

COURSE CODE : PH1C02
COURSE TITLE : APPLIED PHYSICS LABORATORY I
UNIVERSITY : DIBRUGARH UNIVERSITY
SEMESTER : FIRST SEMESTER
CREDIT : 01
L:T:P : 0:0:2

End sem. Examination for this course will carry 50 marks

Experiments	List of experiments
1	Determination of the resistance of a galvanometer by Thompson's method.
2	Determination of the value of H (Earth's horizontal intensity) in the laboratory by using deflection and vibration magnetometers.
3	Determination of the value of J (Mechanical equivalent of heat) with a Joule's calorimeter.
4	Determination of the value of a given low resistance by potential difference method using a potentiometer.
5	Determination of the Young's modulus of the material of a wire by Searle's apparatus.
6	Finding the wavelength of a source of light by Newton's ring method.
7	Study of charging and discharging of a capacitor and determination of time constant.
8	Determination of the magnifying power of a telescope.
9	Study of rotational motion of a flywheel.
10	Study of ultrasound properties.
11	Inverse square law studies for light using photo diode as detector.
12	Optical experiments with diffraction grating.
13	Study of transverse nature of light based on polarization phenomenon.
14	Thermal conductivity studies.

COURSE CODE : PH1C01
COURSE TITLE : APPLIED PHYSICS I
UNIVERSITY : DIBRUGARH UNIVERSITY
SEMESTER : FIRST SEMESTER
CREDIT : 04
L:T:P : 3:1:0

End sem. Examination for this course will carry 100 marks

Module	Details of module	No. of Lectures
1	Optics and Imaging covering Ray Optics- Lens aberration (chromatic, achromatic, spherical, distortion, astigmatism, coma), Aberration removal; (Chromatic & Spherical); Interference – coherence (spatial, temporal) in thin films of uniform thickness (derivation); Diffraction Grating–use as a monochromator; Imaging: including importance, types of imaging (microscopes, telescopes ,cameras etc.); Classification (visible ,IR, electron, magnetic, UV/X-rays, gamma rays, microwaves);Comparative study of different types of imaging(with respect to magnification, resolution, image quality, applications); Fiber Optics including	12

	Introduction, Optical fiber as a dielectric wave guide-total internal reflection, Numerical aperture and various fiber parameters, losses associated with optical fibers, step index and graded index fibers, application of optical fibers.	
2	<i>Elastic Properties of materials and Waves and Vibrations</i> covering, Relation between elastic constants, internal bending moment, bending of beams-cantilever, torsion of a cylinder, torsional rigidity; Simple harmonic motion– its expression and differential equation, superposition of two linear SHMs(with same frequency), Lissajous figures; Damped vibration–differential equation and its solution, critical damping, Logarithmic decrement, Analogy with electric circuits; Forced vibration – differential equation, Amplitude and velocity resonance, Sharpness of resonance and Quality factor.	12
3	<i>Sound</i> covering, Definitions: Velocity, frequency, wavelength, intensity, loudness (expression), timber, of sound, reflection of sound, echo; Reverberation, reverberation time, Sabine’s formula, remedies over reverberation; Absorption of sound, absorbent materials; Conditions for good acoustics of a building; Noise, its effects and remedies; Ultrasonics– Production of ultrasonics by Piezo-electric and magnetostriction; Detection of ultrasonics; Engineering applications of Ultrasonics (Non-destructive testing, cavitation, measurement of gauge);Infrasound – Seismography(concept only).	12
4	<i>Measurements and Errors</i> : covering Measurement and, precision, accuracy, certainty, resolution; Errors-types and sources of errors(definitions and examples), Systematic error, Random error, Ambiguity error, Dynamic error, Drift, Noise; Elements of statistics including precision and variance; Propagation of error with example of Wheatstone bridge; Design of instrument/experiment, Specifications including Measurand, Utility of Measurand, Environment of instrument; Accomplishment of design including commercial availability of components, detectors, displays, energy sources etc; Estimation and minimization of errors in the design followed by implementation and testing.	12

Text & Reference Books :

1. Subramaniam&BrijLal, *TextbookofSound*
2. EugeneHecht&A.R.Ganesan(2009),*Optics*,Pearson
3. FrancisA.Jenkins,HarveyE.White,*FundamentalsofOptics*,McGrawHill
4. Optics by Ajoy Ghatak
5. A text book of Optics by Subrahmanyam & Brij Lal
6. General properties of matter by DS Mathur
7. Books with titles-Engineering Physics

COURSE CODE : EE1C02
COURSE TITLE : BASIC ELECTRICAL ENGINEERING LABORATORY
UNIVERSITY : DIBRUGARH UNIVERSITY
SEMESTER : FIRST SEMISTER
CREDIT : 1
L:T:P : 0:0:2

