



## **SYLLABUS OF BACHELOR OF TECHNOLOGY**

**In the**

**FIRST YEAR ENGINEERING (COMMON TO ALL DISCIPLINES)**

**SCHOOL OF ENGINEERING AND TECHNOLOGY – NAGALAND UNIVERSITY**

<b>Course Category</b>	<b>Total Credits</b>
Base courses	<b>42</b>

w.e.f. Academic Session 2019-2020

SEMESTER 1				
THEORY				
Sl.No	Subject Code	Course Name	Credits	Marks
1.	G1T01	Engineering Mathematics-I	4	100
2.	G1T02	Engineering Physics-I	3	100
3	G1T03	Technical English	3	100
4	G1T04	Electrical Engineering	3	100
5	G1T05	Engineering Chemistry	3	100
6	G1T06	Engineering Graphics	1	100
<b>Total Credits (Theory)</b>			17	600
PRACTICAL				
1	G1L01	Engineering Physics-I Lab	1	100
2	G1L02	Engineering Chemistry Lab	1	100
3	G1L03	Engineering Graphics Lab	2	100
<b>Total Credits(Practical)</b>			4	300
<b>Total Credits</b>			21	900
SEMESTER 2				
THEORY				
1	G2T01	Engineering Mathematics-II	4	100
2	G2T02	Engineering Physics-II	3	100
3	G2T03	Fundamentals of Computing	3	100
4	G2T04	Basic Electronics	3	100
5	G2T05	Engineering Mechanics	3	100
6	G2T06	Environmental Science	0	100
7	G2T07	Sports & Yoga	0	100
<b>Total Credits (Theory)</b>			16	700
PRACTICAL				
1	G2L01	Workshop Practice	2	100
2	G2L02	Basic Electronics Lab	1	100
3	G2L03	Fundamentals of Computing Lab	1	100
4	G2L04	Engineering Physics-II Lab	1	100
<b>Total Credits(Practical)</b>			5	400
<b>Total Credits</b>			21	1100

## Programme outcomes

Students enhance their fundamental knowledge of basic subjects and its applications relevant to various streams of Engineering and Technology. These courses are basic in nature and are necessary and impart a quality in the students to analyze and solve the problem related to Engineering and Technology.

<b>COURSE OUTCOMES</b>			
<b>SEMESTER 1</b>			
<b>THEORY</b>			
<b>Sl.No</b>	<b>Subject Code</b>	<b>Course Name</b>	<b>COURSE OUTCOMES</b>
1.	G1T01	Engineering Mathematics-I	<ol style="list-style-type: none"> <li>1. Students be able to apply mathematical methods and principles to solve problems in their respective fields.</li> <li>2. Students have knowledge of how to apply mathematical methods in computer programming language.</li> </ol>
2.	G1T02	Engineering Physics-I	<ol style="list-style-type: none"> <li>1.Understand basic tenets of classical mechanics and learn how they lie at the core of engineering across disciplines.</li> <li>2. Prepare students to perform calculations about existing engineering techniques and pursue further research if need be.</li> <li>3. Create a foundation for the next course Engineering Physics –II.</li> </ol>
3	G1T03	Technical English	<ol style="list-style-type: none"> <li>1. Enable the students to develop their communication skills in English.</li> <li>2.Facilitate student to a reasonably good skill in pronunciation.</li> <li>3. Train them to use language effectively to face interviews, group discussions and public speaking.</li> </ol>
4	G1T04	Electrical Engineering	<ol style="list-style-type: none"> <li>1. Able to design circuits, test and regularly maintain electrical appliances.</li> </ol>

			2. Able to reconstruct the inbuilt design to increase production efficiency.
5	G1T05	Engineering Chemistry	1. Impart basic knowledge related to importance of engineering chemistry for industrial use. 2. Enable the engineering student upgrade the existing technologies and pursue further research.
6	G1T06	Engineering Graphics	1. Enable the student graphics skill. 2. Help the student to read and interpret the Engineering Drawing.
<b>SEMESTER 2</b>			
<b>THEORY</b>			
1	G2T01	Engineering Mathematics-II	
2	G2T02	Engineering Physics-II	1. Understand basic tenets of electromagnetism and solid state physics and learn how they underline modern engineering equipment across discipline. 2. Prepare students to evaluate and upgrade engineering instrumentation and pursue further research if need be.
3	G2T03	Fundamentals of Computing	1. Students has knowledge of computer Basis. 2. Able to solve basic mathematical problems using C programming language. 3. Understant the necessity of Programming Language.
4	G2T04	Basic Electronics	1. Students have the knowledge to construction, operation and characteristics of semiconductor devices. 2. Acquired knowledge to solve small scale circuits consisting of semiconductor devices. 3. Analyse DC and AC response of small signal amplifier circuits using device models .
5	G2T05	Engineering Mechanics	1. Develop the capacity to predict the effects of force and motion while carrying out the creative design functions of engineering.

