

Branch: Common to all branches

Year: First year

Semester: First

Sl. No.	Course No.	Subject	Periods			Evaluation Scheme					
			L	T	P	Internal Assessment			ESE	Subject Total	Credit
						TA	CT	Tot			
Theory											
1	PH101	Engg. Physics-I	3	1		30	20	50	100	150	4
2	CY102	Enggg. Chemistry-I	3	1		30	20	50	100	150	4
3	MA103	Mathematics-I	3	1		30	20	50	100	150	4
4	CE104	Mechanics of Solids	3	1		30	20	50	100	150	4
5	HU105	Technical Report Writing	2			15	10	25	50	75	2
6	CS106	Computer Programming	2			15	10	25	50	75	2
Practicals/Drawing/Design											
6	CE107	Engineering Graphics-I	3	1		30	20	50	100	150	4
7	CS106L	Computer Programming lab			2	15	10	25	50	50	1.5
8	ME108	Workshop Practice			3	50	50	100		100	1.5
9	PH101L	Engg. Physics-I Lab			3	10		10	40	50	1.5
10	CY102L	Engg. Chemistry-I Lab			3	10		10	40	50	1.5

Total Marks: 1150

Total Credits: 30

**Assam Engineering College  
BE (proposed) course structure**

**Break up of total marks and weightage**

Semester	Total marks	% weight		Marks Carried over	
		Normal entry	Lateral entry	Normal entry	Lateral entry
First	1150	10%		115	
Second	1150	10%		115	
Third	1100	20%	41%	220	220
Fourth	1100	20%	20%	220	220
Fifth	1150	70%	70%	805	805
Sixth	1150	70%	70%	805	805
Seventh	1100	100%	100%	1100	1200
Eighth	1100	100%	100%	1100	1100
<b>Total cumulative marks</b>				<b>4480</b>	<b>4480</b>

## PH 101: Engineering Physics – I

L T P  
(3 – 1 – 3)

Theory Marks =100  
Sessional Marks = 50  
Laboratory Marks = 50

**I PROPERTIES OF MATTER:** Stress and Strain, 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, Bending of beams, Expression for bending moment, Cantilever

**II GEOMETRICAL AND WAVE OPTICS:** Spherical and Chromatic aberrations, Expression for longitudinal chromatic aberration, Achromatism of thin lens, Interference of light, Types of Interference (division of wavefront and division of amplitude), Interference in thin films and wedge shaped films, Newton's Ring, Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at a single slit, Intensity distribution in the diffraction pattern due to single slit.

**III SPECIAL THEORY OF RELATIVITY:** Postulates of Special Theory of Relativity, Lorentz Transformations, Length Contraction & Time Dilation, Relativity of simultaneity, Twin-paradox, Relativity of Mass.

**IV LCR CIRCUIT IN DC NETWORK:** Helmholtz equation of Growth and Decay of current in L-R circuit, Charging & discharging of a condenser through an inductor, Charging & discharging of a capacitor through L&R.

**V DIELECTRICS AND MAGNETIC MATERIALS:** Polar and Non-polar Materials, Dielectric Constant and Dielectric Susceptibility of a material, Polarizability and Polarization, Different types of Polarization, Expression for local field inside a Dielectric, Clausius–Mossotti Relation, Effect of temperature and frequency on polarization, Dielectric Loss, Applications of Dielectric materials. Classification of Magnetic Materials- Diamagnetism, Paramagnetism, Ferromagnetism, Hysteresis Loop, Hysteresis Loss, Soft and Hard Magnetic Materials.

**VI ELECTROMAGNETIC THEORY:** The Del Operator, Gradient of a Scalar Function, Divergence of a Vector, Curl of a Vector and their Physical Significance, Ampere's Law, Poisson's Equation and Laplace's Equation, Continuity Equation, Inconsistency in Ampere's Law, Displacement Current, Maxwell's Equations (Derivation not required), Physical Significance of Maxwell's Equations, Differences between Conduction Current and Displacement Current.

