E.G.S. PILLAY ENGINEERING COLLEGE

(Autonomous)

Approved by AICTE, New Delhi | Affiliated to Anna University, Chennai

Accredited by NAAC with 'A' Grade | Accredited by NBA (CSE, EEE, MECH)

NAGAPATTINAM – 611 002

B.E. Civil Engineering

Full Time Curriculum and Syllabus

First Year – First Semester

Course Code	Course Name	L	T	P	C	Maximum Marks		
						CA	ES	Total
Theory Course								
1701MA101	Engineering Mathematics I	3	2	0	4	40	60	100
1701PH101	Applied Physics for Engineers	3	0	0	3	40	60	100
1701EN101	Technical English	3	0	0	3	40	60	100
1701CH103	Water Technology & Green Chemistry	3	0	0	3	40	60	100
1701GE104	Fundamental of Mechanical Engineering	2	0	2	3	40	60	100
1701GEX04	Engineering Mechanics	2	2	0	3	40	60	100
Laboratory Course								
1701HS151	Physics and Chemistry Laboratory - I	0	0	2	1	50	50	100
1701GEX53	Workshop Practice	0	0	2	1	50	50	100

L – Lecture | T – Tutorial | P – Practical | C – Credit | CA – Continuous Assessment | ES – End Semester

1701MA101	ENGINEERING MATHEMATICS I	L	T	P	C
	(Common to all B.E / B.Tech Degree Programmes)	3	2	0	4

COURSE OBJECTIVES:

1. To educate Matrix Algebra Technique and curvature Theory
2. To impart knowledge of Techniques in solving Ordinary Differential Equations and to apply in solving Modern Engineering Problems
3. To acquaint the students about functions of several variables and also to familiarize the students in infinite series and their convergence

UNIT I EIGEN VALUE PROBLEMS **9 Hours**

Characteristic equation - Eigen values and Eigen vectors of a real matrix – Properties - Cayley– Hamilton theorem- Diagonalization of Matrices - Reduction of a quadratic form to a canonical form by orthogonal transformation – Application of Matrices in Structural Engineering and image processing

UNIT II ORDINARY DIFFERENTIAL EQUATIONS **9 Hours**

Higher order linear differential equations with constant coefficients – Cauchy's and Legendre's linear equations – Method of variation of parameters in solution of ordinary differential equations.

UNIT III DIFFERENTIATION AND GEOMETRICAL APPLICATIONS **9 Hours**

Derivative of special functions (Trigonometry, Exponential, Logarithmic), Derivative by rule (Product, Quotient, Chain rule), Curvature in Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature- Evolutes and involutes.

UNIT IV MULTIVARIABLE CALCULUS **9 Hours**

Functions of two variables and solutions(Partial derivatives and Euler's theorem)– Taylor's series - Maxima and Minima – Application of Partial Derivatives to find the optimum requirement using Lagrangian multipliers.

UNIT V SEQUENCES AND SERIES **9 Hours**

Sequences: Definition and examples – Series: Types and Convergence – Series of positive terms – Tests of convergence: Comparison test, Integral test and D'Alembert's ratio test – Alternating series – Leibnitz's test – Application of Sequences in real life.

TOTAL: 45 + 15 HOURS

FURTHER READING:

1. Modeling and solutions using Newton's Law of Cooling of Bodies
2. Differentiation of implicit Functions, Jacobians and Properties

COURSE OUTCOMES:

On the Successful completion of the course, Students will be able to

CO1: Analyze the characteristics of a linear system with Eigen value and Eigen Vectors
CO2: Recognize and solve Higher order Ordinary Differential Equations
CO3: Solve Derivative of special functions and apply it in solving Geometrical problems
CO4: Apply Partial Derivatives in finding Maxima and Minima of a function
CO5: Test the convergence of any series

REFERENCES:

