



ASSAM SCIENCE AND TECHNOLOGY UNIVERSITY

Guwahati

Course Structure and Syllabus

B.Tech 1st Semester

Semester I/ B.TECH

Sl. No.	Sub-Code	Subject	Hours per Week			Credits
			L	T	P	C
Theory						
1	PH171101	Engineering Physics-I	2	1	0	2.5
2	CH171102	Engineering Chemistry-I	2	1	0	2.5
3	MA171103	Engineering Mathematics-I	3	2	0	4
4	ME171104	Engineering Mechanics	3	2	0	4
5	CS171105	Introduction to Computing	2	0	0	2
6	HS171106	Technical Communication	2	0	0	2
7	CE171107	Engineering Graphics-I	1	0	0	1
Practical						
8	PH171111	Engineering Physics-I Lab	0	0	2	1
9	CH171112	Engineering Chemistry-I Lab	0	0	2	1
10	ME171114	Engineering Mechanics Lab	0	0	2	1
11	CS171115	Introduction to Computing Lab	0	0	2	1
12	CE171117	Engineering Graphics-I Lab	0	0	2	1
TOTAL			15	6	10	23
Total Contact Hours: 31						
Total Credits: 23						

Course Title : ENGINEERING PHYSICS-I
Course Code: PH171101
L-T-P-C: 2-1-0-2.5

Class Hours/week	3
Expected weeks	12
Total hrs. of classes	36

MODULE	TOPIC	COURSE CONTENT	HOURS
1	GENERAL PHYSICS	Hooke's law, Types of elasticity, Equivalence of a shear to a compression and an extension at right angles to each other, Energy of a strained body, Relation connecting the elastic constants, Poisson's ratio and its limits, Bending of beams, Expression for bending moment, Cantilever.	7
2	ACOUSTICS AND ULTRASONICS	Weber Fechner law, Units of Loudness-Decibel, Phone, Sone, Absorption coefficient, Reverberation, Reverberation time, Sabine's formula for reverberation time (Derivation not required), Factors affecting acoustics of buildings and their remedies, Design of a Good Acoustical Building. Properties of ultrasonic waves, Ultrasonic production (Magnetostriction and Piezoelectric method), Applications of Ultrasonics.	9
3	DIELECTRICS	Types of dielectrics, dielectric polarization and its various types, Dielectric loss, Expression for local field inside a dielectric, Claussius-Mossotti equation, application of dielectric materials.	5
4	MAGNETIC PROPERTIES OF SOLIDS	Classification of Magnetic Materials-Diamagnetism, Paramagnetism, Ferromagnetism, Domain theory of Ferromagnetism, Hysteresis Loop, Hysteresis Loss, Expression for Hysteresis Loss in B-H Loop, Soft and Hard Magnetic Materials, Antiferromagnetism and Ferrimagnetism, Applications of Magnetic Materials in different fields	5
5	INTRODUCTION TO QUANTUM MECHANICS AND NANOTECHNOLOGY	De-Broglie hypothesis, matter waves, concept of group velocity and phase velocity, Davisson and Germer Experiment, Heisenberg's Uncertainty principle and its applications. Introduction to nanomaterials, Properties of nanomaterials, Potential well and Quantum	10

		Confinement (Qualitative aspects), types of nanomaterials, applications of nanomaterials	
TOTAL			36

Text/Reference Books:

1. Applied Physics for Engineers, Neeraj Mehta, PHI Learning Private Limited, New Delhi
2. A Text Book of Applied Physics, S. Mani Naidu, Pearson, Dorling Lindersley (India) Pvt. Ltd.
3. Concepts of Modern Physics, Arthur Beiser, Shobhot Mahajan, S. Rai Choudhury, McGraw Hill Education (India) Private Limited, New Delhi
4. Elements of Properties of Matter, D.S. Mathur. Publisher: S. Chand.