### **Text Books and Reference Books:**

1. Engineering Physics, Dutta R Joshi, Mc Graw Hill Education (India) Private Limited.
2. Applied Physics for Engineers, Neeraj Mehta, PHI Learning Private Limited, New Delhi.
3. A Textbook of Engineering Physics, Avadhanulu & Kshirsagar, S. Chand & Company Ltd.
4. Theory & Problems of Electromagnetics, J.A. Edminister, SCHAUM'S OUTLINE SERIES.

## FIRST SEMESTER

### CY 102: Engineering Chemistry-I

**Subject:** Engineering Chemistry-I

**Code:** CY 102

**L-T-P-C:** 3-1-0-3/week

**Class hours:** 4 hours/week

**Total no. of classes:** 40(approx)

L: Lectures T:Tutorials P:Practicals C:credits

#### Course content:

##### **Unit I:** Solid State Chemistry (Mark=15)

Structure of crystalline solids, powder X-ray diffraction. Electronic structure of solids · metallic conduction.

Semiconductors – preparation, extrinsic and intrinsic semiconductors, solid electrolytes amorphous solids.

Superconductors: Introduction, types of superconductor, properties, application preparation and structure of 1:2:3 superconductors.

##### **Unit-II:** Electrochemistry (Mark=10)

Introduction, Electrode potential, Measurement of electrode potential, Nernst equation Electrochemical series, Galvanic cells, Free energy, Entropy and Enthalpy of cells, Types of electrodes, Commercial cells and batteries, Fuel Cells. Electro-deposition.

##### **Unit-III:** Corrosion science (Mark=15)

Introduction, consequences of corrosion, types of corrosion, theories of corrosion, factors affecting rate of corrosion, design and selection of materials – control and prevention of corrosion, corrosion inhibitors.

##### **Unit-IV:** Biochemistry and Biotechnology (Mark=15)

Nucleic acids - DNA and RNA - the double helix structure, Genetic code, Chemical basis of heredity.

Enzymes - Classification and catalytic behaviour, enzyme specificity, factors affecting enzyme activity, Co-enzymes: Co-enzymes involved in biological oxidation reduction

Scope and importance of biotechnology, bio-reactors, biotechnological processes, biotechnological applications of enzymes, industrial enzymes, chemical synthesis through biotechnology - production of ethanol, acetic acid and acetone.

**Unit-V: Food Chemistry (Mark=10)**

Chemical constituents of food – carbohydrates, lipids, proteins, vitamins and minerals, chemical and physical properties of food, food preservation, food additives and food safety, unintentional additives, food adulteration. Soft drinks and alcoholic beverages. Analysis of foods and beverages.

**Unit-VI: Polymer Science and Technology (Mark=15)**

Classification, functionality, determination of molecular weights, types of polymerization, polymerization techniques, basics of polymer processing methods, structure-property-application of few commodity polymers (eg. PE, PP, PS etc.). Biopolymers-properties and their applications, conducting polymers, engineering plastics.

**Unit-VII: Environmental Chemistry (Mark=15)**

Introduction, environmental segments, composition of atmosphere, Earth's radiation balance, particles, ions and radicals in the atmosphere, causes of pollution, types of pollution, carbon monoxide and its effects, role of ozone in the atmosphere, global warming

Water pollution: Aquatic environment, classification and sources of water pollution, water quality parameters and standards, measures to control water pollution

Green Chemistry for clean technology: Definition and concept of green chemistry, goals of green chemistry, principles of Green Chemistry and designing a chemical synthesis, examples of green synthesis/reactions, green chemistry in sustainable development

Chemical toxicology: Toxic chemicals in the environment, impact of toxic chemicals, biochemical effects of some metals, bio-warfare agents.

**Unit-VIII: Ionic Equilibrium (Mark=5)**

Dissociation equilibria of weak electrolytes, Ostwald's dilution law, Henderson-Hasselbach equation and calculation of pK values, uses of buffer solution in chemistry and biology. Measurement of electrical conductivity.