1. Veerarajan R., "Engineering Mathematics", updated second edition for semester I and II,(2017)
2. Grewal. B.S, "Higher Engineering Mathematics", 44th Edition, Khanna Publications, Delhi, (2014).
3. Bali N. P and Manish Goyal, "Text book of Engineering Mathematics", Sixth edition, Laxmi Publications(p) Ltd.,(2014).
4. Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, (2012).
5. P.Kandasamy, K. Gunavathy and K. Thilagavathy, Engineering Mathematics ,Volume II, S. Chand & Co ., New Delhi, (2009)
6. Erwin Kreyszig, Advanced Engineering Mathematics,9th Edition, Wiley International edition, (2006)
7. Ramana B.V, "Higher Engineering Mathematics",Tata McGrawHill Publishing, New Delhi, (2007).
8. M K Venkataraman, Engineering mathematics, Volume I, 2nd ed., National Publishing Co.(2003)
9. nptel.ac.in/courses/111105035, www.nptelvideos.in/2012/11/Mathematics.html
10. www.learnerstv.com/Free-maths-video lectures - ltv348-page1.htm

1701PH101	APPLIED PHYSICS FOR ENGINEERS	L	T	P	C
	(Common to all B.E. / B.Tech Degree Programmes)	3	0	0	3

COURSE OBJECTIVES:

1. To impart knowledge in properties of matter, crystallography and ultrasonics.
2. To understand the applications of lasers and fiber optics.
3. To implement the principles of quantum physics in the respective engineering fields.

UNIT I PROPERTIES OF MATTER 9 Hours

Elasticity: elastic and plastic materials – Hooke's law – elastic behavior of a material – stress – strain diagram – factors affecting elasticity. Three moduli of elasticity – Poisson's ratio – torsional pendulum – twisting couple on a cylinder. Young's modulus – uniform bending – non-uniform bending. Viscosity: coefficient of viscosity – streamline and turbulent flow – experimental determination of viscosity of a liquid – Poiseuille's method.

UNIT II APPLIED OPTICS 9 Hours

Interference: air wedge – theory – uses – testing of flat surfaces – thickness of a thin wire. Laser: introduction – principle of laser – characteristics of laser light– types: CO2 laser – semiconductor laser (homojunction). Fiber optics: principle of light transmission through fiber – expression for acceptance angle and numerical aperture – types of optical fibers (refractive index profile and modes) – fiber optic communication system (block diagram & description).

UNIT III ULTRASONICS 9 Hours

Ultrasonics: introduction – properties of ultrasonic waves – generation of ultrasonic waves – magnetostriction - piezo electric methods – detection of ultrasonic waves – Determination of velocity of ultrasonic waves (acoustic grating). Applications of ultrasonic waves: pulse echo method, SONAR – measurement of velocity of blood flow – modes of operation (A scan, B Scan & C Scan).

UNIT IV SOLID STATE PHYSICS 9 Hours

Crystal Physics: lattice – unit cell – crystal systems – Bravais lattices – Miller indices – 'd' spacing in cubic lattice – calculation of number of atoms per unit cell, atomic radius, coordination number and determination of packing density for SC, BCC, FCC and HCP structures – X-ray diffraction: Laue's method – powder crystal method.

UNIT V QUANTUM MECHANICS 9 Hours

Quantum Physics: development of quantum theory – de Broglie wavelength – Schrodinger's wave equation – time dependent and time independent wave equations – physical significance. Application: particle in a box (1D) – degenerate and non-degenerate states. Electron Microscopy-SEM, TEM - principle and working – problem solving.

TOTAL: 45 HOURS

FURTHER READING:

Neutrino's – expanding universe

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1: Realize the concept of properties of matter and apply the same for practical applications.
CO2: Identify the suitable laser source for fiber optic communication applications.
CO3: Determine the velocity of ultrasonic waves and apply the same for day today applications.
CO4: Classify the different types of crystal structures and analyze their properties.
CO5: Comprehend the efficacy of quantum equations in modern areas.

