

## Diploma in Handloom & Textile Technology

### Curriculum (Semester I & II)

SEMESTER - I								
S No	Category of Course	Code No	Course Title	Hours/week			Total credit Hrs/week	Credits
				L	T	P		
1	Basic Science	25BS101	Mathematics-I	2	1	0	3	3
2	Basic Science	25BS105	Applied Chemistry	2	1	0	3	3
3	Humanities & Social Science	25HS101	Communication Skills in English	2	0	0	2	2
4	Engineering Science	25ES101	Engineering Graphics	0	0	3	3	1.5
5	Engineering Science	25ES103	Engineering Workshop Lab	0	0	3	3	1.5
6	Basic Science	25BS109	Applied Chemistry Lab	0	0	2	2	1
7	Humanities & Social Science	25HS103	Sports and Yoga	0	0	2	2	1
8	Humanities & Social Science	25HS105	Communication Skills in English Lab	0	0	2	2	1
9	Audit	25AU102	Environmental Science	2	0	0	2	0
<b>Total Credits</b>								<b>14</b>
SEMESTER - II								
S No	Category of Course	Code No	Course Title	Hours/week			Total credit Hrs/week	Credits
				L	T	P		
1	Basic Science	25BS102	Mathematics-II	3	1	0	4	4
2	Basic Science	25BS103	Applied Physics	2	1	0	3	3
3	Engineering Science	25ES102	Introduction to IT System	3	0	0	3	3
4	Engineering Science	25ES104	Fundamentals of Electrical, Electronics Engineering	2	1	0	3	3
5	Engineering Science	25ES106	Engineering Mechanics	2	1	0	3	3
6	Basic Science	25BS107	Applied Physics Lab	0	0	2	2	1
7	Engineering Science	25ES108	Introduction to IT System Lab	0	0	2	2	1
8	Engineering Science	25ES110	Fundamentals of Electrical, Electronics Engineering Lab	0	0	2	2	1
9	Engineering Science	25ES112	Engineering Mechanics Lab	0	0	2	2	1
<b>Total Credits</b>								<b>20</b>




## SEMESTER – I

Course Title	: MATHEMATICS-I				
Course Code	: 25BS101	L	T	P	C
Course Category	: BASIC SCIENCE	2	1	0	3

**Course Objectives :**

The course aims to develop a strong mathematical foundation by covering essential topics in Trigonometry, Algebra, Differential Calculus, Binomial theorem, and the Basics of Probability and Statistics. This comprehensive course fosters analytical thinking and prepares students for advanced studies and real-world problem-solving.

**Unit-I Trigonometry****10 Hours**

Concept of angles, triangles (especially right angular triangle), measurement of angles in degrees and radians and their conversions. Pythagoras Theorem (without proof) and its applications (some examples). Trigonometric ratios: trigonometric ratios of some special angles ( $0^\circ, 30^\circ, 45^\circ, 60^\circ, 90^\circ$ ). Trigonometric identities: Compound angle identities –  $\sin(A \pm B)$ ,  $\cos(A \pm B)$ ,  $\tan(A \pm B)$  (without proof), double angle identities –  $\sin 2A$ ,  $\cos 2A$ ,  $\tan 2A$ , simple problems.

**Unit-II Algebra-I****08 Hours**

Complex numbers: Introduction to  $i$  ( $\sqrt{-1}$ ), definition of complex numbers, real and imaginary parts of complex numbers, Cartesian and polar representation of complex numbers, conjugate of complex numbers, modulus and amplitude of complex numbers. Addition, Subtraction, Multiplication, Division of complex numbers.