**Text Books/Reference books:**

1. Advanced Inorganic Chemistry-Cotton et.al. (John Wiley)
2. Inorganic chemistry-Shriver,Atkins,Langford (ELBS)
- 3.Principles of solid state chemistry-H.V.Keer (New Age International)

4. A textbook of physical chemistry-Negi and Anand (New Age International)
5. Outlines of biochemistry-Cohn and Stumpf
6. Polymer science-Gowariker (New Age International)
7. Introduction to polymers-RJ Young
8. Environmental chemistry-A.K.De
9. Environmental chemistry-C.Baird, W.H.Freeman
10. The elements of physical chemistry-P.W.Atkins(Oxford University press)

ASSAM ENGINEERING COLLEGE  
DEPARTMENT OF CIVIL ENGINEERING  
SYLLABUS

CE 104: Mechanics of Solids

2<sup>nd</sup> Semester

16(MA 104)  
Mathematics – I

Theory Marks - 100  
Pass Marks – 30

Sessional Marks – 50

Time: 3 hours

Unit-1: Differential calculus:

50 marks

Successive derivatives, Leibnitz's theorem.

Expansion of functions (Taylor's and Maclaurin's series with Lagrange's form of remainder for a function of one variable).

Angle of intersection of two curves in Cartesian and polar co-ordinates, Length of tangent, normal, sub-tangent and sub-normal, Derivative of arc length.

Curvature, radius of curvature for Cartesian, polar and parametric equations, circle of curvature, centre of curvature.

Asymptotes: Definition, asymptotes parallel to axes, oblique asymptotes for Cartesian equation

Partial differentiation: Introduction, partial derivatives of 1st & higher orders, Homogeneous function, Euler's theorem on homogeneous function, derivatives of composite functions, total derivatives, Jacobians, Maxima & Minima, Lagrange's method of undetermined multipliers.

Unit-II: Integral calculus:

50 marks

Reduction formulae for indefinite integrals involving power of circular functions of x and product of  $\sin^m x \cos^n x$ .

Deduction of

$$\int_0^{\pi/2} \sin^n x dx, \int_0^{\pi/2} \cos^n x dx, \int_0^{\pi/2} \tan^n x dx, \int_0^{\pi/2} \sec^n x dx, \int_0^{\pi/2} \sin^m x \cos^n x dx$$

Concept of curve tracing of some important curves.

Length of plane curves (Cartesian and polar), Area under plane curves (Cartesian and Polar), volume and surface area of solids of revolution of plane curves

Multiple integrals: Evaluation of double and triple integrals, change of order of integrations, change of variables, area and volume by double and triple integrals, Beta and Gamma functions.

Text/References: -

1. Differential Calculus: B.C. Das & Mukherjee : U. N. Dhur & Sons Pvt Ltd.
2. Integral Calculus: B.C. Das & Mukherjee : U. N. Dhur & Sons Pvt Ltd.
3. A text book of Engineering Mathematics : N.P. Bali and Manish Goyal : Laxmi Publications(P) Ltd.
4. Advance Engineering Mathematics: E. Kreyszig : Willey Eastern Ltd.
5. Higher Engineering Mathematics : B.S. Grewal : Khanna Publishers

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**ASSAM ENGINEERING COLLEGE  
DEPARTMENT OF CIVIL ENGINEERING  
SYLLABUS**

**CE 104: Mechanics of Solids**

**2<sup>nd</sup> Semester BE**

**L T P**

**3 1 0**

**Theory: 100**

**Sessional: 50**

**Chapter 1: Simple Stress and Strain**

Simple stress and strain: Tensile, compressive and shear stress, Hook's law. Young's modulus, Poisson's ratio, elastic constants and their relationship.

Hook's law; Stress-strain diagrams for brittle and ductile materials

**Chapter 2 : Generalized stress and strain**

Analysis of plane stress and plane strain, Mohr's circle of stress and strain.