			<p>2. Help the student develop the behavior of machines and structures.</p> <p>3. Develop the ability to visualize problem formulation.</p>
6	G2T06	Environmental Science	<p>1. Helps the students to understand the critical linkages between ecology-society-economy.</p> <p>2. Develop critical thinking for shaping strategies (scientific, social, economic and legal).</p> <p>3. Acquire values and attitudes towards understanding complex environmental economic social challenges.</p>
7	G2T07	Sports & Yoga	<p>1. Practice Physical activities and Hatha Yoga focusing on yoga for strength, flexibility, and relaxation.</p> <p>2. Learn techniques for increasing concentration and decreasing anxiety which leads to stronger academic performance.</p> <p>3. Learn breathing exercises and healthy fitness activities.</p> <p>4. Assess current personal fitness levels.</p> <p>5. Identify opportunities for participation in yoga and sports activities.</p> <p>6. Develop understanding of health-related fitness components: cardiorespiratory endurance, flexibility and body composition etc.</p> <p>7. Improve personal fitness through participation in sports and yogic activities.</p>

<b>Subject Code</b>	<b>Course name</b>	<b>Credits</b>	<b>Lectures</b>	<b>Tutorials</b>	<b>Practical</b>
G1T01	Engineering Mathematics –I	4	3	1	-

**Unit I**

Rank of a matrix, Characteristic equation – Eigenvalues and Eigenvectors of a real matrix , properties of eigenvalues and eigenvectors , consistency of linear system of equations, Cayley-Hamilton Theorem, Diagonalization of matrices, Reduction of a quadratic form to canonical form by orthogonal transformation.

**Unit II**

Convergence and Divergence of series, Tests of convergence (Comparison test, Integral test, Comparison of ratios and D’Alembert’s ratio test), Alternating series, Absolute and conditional convergence, Power Series, Convergence of exponential, logarithmic and Binomial Series.

**Unit III**

Curvature in cartesian and polar co-ordinates, centre and radius of curvature, circle of curvature, evolutes and involutes, envelopes.

**Unit IV**

Leibntz theorem, partial differentiation, Euler’s theorem, Jacobians, Taylor series for function of two variables, maxima and minima of function of two variables, Lagrange’s method of undetermined multipliers.

**Unit V**

Beta and gamma functions and relationship between them.

Applications of single integration to find volume of solids and surface area of solids of revolution, Double integral, change of order of integration, double integral in polar coordinates, applications of double integral to find area enclosed by plane curves, triple integral, change of variables, volume of solids, Dirichlet’s integral.

**Textbooks:**

- 1) Higher Engineering Mathematics: B. S. Grewal
- 2) Advanced Engineering Mathematics: E. Kreyszig

**Reference Books:**

- 1) Advanced Engineering Mathematics: Jain and Iyenger
- 2) Advanced Engg. Mathematics: Michael D. Greenberg
- 3) Advanced Engineering Mathematics (7th Edition): Bali N., Goyal M.

<i>Subject Code</i>	<i>Course name</i>	<i>Credits</i>	<i>Lectures</i>	<i>Tutorials</i>	<i>Practical</i>
G1T02	Engineering Physics-I	3	3	-	-

**UNIT I - Classical Mechanics:**

Overview of Newtonian Mechanics in rectilinear coordinate system. Motion in plane polar coordinates. Conservation principles. Collision problem in laboratory and centre of mass frame. Rotation about fixed axis. Non-inertial frames and pseudo forces. Rigid body dynamics.

**UNIT II - Special Theory of Relativity**

Michelson Morley experiment, Inertial frames of reference, postulates of special theory of relativity, Lorentz transformation equation of space and time, length contraction, time dilation, addition of velocities, variation of mass with velocity, mass-energy equivalence.

**UNIT III - Vector Calculus**

Scalar and vector fields, Gradient of a scalar field, divergence and curl of a vector field, line, surface and volume integral, Gauss divergence theorem, Stoke's theorem, Spherical polar coordinates.

**UNIT IV - Quantum Theory**

Wave particle duality, de Broglie concept of matter waves, Davisson and Germer experiment, Heisenberg's uncertainty principle, Schrodinger wave equation. Probabilities and Normalization. Expectation values. Eigenvalues and eigenfunctions. Applications in one dimension: Particle in a box, Finite Potential well, Harmonic oscillator.

**UNIT V - Optics**

Coherent sources, Conditions of interference, Young's double slit and Fresnel's biprism experiment, Newton's ring. Different Types of Diffraction, Difference between Interference and Diffraction, Fraunhofer Diffraction at a Single Slit and Double slit, Plane transmission diffraction grating spectra.

**G1L01: Physics Laboratory-I**

Determination of focal length of convex and concave lens, Determination of wavelength of sodium vapor lamp using Newton's ring, Determination of surface tension using Jaeger's Surface Tension Apparatus. Acceleration due to gravity by Kater's pendulum, Diffraction Grating.

**Texts:**

1. D. Kleppner and R. J. Kolenkow, An Introduction to Mechanics, Tata McGraw-Hill, 2000.
2. R. Eisberg and R. Resnick, Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles, 2nd Ed., John-Wiley, 1985.

**References:**

1. R. P. Feynman, R. B. Leighton, and M. Sands, The Feynman Lectures on Physics, Vol. I, Norosa Publishing House, 1998.
2. J.M. Knudsen and P.G. Hjorth, Elements of Newtonian Mechanics, Springer, 1995.
3. R. Resnick, Introduction to Special Relativity, John Wiley, Singapore, 2000.
4. A. Beiser, Concepts of Modern Physics, Tata McGraw-Hill, New Delhi, 1995.
5. S. Gasiorowicz, Quantum Physics, John Wiley (Asia), 2000.
6. F. W. Sears, H. D. Young, M. W. Zemansky, University Physics, Narosa Publishing House.