REFERENCES:

1. D.S.Mathur, Elements of Properties of matter, 5th edition, S.Chand & Company Ltd., New Delhi,2012.
2. Charles Kittel, Introduction to Solid State Physics, 8th edition, Wiley India Pvt. Ltd., New Delhi, 2012
3. Arthur Beiser, Shobhit Mahajan and S. Rai Choudhury, Concepts of Modern Physics, 6th edition, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2010.
4. B.K. Pandey and S. Chaturvedi, Engineering Physics, 1st edition, Cengage Learning India Pvt. Ltd., New Delhi, 2012.
5. Halliday and Resnick, Fundamentals of Physics, John Wiley and Sons, Inc, 2011.
6. Ian Morison, Introduction to Astronomy and Cosmology, John Wiley and Sons, Ltd, 2013.
7. http://nptel.ac.in/

1701EN101	TECHNICAL ENGLISH	L	T	P	C
	(Common to all B.E / B.Tech Degree Programmes)	3	0	0	3

COURSE OBJECTIVES:

1.To develop the ability to read and comprehend technical texts in the field of Engineering
2.To develop vocabulary building through the study of word construction
3. To develop ability to write formal definitions of technical terms and expression.
4. To recognize various grammatical structures that will aid the student improve his/her theoretical knowledge.

UNIT I **9 Hours**

Articles-Preposition-Subject-Verb-Object-Adjective-Adverb-Conjunction-Nouns- Usages of Have, has, had-Simple Present-Simple Past-Simple Future-Self introduction-Framing Questions

UNIT II **9 Hours**

Present Continuous-Past Continuous-Future Continuous-Describing a place, person or thing-Framing negative questions-Gerund-Listening to Articles, speeches and audios

UNIT III **9 Hours**

Present perfect-past perfect-future perfect-writing short paragraph-sentence pattern- Infinitive-Tag questions-Reading newspaper cutting

UNIT IV **9 Hours**

Present perfect continuous –Past perfect continuous-Future perfect continuous-writing an Essay in 100 words-Types of sentences-Prefix-suffix-word formation-Dialogue writing.

UNIT V **9 Hours**

Active voice-passive voice-impersonal passive voice –Synonyms and Antonyms-phrasal verbs- Punctuation-Common Errors-Letter writing.

TOTAL: 45 HOURS

FURTHER READING:

Letters from a Father to His Daughter- Jawaharlal Nehru

COURSE OUTCOMES:

On the successful completion of the course, Students will be able to

CO1: Read and comprehend technical texts in the field of Engineering
CO2: Acquire vocabulary building and write effectively in technical writing
CO3: Write formal definitions of technical terms and expression in both verbal and written form.
CO4: Understand grammatical structures and use flawless English in the professional documents

REFERENCES:

1. Meenakshi Raman, Sangeetha Sharma, "***Technical Communication : English Skills for Engineers"*** Oxford University Press: New Delhi, 2016.
2. Rizvi Ashrav.M, "***Effective Technical Communication***" Tata McGraw Hill: New Delhi, 2017
3. Herbert, A.J, "***Structure of Technical English***", London English Language Society. https://archive.org/details/in.ernet.dli.2015.136456
4. J.D. O'Connor, Better ***English Pronunciation*** Paperback, 2nd edition, 162 pages, Published September 16th 2013 by Cambridge University Press,October 23rd 1967
5. Nehru, Jawaharlal. ***Letters from a Father to His Daughter***, Puffin Books, 2004
6. ***Technical English*** by faculty of English –published by EGS Pillay press 2017

1701CH103 WATER TECHNOLOGY AND GREEN CHEMISTRY L T P C
(B.E. Civil Engineering) **3 0 0 3**

COURSE OBJECTIVES:

1. Imparting knowledge on the principles of water characterization, treatment methods and industrial applications.
2. Understanding the principles and application of electrochemistry and corrosion science.
3. Basic information and application of polymer chemistry, nanotechnology and analytical techniques.

UNIT I WATER TECHNOLOGY 9 Hours

Sources, hard & soft water-Degree of hardness and its estimation (EDTA method)– Water Quality Parameters - boiler feed water-requirements - softening of hard water -external treatment –demineralization, internal treatment- boiler compounds - boiler troubles- desalination of sea water –reverse osmosis- Domestic water treatment –disinfection of water – Basic principle of green chemistry (12 guiding principles)-detergents.