1. End sem. Examination for this course will carry 50 marks

Experiments	List of experiments
1	To measure the armature and field resistance of a DC machine.
2	To calibrate a test (moving iron) ammeter and a (dynamometer) Wattmeter with respect to standard (DC PMMC) ammeter and voltmeters.
3	Verification of circuit theorems – Thevenin’s and superposition theorems (with DC sources only).
4	Measurement of current, voltage and power in R-L-C series circuit excited by single phase) AC supply.
5	Open circuit and short circuit tests on a single phase transformer.
6	Connection and starting of a three phase induction motor using direct on line (DOL) or star – delta starter.
7	Connection and measurement of power consumption of a fluorescent lamp and voltage – current characteristics of incandescent lamps.
8	Determination of open circuit characteristics (OCC) of a DC generator.
9	Two wattmeter method of measuring power in three phase circuit (resistive load only)

COURSE CODE : EE1C01
COURSE TITLE : BASIC ELECTRICAL ENGINEERING
UNIVERSITY : DIBRUGARH UNIVERSITY
SEMESTER : FIRST SEMESTER
CREDIT : 04
L:T:P : 3:1:0
End sem. Examination for this course will carry 100 marks

Module	Details of module	No. of Lectures
1	D.C Networks: Definition of active, passive, linear, non-linear circuit elements and network; Kirchoff’s laws; Node and mesh analysis; Voltage and current sources; Network Theorems: Superposition, Thevenin’s, Norton’s and Maximum power transfer.	10
2	Single Phase A.C Circuits: Waveforms of alternating voltage & current; Instantaneous, average and R.M.S. values; Form factor and peak factor; Forms of representation of alternating quantities; Concept of phasor and phasor diagrams; Concept of lead & lag; Reactance and impedances; A.C. circuits: resistive, inductive, R-L, R-C and R-L-C series, parallel and series-parallel combinations; Impedance and admittance triangle; Active and reactive power and power factor.	10
3	Magnetic Circuits: Definitions of mmf, flux density and reluctance; Comparison between electric and magnetic circuits; Series, parallel and seriesparallel circuits and their solutions; Energy stored in a magnetic field; Hysteresis and eddy current losses; Magnetically coupled circuits; Self inductance, mutual inductance and coupling coefficient; Analysis of coupled circuits; Dot-rule and equivalent conductively coupled forms of magnetically coupled circuits.	6
4	Three-Phase Circuits: Concept of three-phase A.C; Phase and line values in star and delta connections; Solutions of simple 3-phase balanced circuits with	6

	resistive and reactive loads; 3-phase power; Phase sequence.	
5	Instruments: Classification of instruments; Essentials of indicating type of instruments: deflecting torque, controlling torque and damping torque; Types of indicating instruments; MC and MI type ammeters and voltmeters; Extension of range using shunt and multipliers; Errors and compensations.	6
6	Basics of Electrical Installations: Domestic wiring, Types of cables (names only); Types of wiring; Circuit layouts: single-phase A.C. mains to DB; 3-phase connections; Accessories: main switch, ceiling rose, fuse, MCB etc; Testing of wiring installation; The megger; Earthing: purpose and methods; Lamps: fluorescent tube and its connection and operation; Indian Electricity Rules regarding electrical installation.	7
Text Books:		
1. A Text Book of Electrical Technology Vol I – B. L. Theraja, A. K. Theraja (S. Chand & Co.)		
2. Engineering Circuit Analysis 6th Ed - William H. Hayt, Jr., Jack E. Kemmerly, Steven M. Durbin (McGraw-Hill, 2002).		
3. Basic Electrical Technology - N. K. De, G. D. Ray and T. K. Bhattacharya (IIT Kharagpur)		

COURSE CODE : HS1C02
COURSE TITLE : BUSINESS COMMUNICATION
UNIVERSITY : DIBRUGARH UNIVERSITY
SEMESTER : FIRST SEMESTER
CREDIT : 02
L:T:P : 2:0:0

End sem. Examination for this course will carry 50 marks

Module	Details of module	No. of Lectures
1	Business Communication covering, Role of communication in information age; communication in a technical organization; concept and meaning of communication; process of communication; forms of communication; mass communication; Barriers to the process of communication; effective communication	5
2	Style and organization in technical communication covering, Listening, speaking, reading and writing as skills; Objectivity, clarity, precision as defining features of technical communication; Principles of effective writings; Various types of business writing: Language and formats of various types of letters, developing outlines, key expressions, article reviews.	5
3	Professional speaking and Advanced Techniques in Technical Communication covering Elements of effective presentation; Connecting with audience during presentation; Planning and preparation a model presentation. Power-point presentation; Seminar Preparation; Professional interaction.	5