<i>Subject Code</i>	<i>Course name</i>	<i>Credits</i>	<i>Lectures</i>	<i>Tutorials</i>	<i>Practical</i>
G1T03	Technical English	3	2	1	-

**FOCUS ON LANGUAGE: VOCABULARY**

General Vocabulary – Changing words from one form to another – Nouns – Compound nouns – Adjectives, Comparative adjectives – Adverbs – Adverb forms – Prefixes and Suffixes – Spelling and Punctuation – British and American vocabulary. Technical Vocabulary – Synonyms and antonyms – Different grammatical forms of the same word – Numerical adjectives – Articles – Conjunctions and prepositions – Conjunctions used in adverbial phrases and clauses – Abbreviations and acronyms – Foreign words and phrases.

**FOCUS ON LANGUAGE: GRAMMAR**

Subject–Verb Agreement – Tenses – Present Tense – Past Tense – Future Tense – Active and Passive Voice – Gerunds and Infinitives – Cause and Effect Expressions – ‘If’ conditionals – Correction of Errors. Phrases and structures indicating use and purpose – Using connectives – Imperative and ‘should’ – Yes/ No question forms – Reported speech – Relative clauses – Adverbial clauses of time, place and manner .

**READING**

Skimming for gist –Inference – Reading in Context, Meanings in context – Intensive Reading – Sequencing of Sentences. Intensive reading and predicting content – Reading and interpretation – Critical reading – Creative and critical thinking .



## **WRITING**

Paragraph Writing – Description – Comparison and Contrast – Definition – Instructions – Formal Letter Writing – Letters to the Editor – Accepting and Declining an Invitation – Permission Letter. Paragraph development - Process description – Descriptive writing - Writing analytical paragraphs – Recommendations – Instructions – Checklists - Letter of application – content, format – Writing Proposals – Report Writing – Types, format, structure, data collection, content, form.

## **LISTENING AND SPEAKING**

Listening and transfer of information – Listening and Note-taking – Creative Thinking and Speaking – Conversation Techniques – Persuasive Speaking – Group Discussion and Oral Reports . Non-verbal communication – Listening – Stress and intonation - Correlating verbal and non- verbal communication – Discussion of problems and solutions – Oral instructions.

## **TEXT BOOKS**

1. Meenakshi Raman and Sangeeta Sharma, “Technical Communication: English Skills for Engineers”, Second Edition, Oxford University Press, 2011.

## **REFERENCE BOOKS**

1. Andrea, J. Rutherford, “Basic Communication Skills for Technology”, Second Edition, Pearson Education, 2007.
2. Pickett, Nell Ann, Ann A.Laster and Katherine E.Staples. “Technical English: Writing, Reading and Speaking”. New York: Longman, 2001.

<b><i>Subject Code</i></b>	<b><i>Course name</i></b>	<b><i>Credits</i></b>	<b><i>Lectures</i></b>	<b><i>Tutorials</i></b>	<b><i>Practical</i></b>
G1T04	Basic Electrical Engineering	3	3	-	-

### **Introduction:**

Basic concepts of Circuit elements & sources, series- parallel circuits, Circuit laws (KCL & KVL), Faraday's laws, Induced emfs and inductances, electromechanical laws, Ohms law, Voltage-Current relations for resistor, inductor, capacitor, introduction to phasor diagrams.

### **FUNDAMENTALS OF Electrical CIRCUITS**

Introduction to DC and AC circuits, Mesh analysis, Nodal analysis, Ideal sources – equivalent resistor, current, Division, voltage division, Concept of three-phase supply

and phase sequence. Voltages, currents and power relations in three phase balanced star-connected loads and delta-connected loads

### **ELECTRICAL MEASURING INSTRUMENTS**

Basic principles and Classification of instruments -Moving coil and moving iron instruments. Construction and Principle of operation of dynamometer type wattmeter and single-phase induction type energy meter.

### **Introduction to Transformers:**

Single phase transformers: Construction (core and shell types). Principle of working, emf equation, voltage and current ratios. Losses, phasor diagrams, Voltage regulation and efficiency, autotransformers (construction and working principle, comparisons with single phase transformers) applications of transformer.

### **Electrical Machines**

Introduction: Working principle of DC machine as a generator and a Motor. Types and constructional features.

DC Generators: Emf equation of generator, relation between emf induced and terminal voltage brush drop and armature reaction.

DC motor: working principle, Back emf and its significance, torque equation.

Types of D.C. motors, characteristics and applications. Necessity of a starter For DC motor.