**Unit-III Differential Calculus****10 Hours**

Concept of function and their graphical representation (especially  $\sin x$ ,  $\cos x$ ,  $\frac{1}{x}$ ,  $e^x$ ). Concept of limit and continuity. Some standard limits and their applications. Concept of differentiability, Differentiation of standard functions  $x^n$ ,  $\sin x$ ,  $\cos x$ ,  $\tan x$ ,  $\sec x$ ,  $\csc x$ ,  $\cot x$ ,  $e^x$ ,  $\log x$ ,  $\sqrt{x}$ ,  $\frac{1}{x}$ . Differentiation of sum, product & quotient of functions. Differentiation of composition of functions (chain rule).

**Unit-IV Permutation, Combination & Binomial Theorem****07 Hours**

Concept and use of permutation & combination. Value of  $n_C r$  and  $n_P r$ . Simple problems. Binomial theorem: Binomial theorem (without proof) for positive integral index (expansion and general form), finding 'r' th term, middle term(s), coefficient of ' $x^r$ ' of expansion,  $x$  free term. Binomial theorem for any index (expansion without proof) first and second binomial approximation with applications to engineering problems.




**Unit-V Probability and Statistics**

**10 Hours**

Random experiment, outcomes, sample space, events, occurrence of events, exhaustive events, mutually exclusive events, 'or', 'and', and 'not' events, independent events. Classical definition of probability, axioms of probability, probability of an event, probability of exhaustive events, mutually exclusive events, 'or', 'and', and 'not' events, independent events.

Statistical data, ungrouped data, grouped data, discrete data, arithmetic mean (direct method only), median, mode.

**Total 45 Hours**

**Text books:**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi, 40<sup>th</sup> Edition, 2007.
2. G. B. Thomas, R. L. Finney, Calculus and Analytic Geometry, Addison Wesley, 9<sup>th</sup> Edition, 1995.
3. Reena Garg, Engineering Mathematics, Khanna Publishing House, New Delhi (Revised Ed 2018).
4. Mathematics NCERT Textbook for Class XI, 2024-25 Edition.
5. Mathematics NCERT Textbook for Class XII part I, 2024-25 Edition.
6. Mathematics NCERT Textbook for Class XII part II, 2024-25 Edition.

**References:**

1. Sundaram, R. Balasubramanian, K. A. Lakshminarayanan, Engineering Mathematics, 6/e., Vi-kas Publishing House.
2. Bartle R.G., Sherbert D.R. Introduction to real analysis (3rd edition)
3. K. Hoffman and R. Kunze: Linear Algebra.
4. H. S. Kasana: Complex Variables – Theory and Applications.
5. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.

**Course Outcomes:**

At the end of the study of this course, the students will be able to

- CO1 Apply trigonometric concepts to perform geometric calculations and solve real-life mathematical problems.
- CO2 Explain the role of algebra as a foundational tool in solving mathematical problems.
- CO3 Explain the geometric and analytical meanings of limits, continuity, and differentiability.
- CO4 Apply binomial theorem to simplify complex problems.
- CO5 Apply the concept of probability and statistics in solving real life problems.



Course Title	: APPLIED CHEMISTRY				
Course Code	: 25BS105	L	T	P	C
Course Category	: BASIC SCIENCE	2	1	0	3

**Course Objectives :**

The course will help the diploma engineers to apply the basic concepts and principles to solve broad-based engineering problems and to understand different technology based applications. It will help engineers understanding the basic knowledge of atomic structure, concentration of solution, acidity and basicity of domestic as well as industrial problems, Redox and Properties of reagent, organic compounds and polymers, chemical Kinetics and states of matter.

**Unit-I Atomic structure, Water & Solution 09 Hours**

Bohr model of atom, Quantum numbers, Aufbau principal, Pauli's Exclusion principle, Hund's rule of maximum multiplicity, Electronic configuration of elements, Definition of Atomic number, Mass number, Isotopes, Isotones and Isobars, Concept of hybridization  $SP^2$ ,  $SP^3$ ,  $SP$  and Shape of molecules.

Classification Soft and Hard water, Salt causing hardness, Unit of hardness, Action of soap on water, Types of Hardness, Causes of hardness, Disadvantages of using hard water, Estimation of total hardness by EDTA method, Removal of hardness by Permutit process, Ion-exchange process and Calgon treatment, TDS.