UNIT II CORROSION AND PROTECTIVE COATING 9 Hours

Corrosion – types-chemical, electrochemical corrosion (galvanic, differential aeration) - Factors influencing corrosion -corrosion control – material selection and design aspects - electrochemical protection – sacrificial anode method and impressed current cathodic method. Protective coatings: Electroplating of gold and electroless plating of nickel. Paints - Constituents and Functions.

UNIT III POLYMER AND NANO TECHNOLOGY 12 Hours

Introduction: Classification of polymers – Natural and synthetic; Thermoplastic and Thermosetting. Functionality – Degree of polymerization. Addition (Free Radical Mechanism) condensation and copolymerization. Fabrication of Plastics. Application -Nylon 66, Teflon and Epoxy resin.

Unique properties of nano material - introduction to quantum materials, quantum dots, supramolecular materials and molecular crystal engineering – molecular machines and devices- Logic gate using electronics material for molecular electronic- nano cluster, nano rod, nanotube (CNT) and nanowire. - Synthesis- precipitation, thermolysis, chemical vapour deposition, laser ablation; Nano polymers- Properties and applications.

UNIT IV ENGINEERING MATERIALS 9 Hours

Abrasives: definition, classification -grinding wheel, Application. Refractories: definition, characteristics, classification, properties –Manufacture of alumina, magnesite and silicon carbide, Portland cement- manufacture and properties - setting and hardening of cement, special cement- waterproof and white cement– properties and uses.

UNIT V INSTRUMENTAL TECHNIQUES OF CHEMICAL ANALYSIS 6 Hours

Laws of photochemistry - Grotthus–Draper law, Stark–Einstein law and Lambert-Beer Law. Electromagnetic spectrum - UV-visible and IR spectroscopy – principles, instrumentation (Block diagram only) - Applications. Colorimetry- principles, instrumentation (Block diagram only) estimation of iron. Flame photometry – principles, instrumentation (Block diagram only) estimation of sodium.

TOTAL: 45 HOURS

FURTHER READING:

1. Synthesis and applications of bio-fuels
2. Cambridge structural database (protein data bank)-noting data bank
3. Brief account of fuel cell, hydrogen fuel (fuel of future), H_2O_2 fuel cell, materials for solar energy conversion and storage devices. Lithium battery

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1: Understand the chemistry of water and its industrial & domestic application
CO2: Utilization of electrochemistry principle in corrosion control and industrial application.
CO3: Differentiate the polymers and materials used in day to day life based on its source, properties and applications.
CO4: Identify the applications of nanotechnology and analytical methods for the estimation of elements.

REFERENCES:

1. Dara S.S, Umare S.S, "Engineering Chemistry", S. Chand & Company Ltd., New Delhi 2010
2. Gowariker V.R., Viswanathan N.V. and Jayadev Sreedhar, "Polymer Science", New Age
3. Ozin G. A. and Arsenault A. C., "Nanochemistry: A Chemical Approach to Nanomaterials", RSC Publishing, 2005.
4. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company, Ltd., New delhi 2010
5. https://en.wikipedia.org/wiki/Ramachandran_plot

6. https://www.ccdc.cam.ac.uk/solutions/csd-system/components/csd/
7. https://link.springer.com/chapter/10.1007/978-3-642-28030-6_2
8. www. santarosa.edu/~yataiiya/4D/QuantumDotsMk2.ppt
9. onlinelibrary.wiley.com/doi/10.1002/9780470661345.smc107/pdf
10. https://en.wikipedia.org/wiki/Molecular electronics
11. Jain and Jain, "Engineering Chemistry", Sixteenth edition, Dhanpatrai publications, 2012.

1701GE104	FUNDAMENTALS OF MECHANICAL ENGINEERING	L	T	P	C
		2	0	2	3

(Common to B.E - Mech. & Civil Programmes)

COURSE OBJECTIVES:

1. To make the students practice various fundamental and derived units to manipulate length, time, mass, temperature and derived concepts from the fundamental quantities.
2. To make the students familiar with various forces and its conversions, material properties and geometric properties through demonstrations.
3. To make the students capable for understanding the energy in various forms (except nuclear energy) and make them capable of converting energy in one form to another form.
4. To familiarize students with all commonly used mechanical elements along with its applications.
5. To expose students with all conventional and unconventional manufacturing techniques along with their application for enabling them to start doing mechanical projects from the second semester.