Synchronous Generators: Principle of operation. Types and constructional features. Emf equation

Three Phase Induction Motors: Concept of rotating magnetic field. Principle of operation. Types and Constructional features. Slip and its Significance

### **Power System**

Transmission Lines, Types and classification, phenomenon associated (skin effect, Ferranti's effect, proximity effect and corona), types of substations, types of Distribution systems, introduction to protection of power system (switchgears & circuit breakers basics only)

### **Reference Books:**

- . Electrical Engineering Fundamentals (V. Del Toro PHI)
- . Engineering Circuit Analysis (W. H. Hayt and J.E. Kemmerly Mc-Graw Hill)
- .A Textbook of Electrical Technology Volume- I – (B.L.Theraja, S.Chand and Company Ltd., New Delhi.)
- .Basic Electrical Engineering, V.K.Mehta, S.Chand and Company Ltd., New Delhi.
- .Theory and problems of Basic Electrical Engineering-(I.J.Nagrath and Kothari, Prentice-Hall of India Pvt. Ltd.)

<i>Subject Code</i>	<i>Course name</i>	<i>Credits</i>	<i>Lectures</i>	<i>Tutorials</i>	<i>Practical</i>
G1T05	Engineering Chemistry	3	3	-	-
<b>UNIT 1: GENERAL CHEMISTRY</b>					<b>(8</b>
<b>Periods)</b>					
a. <b>Periodic Table</b> and properties					
b. <b>Atomic Structure</b> Planck's Quantum theory, Wave particle duality, Uncertainty principle, Quantum mechanical model of hydrogen atom					
c. <b>Phase rule</b> and its application to one component system (water					
d. <b>Chemical Kinetics:</b> Rates of chemical reactions, temperature dependence of chemical reactions; theories of reaction rates – collision and transition state theory, photochemical reactions and free radical polymerization. Homogeneous, heterogeneous, and enzymatic catalysis. Concepts of promoters, inhibitors, and poisons. ), Types and theories of corrosion.					
<b>UNIT 2: COORDINATION COMPOUNDS</b>					<b>(5</b>
<b>Periods)</b>					
Ligands, nomenclature, isomerism, stereochemistry. Concept of CF, VB & MO Theories					
<b>UNIT 3: BONDING IN ORGANIC COMPOUNDS</b>					<b>(8</b>
<b>Periods)</b>					
Classification, trivial names and IUPAC system of nomenclature of organic compounds. Inductive effect, hydrogen bond, conjugation, resonance. Methods of determining reaction mechanisms. Nucleophilic and electrophilic substitutions and additions to multiple bonds. Elimination reactions. Nucleophilic and electrophilic aromatic substitution. Reactive intermediates- carbocations, carbanions, carbenes, nitrenes, free radicals. Molecular rearrangements involving electron deficient atoms.					
<b>UNIT 4: POLYMERS</b>					<b>(6</b>
<b>Periods)</b>					
Introduction & Classification of polymers mechanism of polymerization (Addition, condensation and co- ordination), Bio polymerization, Bio degradable polymerization, preparation properties and technical application of thermo – plastics (PVC, PVA, Teflon) & thermosets (PF, UF), Natural elastomers and synthetic rubber (SBR,GR –N) . Silicones.					
<b>UNIT 5: INSTRUMENTAL ANALYSIS</b>					<b>(6</b>
<b>Periods)</b>					
Basic principles of spectrometry viz UV-Vis/ IR/ NMR/Mass/ GC and HPLC					
<b>UNIT 6: ENGINEERING MATERIALS</b>					<b>(6</b>
<b>Periods)</b>					
a. <b>Cement:</b> Basic constituents and significance, Manufacturing of Portland cement by Rotary Kiln Technology, Chemistry of setting and hardening of cement and role of gypsum					
b. <b>Fuel:</b> Classification, calorific value (Bomb calorimeter);					
<ul style="list-style-type: none"> <li>• Coal: source, classification, carbonization of coal.</li> <li>• Petroleum- classification, different fractions and uses; Cracking of hydrocarbons, knocking and octane number, cetane number, synthetic petrol and petrochemicals.</li> <li>• Biogas and solar energy</li> </ul>					
<b>Glass:</b> Definition, Properties, Manufacturing of glass, Types of silicate glasses and their commercial uses, Importance of annealing in glass making					

**Textbooks:**

1. A Text Book of Engineering Chemistry, Sashi Chawla, Dhanpat Rai & Sons.
2. Concise Inorganic Chemistry, J.D. Lee, Blackwell Science.
3. Basic Inorganic Chemistry, F.A. Cotton, Wiley.
4. Physical Chemistry, Samuel Glasstone, McMillan India Ltd.
5. Engineering Chemistry. B.K. Sharma, Krishna Prakashan.
6. Engineering Chemistry, Jain & Jain, Dhanpat Rai & Sons.
7. Quantitative Chemical Analysis. A.I. Vogel, Longman.
8. Inorganic Chemistry. R.K. Dave.
11. A Handbook of Analytical Inorganic Chemistry. D. Sharma.
12. Advance Organic Chemistry. B.G. Bahl & Anand Bahl. S. Chand & Comp. Ltd.
13. Modern Inorganic Chemistry. K.D. Modon, S. Chand & Comp. Ltd.

<b>Subject Code</b>	<b>Course name</b>	<b>Credits</b>	<b>Lectures</b>	<b>Tutorials</b>	<b>Practical</b>
G1T06	Engineering Graphics	1	1	-	-

**Unit 1**

Plane geometry and machine parts: Introduction of engineering graphics: Principles of projection lines and dimension B.I.S code of practice (SP 46) Scale, representative fraction, plain scale, diagonal scale, Vernier scale and scale of chords. Engineering curves: Classification of engineering curves. Construction of coins, Cycloidal curves involute and spiral. Loci of points: Simple mechanism like slider crank mechanism four bar chain mechanism etc.