Course Title : ENGINEERING CHEMISTRY-I
Course Code: CH171102
L-T-P-C: 2-1-0-2.5

Class Hours/week	3
Expected weeks	12
Total hrs. of classes	36

MODULE	TOPIC	COURSE CONTENT	HOURS
1	WAVE MECHANICS	Wave property of matter, Schrodinger's wave equation, Hamiltonian operator, Eigen function, Eigen value, Particle in an one dimensional box and quantization of energy, Three dimensional potential box and degeneracy of energy states.	6
2	THERMODYNAMICS OF CHEMICAL PROCESS	Entropy and randomness, Second law of thermodynamics, Absolute entropy, Helmholtz free energy, Gibb's free energy and chemical potential, Dependence of Gibb's function on Temperature, Thermodynamic equilibrium constant.	9
3	ELECTROCHEMISTRY AND CORROSION	Electrode and electrode potential, Various types of electrodes, Electrolytic cell and Galvanic cell, Cell emf, Concentration cell, lead storage battery, dry battery, Ni – Cd battery, Lithium ion battery, Solid state battery and fuel cells; Corrosion – definition, causes, effects, theories (Chemical, electrochemical), types of corrosion (dry, wet, atmospheric, pitting, waterline & microbiological), passivity, protection against corrosion.	9
4	CHEMISTRY OF ENGINEERING MATERIALS – I	(a) Nanomaterials : Introduction and differences from other materials, Properties of nanomaterials, 1D, 2D and 3D nanomaterials, Preparation of nanomaterials (top down and bottom up approach), application of nanomaterials, Carbon nanotube, fullerene. (b) Composite materials : Composite and their constituents, Classification – particle reinforced composites, fibre reinforced composites, properties, Metal, Ceramic and Polymer matrix composites. (c) Lubricants : Mechanism of lubrication, solid & liquid lubricants, their properties, grease.	6

5	MOLECULAR SPECTROSCOPY	Fundamentals of Microwave, IR and UV – Visible spectroscopy, Basic concept of spectroscopy, Atomic absorption spectroscopy, nuclear magnetic resonance spectroscopy and flame photometry, Determination of molecular structure.	6
TOTAL			36

Text/Reference Books:

1. Shashi Chawla, *A Text Book of Engineering Chemistry*, Dhanpat Rai Publishing Co.
2. Jain and Jain, *Engineering Chemistry*, Dhanpat Rai Publishing Co.
3. Atkin, *Physical Chemistry*, Oxford.
4. J. D. Lee, *Concise Inorganic Chemistry*, Blackwell Science.
5. C. N. Banwell, E. M. McCash, *Fundamentals of Molecular Spectroscopy*, Tata McGraw – Hill.
6. P. S. Kalsi, *Spectroscopy of Organic Compounds*, Wiley Eastern.
7. Puri, Sharma, Pathania, *Principles of Physical Chemistry*, Shoban Lal Nagin Chand & Co.
8. A. S. Negi, S. C. Anand, *A Text book of Physical Chemistry*, New Age International (P) Ltd.

Course Title : ENGINEERING MATHEMATICS-I
 Course Code: MA171103
 L-T-P-C: 3-2-0-4

Class Hours/week	4
Expected weeks	12
Total hrs. of classes	48

MODULE	TOPIC	COURSE CONTENT	HOURS
1	DIFFERENTIAL CALCULUS	<p>Prerequisites: Derivative of implicit and explicit functions</p> <p>Single variable calculus: Successive Differentiation-Leibnitz theorem, Expansion of functions: Taylor's and Maclaurin's Series.</p> <p>Multi variable calculus: Partial Derivatives, Euler's theorem on homogeneous function (Statement & Application), Total derivatives.</p> <p>Curve tracing: Concept of curve tracing of some important curves (Cycloid, Astroid, Hypocycloid, Lemniscate, Folium of Descartes, Cardioide, Witch of Agnesi)</p> <p>Jacobian: Jacobians and their applications (for two and three variables), Errors and Approximations.</p> <p>Maxima and Minima: Maxima and Minima of Functions of two variables, Lagrange's method of undetermined multipliers.</p>	16
2	INTEGRAL CALCULUS	<p>Prerequisites: Properties of definite integral</p> <p>Single variable calculus: Reduction formula $\int_0^{\frac{\pi}{2}} \sin^n x dx$, $\int_0^{\frac{\pi}{2}} \cos^n x dx$, $\int_0^{\frac{\pi}{2}} \sin^m x \cos^n x dx$, $\int_0^{\frac{\pi}{2}} \tan^n x dx$, $\int_0^{\frac{\pi}{2}} \sec^n x dx$, Areas under Plane curves (Cartesian & Polar),</p> <p>Multi variable calculus: Differentiation under integral sign (Leibniz's rule), Multiple integrals. Areas and Volumes by double and triple integrals, Beta and Gamma functions.</p>	20
3	DIFFERENTIAL EQUATIONS	<p>First order first degree equation: Exact differential equation, reducible to exact differential equation.</p> <p>First order higher degree equation: Solvable for p, x, y, Clairaut's equation.</p> <p>Higher order homogenous linear differential equation: With constant coefficients, Homogeneous (Cauchy-Euler) Equation.</p>	12