**Chapter 3: Bending Moment and Shear Force**

Introduction to bending moment and shear force

Analysis of simply supported and cantilever beam with point load and distributed loads.

**Chapter 4: Bending Stress in Beam**

Theory of Simple Bending - Bending stresses in beams.

**Chapter 5: Shear Stress in Beam**

Flexural shear stress distribution in various shapes of cross section of beams.

**Chapter 6: Columns**

Empirical formula, Rankine's formula, slenderness ratio, Concentric and eccentric load. Columns with initial curvature. Equivalent eccentricity, Beam column.

**Chapter 7: Thin Cylinders and Shells**

Hoop stress, Thin Cylinders and Shells under internal fluid pressure – Riveted Joint Connection - Wire wound thin cylinders.

**Chapter 8: Torsion of Circular Shafts**

Theory of Pure Torsion in Solid and Hollow circular shafts - Torsional Shear Stresses - transmission of Power- Strength of shaft or torsional rigidity.

**Reading:**

- 1) R. Subramanian- Strength of Materials, Oxford
- 2) Debabrata Nag and Abhijit Chanda, Strength of materials, Wiley-India Publishers, 2012.
- 3) S Ramamrutham, Strength of materials, Dhanpat Rai Publishing Company.
- 4) Timoshenko and Gere, Mechanics of Materials, CBS Publishers, New Delhi, 1996.
- 5) S.B. Junarkar and H.J. Shah, Mechanics of Structures, Charotar Publishers, Anand, 1998.
- 6) Beer and Johnston, Mechanics of Materials, McGraw Hill International Edition, 1995.
- 7) E.P. Popov, Engineering Mechanics of Solids, Prentice Hall of India Pvt. Ltd., 1998.

**HU 105: Technical Report Writing.**

L	T	P
2	0	0

**Theory: 50 marks. Sessional: 25marks. Total 75 marks**

## Unit – 1:

Technical Report Writing – Introduction, importance, characteristics, audience recognition. Forms, contents, purpose, kinds of Technical Reports. Structure of Technical Reports – Appropriateness, acceptability, conciseness and flow.

## Unit II.

Planning - arrangement, scheduling, drafting and collection, compilation of Graphic Materials in Technical Reports.

## Unit III.

Mechanics of Language – Impersonal and formal language, bias free and plain writing. Style – Adaptability, clarity, economy, sentence variety and presentation.

## Unit IV.

Techniques for good Technical Writing – Overcoming writer's block, adding emphasis in writing, accentuating the positives, prioritizing for effective writing, avoiding plagiarism and referencing.

**Books Recommended:**

M, Raman & S, Sharma. Technical Communication. New Delhi: Oxford University Press, 2011.

Alex, K. Technical communication & Soft skills. New Delhi: S. Chand Publications, 2012.

**Text Books and Reference Books:**

1. Engineering Physics, Datta & Jishi, McGraw Hill Education (India) Private Limited.

2. Applied Physics for Engineers, Neera Malik, PHI Learning Private Limited, New Delhi.

3. A Textbook of Engineering Physics, Arulmani & Kalanagar, K. Chand & Company Ltd.

4. Theory & Problems of Electromagnetics, I. A. Stevinia, SCHAU'S OUTLINE SERIES.

L: 2  
T: 0  
P: 2

## CS107 Computer Programming

Theory : 50

Practical : 50

Sessional : 25

Total classes required # 30 hours

### Unit 1: Introduction

4 hours

Concept of operating system, Open source software (OSS), number system, brief description about the recent processors, GPU, DSP (Digital Signal Processor), Memory, primary memory, secondary memory, tertiary memory, Cache memory, Flash memory etc. , Networking and networking devices, Introduction to cloud computing, future computing devices, present and future smart phones.

### Unit 2: Program Development and Programming Languages

2 hours

Programming style, brief discussion on different types of programming languages. definition of algorithm, use of Flowcharts. symbols and their uses.