Text/Reference books:

1. Fred Luthans, *Organizational Behaviour*, McGraw Hill
2. Lesikar and petit, *Report writing for Business*
3. M. Ashraf Rizvi, *Effective Technical Communication*, McGraw Hill
4. Wallace and masters, *Personal Development for Life and Work*, Thomson Learning

5. Hartman Lemay, *Presentation Success*, Thomson Learning
6. Malcolm Goodale, *Professional Presentations*
7. Farhathullah, T. M. *Communication skills for Technical Students*
8. Michael Muckian, John Woods, *The Business letters Handbook*
9. Herta A. Murphy, *Effective Business Communication*
10. *MLA Handbook for Writers of Research Papers*

COURSE CODE : BS 105
COURSE TITLE : ENGINEERING CHEMISTRY LABORATORY I
UNIVERSITY : DIBRUGARH UNIVERSITY
SEMESTER : FIRST SEMESTER
L:T:P : 0:0:2
CREDIT : 01

End sem. Examination for this course will carry 50 marks

Experiments	List of experiments	Contact hrs
1	Determination of total hardness of water by edta method	12
2	Determination of acidity / alkalinity of water sample.	
3	Determination of available chlorine in bleaching powder.	
4	Determination of percentage of copper in brass.	
5	Estimation of fe ₂ volumetrically.	
6	Qualitative detection of constituents of any two alloys: --- brass, bronze, nichrome, German silver and gun metal, type metal , monel metal.	

COURSE CODE : CH1C01
COURSE TITLE : ENGINEERING CHEMISTRY I
UNIVERSITY : DIBRUGARH UNIVERSITY
SEMESTER : FIRST SEMESTER
CREDIT : 04
L:T:P : 3:1:0

End sem. Examination for this course will carry 100 marks

Module	Details of module	No. of Lectures
1	Water covering Types of hardness, units. Determination of hardness by EDTA method. Softening methods and numerical problems based on these methods, membrane based processes. Problems with boiler feed water and its treatments. Specifications of drinking water (BIS and who standards). Chlorination of water , sources and quality of drinking water .concepts of water harvesting , storage and recycling .toxicity of water , sources of water pollutants . Water pollution from analytical laboratories in schools, colleges and universities. Measures for minimization and recycling of laboratory waste water.	10
2	Polymers and composites covering basics of polymer chemistry , molecular weight molecular shape , crystallinity, glass transition temperature and	10

	melting point, visco-elasticity , structure property relationship . Methods of polymerization , thermoplastics and thermo – sets , copolymerization , elastomers - structure , applications , curing techniques. Advanced polymeric materials; conducting polymers, liquid crystal properties. Synthesis , properties and uses of pe, pvc, pmma, formaldehyde resin , melamine – formaldehyde resin , adhesives and their adhesive mechanism. Composites – basics of composites, composition and characteristic properties of composites. Types of composites – particle, fiber, reinforced – structural and their applications.	
3	Surfactants and lubricants covering Surface active agents, methods of preparation of soaps. Cleaning mechanism, limitations of soap as cleaning agents. Types and advantages of detergents; critical miceller concentration, hydrophilic and hydrophobic interaction. Fricoohesty of surfactant solutions, hlb values . Lubricants types of lubricants and mechanism of lubrications. Physical and chemical properties of lubricants,	06
4	Biotechnology covering Significance and application of biotechnology, bioreactors. Biotechnology processes; fermentation, production of ethanol. Brief idea of vitamins, bio fuels, biosensors, bio -fertilizers, bio- surfactants. Application of biochips, inter – molecular multiple force theory (immft) of bio surfactants.	06
5	Green chemistry covering Introduction, significance, principles of green chemistry. R4m4 (reduce , reuse , recycle , redesign , multipurpose , multidimensional , multitasking , multi -tracking) models with special reference of survismeter , econoburette Concept of molecular and atomic economy and its use in green chemistry. Brief idea of alternative solvents-- water , ionic --liquids , supercritical fluid system (carbon di-oxide). Advances and applications of green chemistry. (few examples.)	06
6	Instrumental techniques covering Fundamentals of spectroscopy, principles and applications of uv – visible spectroscopy. Application of ir ,aas , mass , nmr , spectroscopy. Principle and applications of chromatographic techniques , including tlc, column , gas , hplc ,	07

COURSE CODE : CE1C01
COURSE TITLE : ENGINEERING GRAPHICS
UNIVERSITY : DIBRUGARH UNIVERSITY
SEMESTER : FIRST SEMESTER
CREDIT : 04
L:T:P : 1:3:0