Introduction of solution, Solvent & Solute. Types of solutions. Method to express concentration of solution- Molarity, Normality, Mass percentage (W/W), Volume Percentage (V/V), Mass by Volume percentage (W/V), Standard solution- primary and secondary standards.

**Unit-II Acid, Base and Salt & Chemical Bonding 09 Hours**

Arrhenius Theory & Lewis theory on Acidity, Basicity & Salts; Avogadro number, Concept of strong & weak acids, Study on Hydrochloric Acid, Acetic Acid, Sulphuric Acid, Concept of Strong & weak bases, Mole concept, Acidity, Basicity, Neutralization reaction, Hydrolysis of Salts, Equivalent Weight of acids, bases & salts; concept of pH and pH scale; choice of Indicator.

Concept of atom and molecule, cause of Chemical Bond, Types of Bonds: Ionic Bond, Covalent Bond & Co-ordinate Bond with example. Hydrogen Bonding in HF, water, and ice; Vander Waal's Force, Adhesive Force & Cohesive Force.

**Unit-III Electrochemistry & Oxidation-Reduction 09 Hours**

Oxidation and Reduction by Electronic concept, Balancing chemical equations by Ion-electron method, Electrolysis, Arrhenius theory, Faraday's Laws, Electrolysis of  $CuSO_4$  solution using Pt-electrode and Cu-electrode. Application of electrolysis such as




Electroplating, Electro-refining and Electrotyping; Electrochemical Cells, Primary Cell -Dry Cell, Secondary Cell -Lead storage cell, Electrochemical series.

Types of Oxidizing & Reducing agent, Types of Binder & their application, Study on  
I) Caustic Soda II) Sodium Chloride III) Bleaching Powder IV) Hydrogen Peroxide

**Unit-IV Basic of Organic Chemistry & Polymer Chemistry 09 Hours**

Organic compounds, Classification, Tetra Valence Of Carbons, Homologous series, Functional groups, Isomerism, IUPAC nomenclature, Properties and preparation of Methane, Ethylene and Acetylene (Simple Alkane, Alkene & Alkynes); Study on - Aromatic Compounds (Benzene & its Derivative Naphthalene and phenol)

Concept of Monomer, Polymers, Homo polymer, Co-polymer, classification of Polymers, Study on - PVC, PTFE, PS, TEFLON; Study on Synthetic Fibre - PAN, NYLON-6, NYLON-66, TERELYENE; Biodegradable and Non-biodegradable Polymers.

**Unit-V States of Matter & Chemical Kinetics 09 Hours**

Three states of matter, Concept of Latent Heat, Inter Molecular Forces, Introduction Of Solid state, Classification of solids – crystalline and amorphous, Relationship between structure and properties of crystalline solids namely ionic solid, covalent solid and molecular solids. Covalent bonds in Carbon.

Reversible and Irreversible reactions, Exothermic and Endothermic Reactions, Chemical equilibrium, Le Chatelier's Industrial preparation of Ammonia by Haber's Process, Nitric acid by Ostwald's process and Sulphuric Acid by Contact Process; Catalyst and Catalysis, Rate of Reactions, Graphical Study on Reactant and Product, limiting Reagent.

**Total 45 Hours**

**Text books:**

1. Text Book of Chemistry for Class XI & XII (Part-I, Part-II); N.C.E.R.T., Delhi, 2022
2. ISC Chemistry, K.L Chugh, Kalyani Publishers, Ludhiana, 2022
3. ISC Chemistry, Dr H.C Srivastava, Nageen Prakashan Pvt Ltd, Meerut- 250002, UP, 2020
4. Dara, S.S & Dr.S.S.Umare, Engineering Chemistry, S. Chand. Publication, New Delhi, 2020.
5. Jain & Jain, Engineering Chemistry, Dhanpat Rai and Sons; New Delhi, 2020.