UNIT I ENGINEERING MEASUREMENTS I 7 Hours

Basic Concepts : Length using scale, sine rule and cosine rule, radians, calculation of surface area and volume of standard objects, time zones, period and frequency, linear velocity, linear acceleration, volume flow rate, angular velocity, angular acceleration, mass, density, specific volume, specific gravity, mass flow rate, momentum, conservation of mass and energy, temperature, heat, conduction, convection, radiation, insulation, thermal expansion, specific heat, calorific value, self-ignition temperature, cryogenic temperature, latent heat, evaporation, condensation. Demonstration, measurement and experiments: Length, surface area and volume of standard objects, periods and frequency, linear velocity, linear acceleration, volume flow rate, angular velocity, mass, density, momentum, conservation of mass and energy, temperature, heat, conduction, convection, radiation, insulation, thermal expansion, specific heat, calorific value, self-ignition temperature, latent heat.

UNIT II ENGINEERING MEASUREMENTS II 7 Hours

Basic Concepts: Newton's Laws, Force, Centripetal Force, Work, Energy, Power, Pressure load area relation, Stress and its types, Atmospheric Pressure, Types of fluids, Elasticity, Plasticity, Fluid Pressure Head Velocity head relation, Surface tension, Archimedes, Principle, Pascal's Law, Force Displacement Relations, Speed and Torque relations, Siphon, Compressibility, Hardness, Brittleness, Toughness, Ductility, Moment, First moment of Area, Second moment of Area. Demonstration, measurement and experiments: Newton's laws, force, centripetal force, power, pressure, pressure load area relation, stress and its types (tension, compression and shear), atmospheric pressure, fluid pressure head and velocity head relation, elasticity, plasticity, types of fluid, surface tension, viscosity, Archimedes principle, Pascal law, siphon, compressibility, hardness, brittleness, toughness, ductility, moment, first moment of area, second moment of area.

UNIT III ENERGY CONVERSION 6 Hours

Basic Concepts : Kinetic energy in linear and rotary form, potential energy in head and pressure form, energy stored in springs, elastic energy, mechanical energy, thermal energy, chemical energy, magnetic energy, law of conservation of energy, conversion of kinetic energy to potential energy vice versa, mechanical energy in various forms to thermal energy, chemical energy to mechanical energy, fluid energy to mechanical energy vice versa, damping, electrical energy to mechanical energy vice versa, electrical energy to thermal energy, efficiency, flywheel energy storage, thermal energy storage, transmission of energy in pressure form, thermal form, kinetic energy form. Demonstration, measurement and experiments: Conversion of linear kinetic, rotary kinetic, potential in pressure head, spring, elastic, thermal, chemical into other forms, law of conservation of energy, energy storage in flywheel and thermal form, transmission of energy in pressure, thermal and kinetic form.

UNIT IV MECHANICAL ELEMENTS 5 Hours

Basic Concepts, Demonstration, measurement and experiments: Bearings - ball bearing, roller bearing, thrust bearing, linear bearing, tapper roller bearing, journal / bush bearing, needle bearing, spherical roller bearings,

bearing blocks, one way bearings-Gears - spur, helical, herringbone, internal ring, face, hypoid, straight bevel, spiral bevel, screw, worm gears, rack and pinion, sprockets, ratchet and Paul, gear trains, sun planet gears-Couplings - rigid coupling - sleeve, flange, clamp couplings. Flexible coupling - Oldham, belt, universal, jaw and fluid couplings. Torque limiter -Belt drives - flat belt, v belt, timing belt drives. Chain drives, cable drives, chain block-Conveyers - roller conveyer, belt conveyer, vertical conveyer, pneumatic conveyer, chain conveyer, screw conveyer-Shafts, keys, spline shafts-Cam and followers - plate cam, wedge / translating cam, barrel cam, face cam, Globoidal cam, Geneva mechanism-Springs - tension spring, compression spring, coil spring, torsion spring, leaf spring, gas spring-Fasteners - screws, bolts, nuts and their specifications in mm and inch scale-Tools - double end spanners, box spanners, Allen keys and standards.