### Unit 3: Introduction to C programming

3 hours

Background, characteristics of C, structure of a C program, source code file, header files, object files etc. Comments, keywords, Identifier, datatypes, variables, constants, operators in C, type conversion and typecasting.

### Unit 4: Conditional Control and Looping statements

4 hours

if, if-else, if-else-if, nested if, switch-case etc, for, while, do-while, nested loops, break statement, continue statement etc.

### Unit 5: Arrays and Strings

4 hours

Declaration of arrays, accessing elements of the array, calculating the address of array elements, Initialization of arrays, inputting values, assigning values, sizeof operator to calculate the length of array, operations on array: traversal, insertion, deletion, merging, searching array elements, multi dimensional arrays,

**Strings** : Calculate Length, lowercase to uppercase and vice-versa, concatenate, compare, copy, reverse, extracting substring.

### Unit 6: Functions

5 hours

Type of functions, function definition, function prototype, return type, declaration, function calling. Formal argument & actual argument. Parameter passing call by value and call by reference, User Define Function & Library function.

### Unit 7: Structure, Union and Enumerated Data Types

3 hours

**Structure** : Structure declaration, typedef declaration, initialization of structures, accessing

members of a structure, copying and comparing structures, nested structures, array of structures, structures and functions.

**Union** : Declaration of union, accessing members of union, initializing union.

Enumerated Data Types: enum variables.

**Unit 8: Introduction to Object Oriented programming (OOP) 5 hours**

Features of Object Oriented Programming. Class and Inheritance mechanism in OOP . Basic programming using class and Inheritance.

**Recommended Books:**

1. Programming in C (Tata McGraw Hill) — Byron Gottfried
2. A First Course in Programming with C – T Jeyapoovan , Vikas publication house
3. Programming in C (Tata McGraw Hill) — E Balaguruswamy.
4. Computer Fundamentals and Programming in C – Reema Thareja, Oxford University Press.
5. Let Us C – Y Kanetkar, BPB publication.
6. Object Oriented Programming with C++ – Sourav Sahay, Oxford University Press.

**Marks distribution for final examination**

**Unit 1 : 6 marks**

**Unit 2 : 3 marks**

**Unit 3 : 3 marks**

**Unit 4 : 7 marks**

**Unit 5 : 9 marks**

**Unit 6 : 7 marks**

**Unit 7 : 7 marks**

**Unit 8: 8 marks**

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**Total : 50 marks**

**Optional questions can be given from any topic of the syllabus.**

CE107, CE Engineering Graphics-I (1-6-0) Credits:4

Theory: 100; Sessional: 50

First Semester, B.E.

1. **Introduction:** Introduction to Engineering Graphics, general instruction regarding instruments, lines, dimensions and lettering.
2. **Scales:** Representative fraction, types of scales-plain, diagonal, comparative, vernier and scale of chords.
3. **Engineering curves:** Construction of ellipse, parabola, hyperbola, cycloid, trochoid and involute. Drawing of tangent and normal to the above curves.
4. **Projections:** Concept of projection, types of projection, orthographic projection, IS specifications, projection of points in different quadrants.
5. **Projection of line:** Parallel to both planes, parallel to one plane and perpendicular to other, parallel to one plane and inclined to other, inclined to both planes, traces of a line, true length of a line and its inclination to reference planes.
6. **Projection of a plane:** parallel to one plane and perpendicular to other, parallel to one plane and inclined to other, oblique plane, traces of a plane.
7. **Projection of solids:** Simple solids in different positions, axis perpendicular to a plane, axis parallel to both planes, axis parallel to one plane and inclined to the other, axis inclined to both planes.

**Books:**

Elementary Engineering Drawing; N D Bhatt, Pradeep Publications

Engineering Drawing; M B Shah, B C Rana, Pearson Education

Engineering Drawing and Graphics; K. Venugopal, New Age International (P) Limited, Publishers