**Unit 2**

Solid geometry: Introduction to projection of point, line and plane: Projection of line inclined to both planes and simple cases. True length, of straight line and its inclination with reference planes (traces are not included). Projection of perpendicular and oblique planes. Introduction to projection of solids, section of solids and interpenetration of solids: Classification of solids, projection of right and regular solids with their axis inclined to both planes. Projection of sphere. Section of pyramid, cone, prism and cylinder, Method of determining line of intersection and curve of intersection.

**Unit 3**

Orthographic projections: Orthographic projection: Conversion of pictorial view into orthographic views, type of sections (full, half, offset, broken, removed, revolved) section view, orthographic reading, missing view and missing lines problems. Isometric View: conversion of orthographic view into isometric view. Introduction to computer aided Drafting: Advantage of CAD, elements of CAD, components of computer, input and output devices, type of software, basic functions drafting software.

**Term work/list of practical's:**

1. One sheet of Engineering curves.
2. One sheet of loci of points.

3. One sheet of projection of points, line and plane surface.
4. One sheet of projection of solids and section of solids.
5. One sheet of orthographic view with section.
6. One sheet of isometric projection/views.
7. Sketch book containing sketches of Machine parts, Electrical, Electronics, Chemical and pipe drawing Lines, Dimensioning, scales.

**Books:**

1. Engineering Drawing Volume-I & II- P.J.Shan.
2. Engineering Drawing-N.D Bhatt & V.M Panchal

<i>Subject Code</i>	<i>Course name</i>	<i>Credits</i>	<i>Lectures</i>	<i>Tutorials</i>	<i>Practical</i>
G2T01	Engineering Mathematics –II	4	3	1	-

**Unit I Vector Calculus**

Gradient and directional derivative, Divergence and Curl and their physical interpretations, Irrotational and Solenoidal vector fields , Line integral over a plane curve , Surface Integral and Volume Integral - Green's, Gauss divergence and Stoke's theorems(without proof) and their applications

**Unit II Complex analysis**

Functions of complex variables, analytic functions,zeros and singularities, complex integration, taylor and Laurent series, Residues - residue theorem, evaluation of real integrals using residue theorem

**Unit III Ordinary Differential Equations**

Exact differential equations, linear differential equations of second and higher order with constant coefficient, method of variation of parameters, Cauchy's and Legendre's linear equations, simultaneous linear equations with constant co-efficients.

**Unit IV**

Series solution of ODE with special emphasis to Legendre and Bessel's equation.

**Unit V Laplace transform**

Laplace transforms of elementary functions, properties of Laplace transforms, existence conditions, transforms of derivatives, transforms of integrals, multiplication by t, division by t. Evaluation of integrals by Laplace transforms. Laplace transform of unit step function, unit impulse function and periodic function. Inverse transforms, convolution theorem, application

to linear differential equations and simultaneous linear differential equations with constant coefficients and applications to integral equations.

**Textbooks:**

- 1) Higher Engineering Mathematics: B. S. Grewal
- 2) Advanced Engineering Mathematics: E. Kreyszig
- 3) Calculus and Analytic Geometry: G. B. Thomas, R. L. Finney

**Reference books:**

- 1) Advanced Engineering Mathematics: Jain and Iyenger
- 2) Advanced Engg. Mathematics: Michael D. Greenberg
- 3) Advanced Engineering Mathematics (7th Edition): Bali N., Goyal M.

<i>Subject Code</i>	<i>Course name</i>	<i>Credits</i>	<i>Lectures</i>	<i>Tutorials</i>	<i>Practical</i>
G2T02	Engineering Physics-II	3	3	-	-

**UNIT I - Electrostatics**

Gauss's Law and its integral and differential forms, applications, Poisson and Laplace equations. Maxwell's equations, Basic Concepts of Electromagnetic Waves and its solution in free space.

**UNIT II - Magnetostatics**

Lorentz force, Biot-Savart and Ampere's laws and their applications, Divergence and Curl of Magnetostatic fields, Magnetic vector Potential, Force and torque on a magnetic dipole, Magnetic materials, Magnetization,

**UNIT III - Band theory of solids**

Origin of energy bands in solids, motion of electrons in a periodic potential- The Kronig-Penny model, Brillouin zones, effective mass Metals. semi-metals, semi-conductors and insulators and their energy band structure. Extrinsic and intrinsic semiconductors, doping - Fermi energy for doped and undoped semiconductors, the p-n junction (energy band diagrams with Fermi energy), the unbiased diode, forward and reverse biased diodes- its characteristics, tunnel diode, zener diode, photo-diode, LED, the photo-voltaic cell, the transistor, its characteristics, common base, common emitter, common collector.

**UNIT IV - X-rays**

Origin of X-rays, Continuous and characteristics X-ray spectra, Moseley's Law, Absorption of X-rays, Diffraction of X-rays, Bragg's Law, Bragg's spectrometer, Practical applications of X-rays, Compton effect.