		Higher order Non homogenous linear differential equation: Differential operator methods, Variation of parameter method, Method of undetermined coefficients. Solution of Simultaneous Equations.	
TOTAL			48

Text/Reference Books:

1. Advanced Engineering Mathematics by Erwin Kreyszig (Wiley Eastern Ltd.).
2. Higher Engineering Mathematics by B. S. Grewal (Khanna Publication, Delhi).
3. Engineering Mathematics, Wylie C.R. & Barrett L.C. (McGraw-Hill, Inc.)
4. An Introduction to Differential Equations, R.K. Ghosh and K.C.Maity (New Central Book Agency)
5. Engineering Mathematics (part I and part II), Babu Ram (Pearson).
- 6.A Textbook of Engineering Mathematics –I by U.N.Mishra, A.Devi, B.Sarma and R.Kalita (Mani Manik Prakash, Guwahati).

Course Title : ENGINEERING MECHANICS

Course Code: ME171104

L-T-P-C: 3-2-0-4

Class Hours/week	4
Expected weeks	12
Total hrs. of classes	48

MODULE	TOPIC	COURSE CONTENT	HOURS
1	FORCES & MOMENTS	Force ; Classification of forces; Co-planar concurrent & Co-planar parallel forces; Free body diagram ; Resultant of forces ; Parallelogram , Triangle & Polygon Laws of forces : Resolution of forces ; Lami's Theorem; Varignon's theorem : Principle of Moments ; General conditions of equilibrium; Moment and Couple; Simple problems	10
2	CENTRE OF GRAVITY AND MOMENT OF INERTIA	Centroid and Centre of gravity of axes and composite areas; Determination of C.G. of plane figures and areas. Area moment of inertia and mass moment of inertia for plane figures and bodies. Simple problems	8
3	FRICTION	Introduction to dry friction ; Laws of friction ; Friction in inclined planes, wedges and ladders; Simple problem	8
4	SIMPLE LIFTING MACHINES	Definition of machine, Lifting Machines-Velocity ratio, Mechanical advantage and Efficiency of a Machine: Lever, Wheel & Axle, Pulley. Laws of machines, Reversibility of machine; Simple problems.	6
5	KINETICS OF RIGID BODIES	General plane motion –Velocity and Acceleration, D'Alembert's Principle and dynamic equilibrium, Work and energy, Impulse and momentum. Simple problems.	8
6	TRUSSES AND FRAMES	Classification and Analysis of Trusses & Frames; Methods of Joints and Graphical methods. Simple problems.	8
TOTAL			48

Text/Reference Books:

- 1) Engineering Mechanics – S. Timoshenko & D.H. Young – Mcgraw Hill Int.
- 2) Engineering Mechanics Statics and Dynamics– A.K. Tayal- Umesh Publications
- 3) Engineering Mechanics – D. S. Kumar – S. K. Kataria & Sons.
- 4) Engineering Mechanics – Statics and Dynamics- Irving H. Shames-Prentice Hall of India
- 5) Engineering Mechanics: Statics and Dynamics (12thEdition)-Russell C. Hibbeler - Prentice Hall.
- 6) Engineering Mechanics- B. Bhattacharya- Oxford University Press
- 7) Engineering Mechanics – R. K. Bansal – Laxmi Publication (P) Ltd.
- 8) Engineering Mechanics - K L Kumar – McGraw Hill Publishing Co

