading and examples on applications)

- 1. A.Craft and Robert Davison "Mathematics for Engineers-a modern interactive approach" -Willey
- 2. Loius Pipes "Applied Mathematics and physicists" Mc Graw Hill publishers.
- 3. Kanti.B.Datta "Mathematical Methods of Science & Engg," Aided with MATLAB,. Cengage Learning India Pvt.Ltd.
- 4. AR Collar and A. Simpson "Matrices for Engineering Dynamics" -John Willey & sons.

3L Periods per week + 1 (extra hour)

16PY C01

ENGINEERING PHYSICS

Instruction	
Duration of End Examination	
End Examination	
Sessional	
Credits	

3L Periods per week 3 Hours 70 Marks 30 Marks 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.

UNIT – III Polarization: Malus's law – 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, Dhanpat Rai Publications, 2011.

- 1. R. Murugeshan and Kiruthiga Sivaprasath, "Modern Physics", S. Chand Publications S. Chand Publications, 2014
- 2. V. Rajendran, "Engineering Physics", McGahill 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 Duration of End Examination End Examination Sessional Credits 2L Periods per week 2 Hours 50 Marks 20 Marks 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, the 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 corrosion environment – temperature, humidity and P^{H} . 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 - H_2 - O_2 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", Dhanpat Rai Pub, Co., New Delhi (2002)
- 2. Applied Chemistry "A text for Engineering & Technology" Springer (2005).
- 3. ShasiChawla, "Text Book of Engineering Chemistry", Dhanpat Rai Publishing Company, NewDelhi (2008).
- 4. S.S. Dara "A text book of engineering chemistry" S.Chand & Co.Ltd., New Delhi (2006).
- 5. B. Sivasankar "Engineering Chemistry" Tata McGraw-Hill Pub.Co.Ltd, New Delhi (2008).
- 6. Applied Chemistry by N. Krishnamurthy: P. Vallinavagam. And K. Jeysubramanian TMH
- 7. Chemistry of Engineering Materials by CV Agarwal, C.P Murthy, A.Naidu, BS Publications.
- 8. Chemistry of Engineering Meterials by R.P Mani and K.N.Mishra, CENGAGE learning

- 1. B.K.Sharma, "Engineering chemistry" Krishna Prakasan Media (P) Ltd., Meerut (2001)
- 2. Water Treatment : F. I. Bilane, Mir publisher
- 3. Fundamentals of Corrosion: Michael Henthorne, Chemical Engineering.
- 4. A textbook of Polymer Science: Fred, Billmeyer Jr., Wiley India Third edition.
- 5. Chemistry of Advanced Materials: CNR Rao, Rsc Publication.
- 6. Materials Science and Engineering an Introduction, William D. Callister, (Jr. Wiley publisher).
- 7. Introduction to nano materials by T.Pradeep.

16EE C01

ELEMENTS OF ELECTRICAL ENGINEERING

Instruction Duration of End Examination End Examination Sessional Credits 3L Periods per week 3 Hours 70 Marks 30 Marks

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.

- 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
Duration of End Examination
End Examination
Sessional
Credits

3L Periods per week 3 Hours 70 Marks 30 Marks 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, BS Publications, Hyderabad, 2011.
- 2. Ferdinand L Singer, Engineering Mechanics, Harper and Collins, Singapore, 1904.

- 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

16EG	C01
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PROFESSIONAL COMMUNICATION IN ENGLISH

Instruction	3L Periods per week
Duration of End Examination	3 Hours
End Examination	70 Marks
Sessional	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: Tense, 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 TakenRobert Frost2. Goodbye Party For Miss Pushpa T. SNissim 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,

- 1. M .Ashraf Rizvi, Effective Technical Communication, Tata Mc Graw-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, Meera Banerji, 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	1L Periods per week
Duration of End Examination	2 Hours
End Examination	50 Marks
Sessional	
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.

$\mathbf{UNIT} - \mathbf{IV}$

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

- 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 Environmental Chemistry & Polution Control", S. Chand Limited, 2006

16ME C02

ENGINEERING GRAPHICS

Instruction Duration of End Examination End Examination Sessional Credits 1L + 3D Periods per week 3 Hours 70 Marks 30 Marks 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, 2012
- 2. Basanth Agrawal and C M Agrawal "Engineering Drawing 2e", McGraw-Hill Education(India) Pvt. Ltd.

- 1. K.L.Narayana and P.K.Kannaiah, "Text Book of Engineering Drawing", Scitech Publications, 2011
- 2. P.S.Gill' "Engineering Graphics", Kataria Publications, 2011
- 3. K. Veenugopal, "Engineering Drawing and Graphics + Autocad", New Age International Pvt. Ltd, 2011
- 4. Shaw M.B and Rana B.C., "Engineering drawing", Pearson, 2nd edition, 2009
- 5. P I Varghees, "Engineering Graphics ", Tata McGraw-Hill publications, 2013
- 6. Bhattacharya. B, "Engineering Graphics", I. K. International Pvt. Ltd, 2009
- 7. Dhawan R.K., "Principles of Engineering Graphics and Drawing", S. Chand, 2011

16PY C03

ENGINEERING PHYSICS LABORATORY

Instruction Duration of End Examination End Examination Sessional Credits 2P Periods per week 2 Hours 35 Marks 15 Marks

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.

- 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
Duration of End Examination
End Examination
Sessional
Credits

2P Periods per week 2 Hours 35 Marks 15 Marks

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 water characterization and treatment of 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 KMnO₄
- 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 CH₃COOH conductometerically using NaOH solution
- 10. Estimation of amount of HCl and CH₃COOH 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 KMnO₄ solution

- 1. Applied Chemistry: Theory and Practice (Latest ed.), By O.P. Vermani & A.K. Narula
- 2. Vogel's Textbook of Quantitative Chemical Analysis (Latest ed.), Revised by G.H. Jeffery, J. Bassett, J. Mendham & R.C. Denney
- 3. Instrumental methods of Chemical Analysis, MERITT & WILLARD East-West Press

PROFESSIONAL COMMUNICATION LABORATORY

Instruction Duration of End Examination End Examination Sessional Credits 2P Periods per week 2 Hours 35 Marks 15 Marks

Course Objectives:

- 1. To introduce students to phonetics and the 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 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: 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. 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 the 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 to be shown 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.

- 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