**G2L04: Physics Laboratory-II**

P-N junction diode characteristics, Zener diode characteristics, Input and output characteristics of transistor in common base, common emitter, common collector configurations, Hall effect, Determination of resistivity of transistor using four probe method.

**Text/References Books:**

1. S. O. Pillai, Solid State Physics, New Age International Publishers
2. Charles Kittel, Introduction to Solid State Physics, Wiley India
3. A. J. Dekker, Solid State Physics, Macmillan
4. F. W. Sears, H. D. Young, M. W. Zemansky, University Physics, Narosa Publishing House
5. S. M. Sze, Semiconductor Devices: Physics and Technology, Wiley India

<i>Subject Code</i>	<i>Course name</i>	<i>Credits</i>	<i>Lectures</i>	<i>Tutorials</i>	<i>Practical</i>
G2T03	Fundamentals of Computing	3	3	-	-
<p><b>Unit I</b>  <b>Introduction to Computer systems and software:</b>Classification, History, Types of Computers. Elements of a Computer System: Block Diagram of The Computer System, Introduction to various units.Hardware: CPU, Memory, Input and Output devices, Auxiliary storage devices.Software: System and Application Software, Utility packages.</p> <p><b>Unit II</b>  <b>Basic programming using C:</b> Concept of variables, program statements and function calls from the library (Printf for example). C data types, int, char,float etc., C expressions, arithmetic operation, relational and logic operations, C assignment statements, extension assignment of the operations. C primitive input output using getchar and putchar, exposure to the scanf and printf functions, C statements, conditional executing using if, else. Optionally switch and break statements may be mentioned.</p> <p><b>Unit III</b>  <b>Iterations and subprograms:</b> Concept of loops, example of loops in C using ‘for’, while and do-while. Optionally continue may be mentioned. One dimensional arrays and example of iterative programs using arrays, 2-d arrays Use in matrix computations. Concept of Sub-programming, functions: Example of functions. Arguments passing mainly for the simple variables.</p> <p><b>Unit IV</b></p>					

**Pointers and Strings:** Pointers, relationship between arrays and pointers  
Argument passing using pointers, Array of pointers. Passing arrays as arguments.  
Strings and C string library. Structure and Unions. Defining C structures, passing  
strings as arguments programming examples.

**Unit V**

**File Handling:-**Types of I/O. Formatted Console Input output Functions. Text  
mode vs binary mode. Storing and retrieving records form files.

**TEXT BOOKS:**

- 1.Introduction to Computers by Peter Norton, McGraw Hill
- 2.YashwantKanetkar,"Let us C", BPB publications, 2<sup>nd</sup> Edition, 2001.
- 3.Programming C, Gottfried, Schaum outline series.
- 4.HerbertSchildt,"C: The complete reference", OsbourneMcgraw Hill,4<sup>th</sup> Edition, 2002.

**REFERENCE BOOKS:**

1. Introduction to Computers, Balagurusamy
- 2.Raja Raman,"Computer programming in C", pre3ntice Hal of India,1995.
- 3.Kernighan & Ritchie, " C Programming Language", The ( Ansi C Version), PHI, 2<sup>nd</sup> Edition.

<i>Subject Code</i>	<i>Course name</i>	<i>Credits</i>	<i>Lectures</i>	<i>Tutorials</i>	<i>Practical</i>
G2T04	Basic Electronics	3	3	-	-

**1.Semiconductor Diodes**

Semiconductor materials- intrinsic and extrinsic types, Ideal Diode, Terminal characteristics of diodes: p-n junction under open circuit condition, p-n junction under forward bias and reverse bias conditions, p-n junction in breakdown region, Zener diode and applications, Rectifier Circuits, Clipping and Clamping circuits

**2. Bipolar Junction Transistors (BJTs)**

Physical structure and operation modes, Active region operation of transistor  
Transistor as an amplifier, Basic BJT amplifier configuration: common emitter, common base and common collector amplifiers, Biasing the BJT: fixed bias, emitter feedback bias, collector feedback bias and voltage divider bias, Transistor as a switch: cut-off and saturation modes

**3. Field Effect Transistor (FET)**

Enhancement-type MOSFET: structure and physical operation, current-voltage



characteristics, Depletion-type MOSFET, Basic MOSFET amplifier configuration: common source, common gate and common drain types, Junction Field-Effect Transistor (JFET)

**1. Amplifiers and Oscillators**

Single Stage CE Amplifier , decibels and half power points., The Barkhausen Criterion for Oscillations, BJT RC phase shift oscillator, Hartley Colpitts and crystal oscillator using FET. Expression for output frequency

**2. Operation Amplifier (Op-amps)**

Ideal Op-amp, Differential amplifier: differential and common mode operation common mode rejection ratio (CMRR), Practical op-amp circuits: inverting amplifier, non -inverting amplifier, Other applications of op-amps: voltage follower, addition, subtraction, integration and differentiation.

**Text books:**

1. R.P. Jain, “ Modern Digital Electronics “ TMH, 3<sup>rd</sup> Ed, 2004.
2. Morris Mano, “ Digital Design “, PHI, 2<sup>nd</sup> Ed, 2002.