Course Title : INTRODUCTION TO COMPUTING

Course Code: CS171105

L-T-P-C: 2-0-0-2

Class Hours/week	2
Expected weeks	12
Total hrs. of classes	24

MODULE	TOPIC	COURSE CONTENT	HOURS
1	INTRODUCTION	Definition of Algorithm and Computer Programming. Use of Flow Charts, Symbols and their uses.	2
2	OVERVIEW OF C LANGUAGE	C keywords, data types, identifiers, constants, operators. Header and library files for basic input and output operations.	4
3	EXPRESSIONS /STATEMENTS USING OPERATORS IN C	Operators: arithmetic, assignment, relational, logical, increment and decrement, conditional, bitwise.	4
4	CONDITIONAL CONTROL STATEMENTS	Decision making and branching: if statement, if...else statements, nesting if...else statements, switch statement. Decision making and iteration: while statement, do statement, for statement, break statement, continue statement.	5
5	ARRAYS	Introduction to integer/float array, operations on integer/float array, introduction to string, operations on strings. One dimensional array, two dimensional array.	5
6	FUNCTIONS	Function declaration, function definition, function calling, formal arguments, actual arguments, call by value, introduction to pointers, call by reference.	4
TOTAL			24

Text/Reference Books:

1. Programming in ANSI C (McGraw-Hill) ----- E Balagurusamy
2. Let Us C (BPB publication) ----- Yashavant Kanetkar
3. Programming With ANSI and Turbo C(Pearson Publication) ----- Ashok N. Kamthane
4. Mastering C (Tata McGraw Hill) ----- Venugopal and Prasad
5. Computer Fundamentals and Programming in C(Oxford) ----- Reema Thareja

Course Title : TECHNICAL COMMUNICATION

Course Code: HS171106

L-T-P-C: 2-0-0-2

Class Hours/week	2
Expected weeks	12
Total hrs. of classes	24

MODULE	TOPIC	COURSE CONTENT	HOURS
1	BASICS OF COMMUNICATION	The process of Communication-introduction, basic elements (sender, message, channels, receiver, feedback), types, barriers Principles of effective communication Importance of Communication Skills in today's competitive world.	3
2	TECHNIQUES OF ORAL COMMUNICATION	Sounds of English- Pronunciation (Vowel sound, Consonant sound) Stress and Intonation.	4
3	GRAMMAR AND VOCABULARY	Tense Active and passive construction Direct and indirect speech Conditionals Transformation of sentences Common mistakes in grammar Confusables Word formation (prefix, suffix) Synonyms and antonyms.	4
4	ACADEMIC WRITING	Paragraph writing- stages of writing a paragraph (pre writing, drafting, editing), topic sentence, Use of semantic markers/ linkers for coherence and cohesion Précis writing.	4
5	PROFESSIONAL COMMUNICATION	Oral presentation Business letters- format and language Memorandum Emails CV and Resume.	5
6	TECHNICAL REPORT WRITING	Introduction- importance, characteristics, types Format and language of a technical report Structure of a technical report Planning the report-(Purpose, audience recognition, data collection) Drafting the report-(writing an abstract, compilation of Graphic materials in a technical report, writing reference and bibliography)	4
TOTAL			24

Text/ Reference books:

1. Effective technical communication, M Ashraf Rizvi, McGraw Hill Higher Education, ISBN13: 978-0-07-059952-9, ISBN 10: 0-07-059952-1
2. Technical communication: principles and practice, Meenakshi Raman and Sangeeta Sharma, Oxford University Press, ISBN 0-19-945749-2
3. Writing Academic English Level 1, Alice Oshima and Ann Hogue, The Longman Pearson, ISBN 10: 0131523597, ISBN 13: 9780131523593
4. High school English grammar and composition, Wren and Martin, S Chand
5. Cambridge English Pronouncing Dictionary, Daniel Jones, Cambridge University Press, ISBN 978-1-107-66920-8
6. Common mistakes in English, T.J Fitikides, Pearson