UNIT V MANUFACTURING PROCESSES **5 Hours**

Basic Concepts, Demonstration, measurement and experiments: Turning, facing, drilling, internal and external thread cutting, boring, grooving, tapper turning in lathe. Milling using end milling cutters. drilling using universal drilling machine -sheet metal spinning, deep drawing, forging of clay models, making water tank using FRP, sheet metal work-arc welding, brazing, riveting -investment casting, sand casting, injection molding, vacuum molding, blow molding -powder coating.

FURTHER READING:

Triangulation, projectile motion in trebuchet, water hammer, water bug, air suspension, MR fluid, five axis milling.

EXPERIMENTS

1. Measure the size, area and volume of given object. **2 Hours**
2. Measure the natural period, natural frequency and maximum velocity of an oscillating pendulum. **2 Hours**
3. Measure the volume and mass low rate of water through a given pipe. **2 Hours**
4. Measure the mass, weight and density of given material or fluid. **2 Hours**
5. Demonstrate the conservation of energy in a colliding object and name all the energy conversions. **2 Hours**
6. Design a setup to prevent heat loss from a given hot object through conduction, convection and radiation. **2 Hours**
7. Find the calorific value, specific heat and self-ignition temperature of a given fuel. **2 Hours**
8. Demonstrate an experimental setup to prove Archimedes Principle. **2 Hours**
9. Design an experimental setup to prove Pascal Law. **2 Hours**
10. Identify the given materials based on their mechanical properties such as hardness, brittleness and Toughness. **2 Hours**
11. Design an experimental setup to convert mechanical energy in rotation form to any other form. **4 Hours**
12. Design an experimental setup to convert potential energy into mechanical rotation. **4 Hours**

TOTAL: 30 + 30 HOURS

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1: Use the instruments to measure any fundamental quantities such as length, time, mass, temperature.

CO2: Measure force, fluid and material related parameters and convert the measured values from instruments into any system of units.

CO3: Convert energy in one form into another form by understanding conservation of mass energy principle.

CO4: Identify any commonly known mechanical component along with its application and its working principle.

CO5: Identify any conventional manufacturing process and understand their limits and capabilities.

REFERENCES:

1. David Halliday, Robert Resnick, Jearl Walker, Principles of Physics, 10th Edition International Student Version, John Wiley & Sons, 2014.
2. Moaveni, Saeed, Engineering fundamentals: an introduction to engineering, Cengage Learning, 2015.
3. Wickert, Jonathan, and Kemper Lewis, An introduction to mechanical engineering, Cengage learning, 2012.
4. Serway, Raymond, and John Jewett. Physics for scientists and engineers with modern physics, Cengage learning, 2013.
5. Roger Timing, Engineering Fundamentals, Newnes, 2002.
6. C. F. Geraldand P. O. Wheatley, Applied Numerical Analysis, Pearson Education 2003.

1701GEX04	ENGINEERING MECHANICS	L	T	P	C
	(Common to B.E - Mech. & Civil Programmes)	2	2	0	3

COURSE OBJECTIVES:

1. To familiarize on various methods of adding and resolving various force systems in a real world environment.
2. To provide knowledge on understanding the effects of forces on a point and at a distance and to arrive at equivalent systems from the given force system.
3. To provide knowledge on various support conditions of a rigid body and deciding a support system for given condition.
4. To expose students with impact of geometries of load bearing systems and make them calculate moment of inertia of various cross sections.
5. To make students understand concepts of friction under various applications and make them calculate frictional forces induced.

UNIT I BASIC CONCEPTS AND FORCE SYSTEM 5 Hours

Introduction to mechanics - idealization of mechanics - laws of mechanics - principle of transmissibility - vector - addition, subtraction and product. Force- types - system of forces - resultant forces - composition of forces - resolution of force-free body diagram for real world systems.

UNIT II STATICS OF PARTICLES AND FORCE SYSTEM 6 Hours

Equilibrium of particle in space, moment of couple-equilibrant Moment about point and specific axis-moment at couple- simplification of force and couple systems.