**Reference books:**

1. R.J. Tocci, “ Digital Systems”, PHI,2000.
2. Malvino and Leach, “ Digital principles and applications”, TMH, 2000.
3. I.J. Nagrath, ” Electronics, Analog & Digital”, PHI, 1999.
4. J.M. Yarbrough, “ Digital Logic-Application and Design “, PWS publishing,1999.
5. B.S. Nai,” Digital Electronics and Logic Design “, PHI, 2000.
6. Balabanian and Carlson, “ Digital Logic Design principles”, Wiley pub., 2000.

<b>Subject Code</b>	<b>Course name</b>	<b>Credits</b>	<b>Lectures</b>	<b>Tutorials</b>	<b>Practical</b>
G2T05	Engineering Mechanics	3	2	1	-

**Unit I**

Basic concept of force systems: Force and Equilibrium, Basic Concepts, Force Moments and couple, principle of Transmissibility, Varignon’s theorem, Resultant of force Systems-concurrent and Non-concurrent coplanar Forces, Funicular polygon. Free body diagram. Beams Bending moment and shear force diagrams for statically determinate beams.

**Unit II**

Plane Trusses: plane structures, Various method of analysis of Trusses, Method of joints,

**Unit III**

Properties of surfaces: Method of sections and Graphical Moment of Inertia, Centre of gravity, centroids of Une,Area, volume and Composite bodies, Area Moment of Inertia and Mass Moment of Inertia for plane figures and bodies including composite bodies, Product Moment of inertia, Parallel axis theorem, principle moment of inertia .

**Unit IV**

Friction: Introduction, Dry Friction, Co-efficient of static friction. Friction cone, Screw jack and Belt friction.

**Unit V**

Kinematics of Rigid Bodies:Plane motion, Absolute motion, Relative motion, Translating axes and Rotating axes.Kinetics of Rigid Bodies: plane motion, Force, Mass and acceleration, Work and energy, Impulse and momentum, principle and dynamic equilibrium.

**Books:**

Engineering Mechanics, R.S. Khurmi, S Chand Pub  
 Beer. F.P. &Johnston,F.R. : Mechanics for Engineers, Mc Graw Hill.  
 Meriam, J.L. : Dynamics, John Wiley.  
 Shames, I.H. : Engineering Mechanics, Prentice Hall of India.  
 Dayaratnam, P. : Statics, Tata McGraw Hill.  
 Timoshenko, S. and Young D. : Engineering Mechanics, Mc Graw Hill.

<i>Subject Code</i>	<i>Course name</i>	<i>Credits</i>	<i>Lectures</i>	<i>Tutorials</i>	<i>Practical</i>
G2T06	Environmental Science	3	3	-	-

**UNIT 1: ENVIRONMENT AND ECOSYSTEMS**

Environmental education: definition - scope - objectives and importance. Concept of an ecosystem – types (terrestrial and aquatic ecosystems) – structure and function – ecological succession - food chains, food webs and ecological pyramids

**UNIT 2: BIODIVERSITY**

Introduction: definition - genetic, species and ecosystem diversity - value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - threats to biodiversity: habitat loss, poaching of wildlife - endangered and endemic species of India, Conservation of biodiversity: in-situ and ex-situ conservations.

**UNIT 3: POLLUTION AND WASTE MANAGEMENT**

Classification of pollutants and their effects. Air and water pollution — causes, effects and control measures. Waste water treatment (general) – primary, secondary & tertiary stages.

Solid waste management: causes - effects of municipal waste, hazardous waste, bio medical waste - process of waste management.

#### **UNIT 4: CURRENT ENVIRONMENTAL ISSUES**

Environmental ethics -issues and possible solutions- population explosion, climatic change, ozone layer depletion, global warming, acid rain and green house effect. Sustainable development: definition, objectives and environmental dimensions of sustainable development- environmental audit for sustainable development.

#### **UNIT 5: ENVIRONMENTAL PROTECTION**

National and international concern for environment: Important environmental protection acts in India – water, air (prevention and control of pollution) act, wild life conservation and forest act – functions of central and state pollution control boards - international effort – key initiatives of Rio declaration, Vienna convention, Kyoto protocol and Johannesburg summit. Concept of Green Chemistry and Green engineering.

#### **TEXT BOOKS**

1. Sharma.B.K. and Kaur, “Environmental Chemistry”“ Goel Publishing House, Meerut, 1994.
2. De.A.K., “Environmental Chemistry”, New Age International (p) Lt., , New Delhi, 1996.
3. Kurian Joseph & R. Nagendran, “Essential of Environmental Studies”“ Pearson Education, 2004.

#### **REFERENCE BOOKS**

Dara S.S., A Text Book of Environmental Chemistr y and pollution control, S.Chand & Company Ltd., New Delhi, 2004.

<i>Subject Code</i>	<i>Course name</i>	<i>Credits</i>	<i>Lectures</i>	<i>Tutorials</i>	<i>Practical</i>
G2T07	Sports and Yoga	0	0	0	2

#### **● Introduction to Physical Education**

- o Meaning & definition of Physical Education
- o Aims & Objectives of Physical Education
- o Changing trends in Physical Education

#### **● Olympic Movement**

- o Ancient & Modern Olympics (Summer & Winter)
- o Olympic Symbols, Ideals, Objectives & Values
- o Awards and Honours in the field of Sports in India (Dronacharya Award, Arjuna Award, Dhayanchand Award, Rajiv Gandhi Khel Ratna Award etc.)