PRACTICALS

Course Title : ENGINEERING PHYSICS-I LAB

Course Code: PH171111

L-T-P-C: 0-0-2-1

Expected No. of weeks : 12 (approx)

EXPERIMENT NO.	AIM OF THE EXPERIMENT	HOURS
1	Determination of Rigidity of Modulus of the material of the given rod by Statical method.	4
2	Determination of Moment of Inertia of a given solid about its own axis by using M.I. Table	2
3	Determination of Resistance of a Galvanometer using Post Office Box.	2
4	Determination of ratio of E.M.F of two cells using Potentiometer.	2
5	To determine the internal resistance of a cell with the help of a potentiometer.	2
6	To convert a given galvanometer into a voltmeter of given range and then calibrate it with the help of an ammeter and standard resistance.	2
7	Determination of the focal length of a convex mirror with the help of an auxiliary lens.	2
8	To determine the grating element and number of lines per unit length of a given grating by spectrometer.	4
9	Determination of coefficient of Viscosity of water by Capillary Flow Method.	2
10	Revision of experiments and Internal Viva	2
TOTAL		24

Text/Reference Books:

1. A Text Book of Advanced Practical Physics, Samit Kumar Ghosh, New Central Book Agency (P) Ltd, Kolkata
2. A Text Book on Practical Physics, K. G. Mazumdar and B. Ghosh, Sreedhar Publishers, Kolkata

Course Title : ENGINEERING CHEMISTRY-I LAB

Course Code: CHI71112

L-T-P-C: 0-0-2-1

Expected No. of weeks : 12 (approx)

EXPERIMENT NO.	AIM OF THE EXPERIMENT	HOURS
1	Detection of elements (N, Cl, Br, I & S) in an organic compound.	2
2	Estimation of hardness of water by a standard solution of EDTA.	2
3	To determine λ_{\max} (wavelength of maximum absorption) of a solution of KMnO_4 using a spectrophotometer.	2
4	Verify Beer's Law and apply it to find the concentration of a given unknown solution.	2
5	To estimate the total quantity of Fe^{2+} in a given solution by titrating against standard KMnO_4 solution.	2
TOTAL		10

Text/Reference Books:

1. Dr. S. Rattan, Experiments in Applied Chemistry, S. K. Kataria & Sons.
2. V. K. Ahluwalia, S. Dhingra, *Comprehensive Practical Organic Chemistry*, University Press.

Course Title : ENGINEERING MECHANICS LAB

Course Code: ME171114

L-T-P-C: 0-0-2-1

Expected No. of weeks : 12 (approx)

EXPERIMENT NO.	AIM OF THE EXPERIMENT	HOURS
1	Verification of Triangular and Polygon Law of Forces	4
2	Determination of CG of a circular and rectangular plate	4
3	Determination of coefficient of friction between two surfaces	2
4	Determination of moment of inertia of a flywheel	2
5	Verification of law of Parallel Forces	2
6	Determination of velocity ratio, mechanical advantage and efficiency of a simple lever	2
TOTAL		16

Course Title : INTRODUCTION TO COMPUTING LAB

Course Code: CS171115

L-T-P-C: 0-0-2-1

Expected No. of weeks : 12 (approx)

EXPERIMENT NO.	AIM OF THE EXPERIMENT	HOURS
1	a) W.A.P. to display a string of alphabets ex: Hello World. b) W.A.P. to take two values using standard input function and find: i) Addition of two values. ii) Subtraction of a value from another value. iii) Multiplication of two values. iv) Division between two values. v) Modulo division between two values. Display the result using standard output function.	2
2	<u>Use of relational and logical operators and if...else statement</u> a) W.A.P. to take three values using standard input function and find the smallest of the three values. b) W.A.P. to take three values using standard input function and find the greatest of the three values. Display the result using standard output function.	2
3	<u>Use of bitwise operators</u> a) W.A.P to take two values using standard input function and find the following: i) Bitwise OR between the values. ii) Bitwise AND between the values. iii) Bitwise exclusive OR between values. iv) Left shift of one value by other value. v) Right shift of one value by other value. Display the result using standard output function	2
4	<u>Use of Iterations(for/While/do-while)</u> a) W.A.P. to display Fibonacci series of 15 terms using standard output function. b) W.A.P. to sum of ten values taken using standard input function and display the result using standard output function. c) W.A.P. to find factorial of a number and display.	2
5	<u>Use of Array(single dimension)</u> a) W.A.P. to input ten integer values to an array of type integer and display the values.	2