UNIT III STATICS OF RIGID BODIES 7 Hours

Equilibrium of rigid bodies in two and three dimensions - beams - types of loads, supports and their reactions Two and three force Members-Static determinacy.

UNIT IV PROPERTIES OF SURFACES AND SOLIDS 7 Hours

Determination of centroid of areas, volumes and mass - Pappus and Guldinus theorems - moment of inertia of plane and areas Parallel axis theorem radius of gyration of area- product of inertia- mass moment of inertia.

UNIT V FRICTION 5 Hours

Introduction - mechanism of friction-types -laws of friction - friction on horizontal and inclined planes, ladder and wedge friction - rolling resistance.

FURTHER READING:

Moment of Inertia of flywheel - Internal force of a member - Equilibrium of rigid bodies in three dimensions: Ball and socket joint.

TOTAL: 30 + 15 HOURS

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1: Draw a free body diagram from the given real world system and add or subtract or resolve the forces involved in the system.

CO2: Calculate the moment created by the applied force with reference to any reference in a three dimensional space.

CO3: Determine the appropriate support system for the given real world system by calculating the reactions generated.

CO4: Suggest suitable cross section or geometry for a load bearing support to prevent it from collapsing due to bending.

CO5: Calculate the frictional force involved in various real world systems.

REFERENCES:

1. F.P. Beer, and Jr. E.R Johnston, Vector Mechanics for Engineers - Statics and Dynamics, Tata McGraw-Hill Publishing Company, New Delhi, 2007.
2. N.H. Dubey, Engineering Mechanics- Statics and Dynamics, Tata McGraw-Hill Publishing Company, New Delhi, 2013.
3. Irving H. Shames, Engineering Mechanics - Statics and Dynamics, Pearson Education Asia Pvt. Ltd., 2006.
4. R.C. Hibbeller, Engineering Mechanics: Combined Statics & Dynamics, Prentice Hall, 2009.
5. D. P. Sharma, Engineering Mechanics, Dorling Kindersley (India) Pvt. Ltd., New Delhi, 2010.
6. S. Rajasekaran and G. Sankara subramanian, Fundamentals of Engineering Mechanics, Vikas Publishing House Pvt. Ltd., New Delhi, 2005.

1701HS151	PHYSICS AND CHEMISTRY LABORATORY-I	L	T	P	C
	(Common to all B.E. / B.Tech Degree Programmes)	0	0	2	1

COURSE OBJECTIVES:

1. To make the students gain practical knowledge to co-relate with the theoretical studies
2. To achieve perfectness in experimental skills
3. To bring confidence and ability to develop and fabricate engineering and technical equipments.
4. To train the students to analyses the water sample
5. To make the student to acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis

PHYSICS

LIST OF EXPERIMENTS:

1. Determine the moment of inertia of the disc and calculate the rigidity modulus of a given wire using torsion pendulum (symmetrical masses method).
2. Find the elevation of the given wooden beam at the midpoint by loading at the ends and hence calculate the Young's modulus of the material by uniform bending.
3. Determine the coefficient of viscosity of the given liquid by Poiseulle's method.
4. From the interference fringes from the air wedge setup and calculate the thickness of the given wire.
5. By applying the principle of diffraction, determine the wavelength of given laser light and the average particle size of lycopodium powder using laser source.
6. Determine the
   (i) Wavelength of ultrasonic in a liquid medium
   (ii) Velocity of ultrasonic waves in the given liquid
   (iii) Compressibility of the given liquid using ultrasonic interferometer.