#### **● Physical Fitness, Wellness & Lifestyle**

- o Meaning & Importance of Physical Fitness & Wellness
- o Components of Physical fitness

- o Components of Health related fitness
  - o Components of wellness
  - o Preventing Health Threats through Lifestyle Change
  - o Concept of Positive Lifestyle
  - **Fundamentals of Anatomy & Physiology in Physical Education, Sports and Yoga**
  - o Define Anatomy, Physiology & Its Importance
  - o Effect of exercise on the functioning of Various Body Systems. (Circulatory System, Respiratory System, Neuro-Muscular System etc.)
  - **Kinesiology, Biomechanics & Sports**
  - o Meaning & Importance of Kinesiology & Biomechanics in Physical Edu. & Sports
  - o Newton's Law of Motion & its application in sports.
  - o Friction and its effects in Sports.
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- **Postures**
  - o Meaning and Concept of Postures.
  - o Causes of Bad Posture.
  - o Advantages & disadvantages of weight training.
  - o Concept & advantages of Correct Posture.
  - o Common Postural Deformities – Knock Knee; Flat Foot; Round Shoulders; Lordosis, Kyphosis, Bow Legs and Scoliosis.
  - o Corrective Measures for Postural Deformities
  - **Yoga**
  - o Meaning & Importance of Yoga
  - o Elements of Yoga
  - o Introduction - Asanas, Pranayama, Meditation & Yogic Kriyas
  - o Yoga for concentration & related Asanas (Sukhasana; Tadasana; Padmasana & Shashankasana)
  - o Relaxation Techniques for improving concentration - Yog-nidra
  - **Yoga & Lifestyle**
  - o Asanas as preventive measures.
  - o Hypertension: Tadasana, Vajrasana, Pavan Muktasana, Ardha Chakrasana, Bhujangasana, Sharasana.
  - o Obesity: Procedure, Benefits & contraindications for Vajrasana, Hastasana, Trikonasana, Ardh Matsyendrasana.
  - o Back Pain: Tadasana, Ardh Matsyendrasana, Vakrasana, Shalabhasana, Bhujangasana.
  - o Diabetes: Procedure, Benefits & contraindications for Bhujangasana, Paschimottasana, Pavan Muktasana, Ardh Matsyendrasana.
  - o Asthema: Procedure, Benefits & contraindications for Sukhasana, Chakrasana, Gomukhasana, Parvatasana, Bhujangasana, Paschimottasana, Matsyasana.
  - **Training and Planning in Sports**
  - o Meaning of Training
  - o Warming up and limbering down
  - o Skill, Technique & Style
  - o Meaning and Objectives of Planning.

o Tournament – Knock-Out, League/Round Robin & Combination.

● **Psychology & Sports**

- o Definition & Importance of Psychology in Physical Edu. & Sports
- o Define & Differentiate Between Growth & Development
- o Adolescent Problems & Their Management
- o Emotion: Concept, Type & Controlling of emotions
- o Meaning, Concept & Types of Aggressions in Sports.
- o Psychological benefits of exercise.
- o Anxiety & Fear and its effects on Sports Performance.
- o Motivation, its type & techniques.
- o Understanding Stress & Coping Strategies.

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● **Doping**

- o Meaning and Concept of Doping
- o Prohibited Substances & Methods
- o Side Effects of Prohibited Substances

● **Sports Medicine**

- o First Aid – Definition, Aims & Objectives.
- o Sports injuries: Classification, Causes & Prevention.
- o Management of Injuries: Soft Tissue Injuries and Bone & Joint Injuries

● **Sports / Games**

Following subtopics related to any one Game/Sport of choice of student out of: Athletics, Badminton, Basketball, Chess, Cricket, Kabaddi, Lawn Tennis, Swimming, Table Tennis, Volleyball, Yoga etc.

- o History of the Game/Sport.
- o Latest General Rules of the Game/Sport.
- o Specifications of Play Fields and Related Sports Equipment.
- o Important Tournaments and Venues.
- o Sports Personalities.
- o Proper Sports Gear and its Importance.

**Text Books/References:**

1. Modern Trends and Physical Education by Prof. Ajmer Singh.
2. Light On Yoga by B.K.S. Iyengar.
3. Health and Physical Education – NCERT (11th and 12th Classes)

<b>Subject Code</b>	<b>Course name</b>	<b>Credits</b>	<b>Lectures</b>	<b>Tutorials</b>	<b>Practical</b>
G2L02	Basic Electronics Lab	1	-	-	2
1. Study of Electronics equipments <ol style="list-style-type: none"> <li>a. Study of CRO</li> <li>b. Study of Function Generator</li> <li>c. Study of Breadboard</li> </ol>					

- d. Study of Soldering Iron
- e. Study of Multimeter
2. To calibrate the CRO and measure the amplitude and frequency.
3. To connect the given circuit in Breadboard.
4. To measure the Resistance of given Resistor.
5. To generate a sine wave, triangular wave and square wave and verify the wave using CRO.
6. To plot the V-I characteristics of a P-N Diode.
7. To plot the V-I characteristics of a Zener Diode.
8. Verification of series and Parallel circuits.
9. Verification of KVL and KCL.