	b) W.A.P. to input ten integer values to an array and find the smallest of the ten numbers and display.	
6	<p style="text-align: center;"><u>Use of Matrix(Two Dimensional array)</u></p> <p>a) W.A.P. to input value to two matrices of size 3X3 and calculate the sum of the two matrices to another 3X3 matrix and display.</p> <p>b) W.A.P. to do matrix multiplication of two matrices and display the resultant matrix.</p>	2
7	<p style="text-align: center;"><u>Use of strings</u></p> <p>a) W.A.P to input and display a string.</p> <p>b) W.A.P. to concatenated two strings taken as input using standard input function and display.</p> <p>c) W.A.P. to find if a string is palindrome.</p> <p>d) W.A.P. to reverse a string.</p>	2
8	<p style="text-align: center;"><u>Use of Function</u></p> <p>a) W.A.P. to find:</p> <p style="margin-left: 20px;">i) Sum of two numbers.</p> <p style="margin-left: 20px;">ii) Subtraction of a value from another value.</p> <p style="margin-left: 20px;">iii) Multiplication of two values.</p> <p style="margin-left: 20px;">iv) Division between two values.</p> <p style="margin-left: 20px;">v) Modulo division between two values.</p> <p style="margin-left: 40px;">All Using five user-defined functions with call by value.</p> <p>b) W.A.P. to calculate factorial of a number using user defined function.</p> <p>c) W.A.P. to calculate square-root of a number (floating-point value) using user defined function.</p>	2
TOTAL		16

**Course Title : ENGINEERING GRAPHICS-I/
ENGINEERING GRAPHICS-I Lab**

Course Code: CE171107/CE171117

L-T-P-C: 1-0-0-1/0-0-2-1

Class Hours/week	2
Expected weeks	12
Total hrs. of classes	24

MODULE	TOPIC	COURSE CONTENT	HOURS
1	INTRODUCTION	Drawing Instruments, Handling & Use	2
2	LINES, LETTERING AND DIMENSIONING	Types, Thickness, Shades, single stroke letters, general rules of dimensioning.	4
3	SCALES	Representative fraction, Types of scales-plain scales, Diagonal scales, Comparative scale, vernier Scale, Scale of Chords.	4
4	CURVES USED IN ENGINEERING PRACTICALS	Conic sections- Ellipse, Parabola, Hyperbola, Tangent and normal to conics, Cycloid, Trochoid.	4
5	ORTHOGRAPHIC PROJECTION	Planes of projection, four quadrants, first angle projection, third angle projection.	2
		i. Projection of Points	
		ii. Projection of Straight Line: Introduction, Inclined to one plane and parallel to the other, Line inclined to both the Planes, Line contained by a plane perpendicular to both the reference planes, true length of a straight line and its inclinations with to reference plane.	4
		iii. Projections of planes: Traces of planes, projection of planes inclined to one reference plane and perpendicular to other, projection of oblique planes.	4
TOTAL			24

Text/Reference Books:

1. Engineering Graphics Degree, K.C John, Published by PHI Learning Limited, ISBN-978-81-203-3788-6.
2. Engineering Drawing, N.D. Bhatt, charotar Publishing House Pvt. Ltd. ,ISBN: 978-93-80358-17-8.
3. Engineering Drawing with an introduction to AutoCAD, Dhananjay A Jolhe, Tata McGraw Hill Education Pvt. Ltd., ISBN: 978-0-07-064837-1.