CHEMISTRY

LIST OF EXPERIMENTS:

1. Determination of total, temporary & permanent hardness of water by EDTA method
2. Determination of strength of given hydrochloric acid using pH meter
3. Estimation of iron content of the given solution using potentiometer
4. Estimation of sodium present in water using flame photometer
5. Corrosion experiment – weight loss method
6. Determination of molecular weight of a polymer by viscometry method
7. Conductometric titration of strong acid Vs strong Base

TOTAL: 45 HOURS

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1: Realize the concept of properties of matter and apply the same for practical applications.
CO2: Identify the suitable laser source for fiber optic communication applications.
CO3: Determine the velocity of ultrasonic waves and apply the same for day today applications.
CO4: Classify the different types of crystal structures and analyze their properties.
CO5: Comprehend the efficacy of quantum equations in modern areas.
CO6: Identify the pH of the solution.
CO7: Find the iron content of the water sample using potentiometer.
CO8: Explain and demonstrate the conductance of the solution.
CO9: Interpret the hardness and metal ions present in the water.

REFERENCES:

1. D.S.Mathur, Elements of Properties of matter, 5th edition, S.Chand & Company Ltd., New Delhi,2012.
2. Charles Kittel, Introduction to Solid State Physics, 8th edition, Wiley India Pvt. Ltd., New Delhi, 2012.
3. Arthur Beiser, Shobhit Mahajan and S. Rai Choudhury, Concepts of Modern Physics, 6th edition, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2010.
4. B.K. Pandey and S. Chaturvedi, Engineering Physics, 1st edition, Cengage Learning India Pvt. Ltd., New Delhi, 2012.
5. Halliday and Resnick, Fundamentals of Physics, John Wiley and Sons, Inc, 2011.
6. Ian Morison, Introduction to Astronomy and Cosmology, John Wiley and Sons, Ltd, 2013.
7. Daniel R. Palleros, "Experimental organic chemistry" John Wiley & Sons, Inc., New Yor (2001).
8. Furniss B.S. Hannaford A.J, Smith P.W.G and Tatchel A.R., "Vogel's Textbook of practical organic chemistry", LBS Singapore (1994).
9. Jeffery G.H., Bassett J., Mendham J.and Denny vogel's R.C, "Text book of quantitative analysis chemical analysis", ELBS 5th Edn. Longman, Singapore publishers, Singapore, 1996.
10. Kolthoff I.M., Sandell E.B. et al. "Quantitative chemical analysis", Mcmillan, Madras 1980.

1701GEX53	WORKSHOP PRACTICE	L	T	P	C
	(Common to all B.E. / B.Tech Degree Programmes)	0	0	2	1

COURSE OBJECTIVES:

1. To provide hands on training for fabrication of components using sheet metal and welding equipment / tools.
2. To develop skill for using carpentry and fitting tools to make simple components and metal joints.
3. To provide hands on training for preparing the green sand mould using foundry tools.
4. To provide training for making simple house hold electrical & pipe line connections using suitable tools.
5. To develop the skill to make / operate/utilize the simple engineering components.

LIST OF EXPERIMENTS

1. Forming of simple object in sheet metal using suitable tools (Example: Dust Pan / Soap Box) (or) making simple object using Metal Spinning Machine. (Example: Aluminum Cup). **4 Hours**
2. Prepare V (or) Half round (or) Square (or) Dovetail joint from the given mild Steel flat. **4 Hours**
3. Fabrication of a simple component using thin and thick plates. (Example: Book rack) **2 Hours**
4. Making a simple component using carpentry power tools. (Example: Electrical switch Box/Tool box/ Letter box. **2 Hours**
5. Construct a household pipe line connections using pipes, Tee joint, Four way joint, elbow, union, bend, Gate way and Taps (or) Construct a pipe connections of house application centrifugal pump using pipes, bend, gate valve, flanges and foot valve. **4 Hours**
6. Prepare a green sand mould using solid pattern/split pattern. **4 Hours**
7. Study of gas welding equipment and its demonstration **2 Hours**
8. Soldering Practice for simple printed circuit board. **4 Hours**
9. Construct a domestic electrical wire connections using indicator, one way switch with calling bell, two way switch with lamp, one way switch with fan regulator and one way switch with socket. **4 Hours**

TOTAL: 30 HOURS

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1: Fabricate simple components using sheet metal & welding equipment/tools.
CO2: Make simple components / joints using carpentry and fitting tools.
CO3: Prepare green sand mould using suitable tools.
CO4: Make simple house hold electrical & pipe line connections using suitable tools.
CO5: Make / operate / utilize the simple engineering components.