End sem. Examination for this course will carry 100 marks

Module	Details of module	No. of Lectures
1	<i>Introduction to Engineering Drawing</i> <ol style="list-style-type: none"> Principles of Engineering Graphics and their significance, usage of Drawing instruments. Lines and Lettering : Different types of line, Single stroke letter – Vertical and inclined capital and small letter Scales: Introduction, Reducing and enlarging scales, representative fraction, types of scale – plain scale, diagonal scale, comparative scale, venier scale, chord scale. Curves: Conic sections – Ellipse, parabola, hyperbola,different methods of construction of conic sections, tangents and normal to conics. cycloid curves – cycloid, trochoid, epicycloids, hypocycloid. Normal and tangents to cycloid curves. Involutess and Archimedean spiral, normal and tangents to involutes and 	13

	Archimedean spiral	
2	<p><i>Orthographic Projections</i></p> <p>i. Principles of Orthographic Projections- Conventions</p> <p>ii. Projection of points : Introduction of projection, quadrants, 1st , 2nd , 3rd and 4th angle projection of points.</p> <p>iii. Projection of lines (First angle only) : Line parallel to one or both planes, line perpendicular to a plane, line inclined to one plane and parallel to other, line inclined to both plane. traces of lines</p> <p>iv. Projections of planes (First angle only): Plane perpendicular to one plane and parallel to other, plane perpendicular to both plane, plane inclined to one plane and perpendicular to other, oblique plane.</p> <p>v. Projection of solids (First angle only) : Axis perpendicular to one plane and parallel to other, axis parallel to both plane, axis inclined to one plane and parallel to other, axis inclined to both plane.</p>	15
3	<p><i>Sections and Sectional Views of Right Angular Solids</i></p> <p>Section of solids : Section plane parallel to one plane and perpendicular to other, section plane inclined to one plane and perpendicular to other.</p>	4
4	<p><i>Isometric Projections</i></p> <p>Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions.</p>	4

Text/Reference Books:

1. Bhat, N.D.& M. Panchal (2008), *Engineering Drawing*, Charotar Publishing House
2. Shah, M.B. & B.C. Rana (2008), *Engineering Drawing and Computer Graphics*, Pearson Education
3. Dhawan, R.K. (2007), *A Text Book of Engineering Drawing*, S. Chand Publications
4. Narayana, K.L. & P Kannaiah (2008), *Text book on Engineering Drawing*, Scitech Publishers.

COURSE CODE : MA1C01
COURSE TITLE : MATHEMATICS I
(ELEMENTARY MATHEMATICS FOR ENGINEERS)
UNIVERSITY : DIBRUGARH UNIVERSITY
SEMESTER : FIRST SEMESTER
CREDIT : 04
L:T:P : 3:1:0

End sem. Examination for this course will carry 100 marks

Module	Details of module	No. of Lectures
1	Differential and Integral Calculus - Successive differentiation; Standard forms, Leibnitz Theorem , Mean value Theorems of Lagrange's and Cauchy's; Expansion of functions by Taylor's Series, Indeterminate forms ; L'Hospital's rule, Tangents and Normals, Sub-tangents and subnormals. Curvature and radius of Curvature in Cartesian and Polar co-ordinates. Asymptotes and tracing of simple curves. Reduction formulas, Areas and lengths of plane curves, Volumes and surface areas of solids of revolution.	24
2	Differential Equations - Ordinary differential equations of first order	12

	and first degree, Exact equations, Equations of first order but not first degree; Equations solvable for “p”. Equations solvable for “y” and for “x”. Clairaut’s form. Linear equations with constant coefficients. Homogeneous linear equations. Simultaneous differential equations, Some Engineering applications (mechanical and electrical circuits).	
3	Linear Algebra - Some special types of matrices such as orthogonal matrices, complex matrices, hermitian and skew-hermitian matrices, unitary, nilpotent and involutory matrices. rank of a matrix, elementary transformation and equivalent matrices, triangular form, normal form, inverse by elementary transformation, Vector spaces and subspaces, linear dependence, basis and dimensions, consistency and solutions of linear equations (non-homogeneous and homogeneous). Characteristic equations, Eigen values, Eigen vectors and their properties, Cayley-Hamilton’s theorem, Eigen values of hermitian, skew-hermitian and orthogonal matrices.	12

Text Books/References

- 1) Differential Calculus : By Shanti Narayan (S.Chand & Co.)
- 2) Integral Calculus : -do-
- 3) Differential Calculus : By Das & Mukherjee (U.N.Dhar&Co.)
- 4) Integral Calculus : -do-
- 6) A Text Book Of Engg.Mathematics: By N.P Bali &Dr. Manish Goyal(Lakshmi Publication)
- 7) A Text Book Of Matrices : By Shanti Narayan (S.Chand & Co.)