**References:**

1. All in one Chemistry for class XI & XII, Arihant Pvt Ltd, 2022
2. CBSC Chemistry For class XI & XII, Allen Pvt Ltd, 2024
3. Maiti, Tewar & Roy, Chemistry for XI & XII, Chhaya Prakashani Pvt.Ltd., 2024

**Course Outcomes:**

At the end of the study of this course, the students will be able to

- CO1 Explain the general properties of Atom & molecules, water along with its solutions.  
CO2 Describe the suitability of oxidizing and reducing agent for domestic and industrial application.



- CO3 Explain the principles of electrochemical cells, electrode potentials, and oxidation-reduction processes.
- CO4 Define organic compounds and polymers suitable for economical industrial processing to obtain Eco-friendly finished products.
- CO5 Describe states of matter chemical kinetics and economical techniques of reaction mechanism.

Course Title	: <b>COMMUNICATION SKILLS IN ENGLISH</b>				
Course Code	: <b>25HS101</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
Course Category	: <b>HUMANITIES &amp; SOCIAL SCIENCE</b>	2	0	0	2

### Course Objectives :

This course aims at introducing basic concept of communication skills with an emphasis on developing the personality of the students. Thus the main objectives of this course are to develop confidence in speaking English with an emphasis on correct pronunciation, to develop and enhance the skills like Listening, Speaking, Reading and Writing etc., to introduce the need for personality development.

#### Unit - I Communication: Theory and Practice

**09 Hours**

Basics of communication: Introduction, meaning and definition, process of communication. Types of communication: Formal and informal, verbal and non-verbal and written. Barriers to effective communication, 7 Cs for effective communication (considerate, concrete, concise, clear complete, correct, courteous), Art of Effective communication (choosing words, voice modulation, clarity, time, simplification of words, technical communication).

#### Unit - II Soft Skills for Professional Excellence

**09 Hours**

Introduction to Soft Skills and Hard Skills, Importance of Soft Skills. Life Skills: Self-awareness and self-analysis, adaptability, resilience, emotional intelligence and empathy etc. Applying soft-skills across cultures.

#### Unit - III Reading Comprehension

**09 Hours**

Comprehension, vocabulary enhancement and grammar exercises based on reading of the following texts:

Section 1-The Blue Umbrella: Ruskin Bond, Jimmy Valentine: O. Henry, My Lost Dollar: Stephen Leacock, Nobel Lecture: Mother Teresa, Engine Trouble: R. K Narayan.

Section 2-Shall I compare thee to a summer's day (Sonnet no.18): William Shakespeare, Stopping by woods on a Snowy Evening: Robert Frost, Where the Mind is Without Fear: Rabindranath Tagore, The Night of the Scorpion: Nissim Ezekiel, The cold within: James Patrick Kinney.

#### Unit - IV Professional Writing

**09 Hours**

Précis writing, Letter writing (Personal and Business), E-mail, Notice, Minutes of a meeting, Filling-up various forms.




**Unit - V Structure, Vocabulary and Grammar**

**09 Hours**

The structure of English Language (System of English Speech Sounds, Structure of Words, Sentence Structure, Discourse Structure).

Grammar: Articles, Prepositions, Tenses, Voice, Direct-Indirect Speech, Transformation of sentences.

**Total 45 Hours**

**Text books:**

1. J.D.O'Connor. Better English Pronunciation. Cambridge: Cambridge University Press, 1980.
2. Lindley Murray, An English Grammar: Comprehending Principles and Rules. London: Wilson and Sons, 1908.
3. Kulbhushan Kumar, Effective Communication Skills, Khanna Publishing House, New Delhi (Re-vised Edition 2018)
4. Basudeb Chakraborti & others, Enrich 1, Cambridge University Press, 2023
5. Ruskin Bond, The Blue Umbrella, Red Turtle, 2013.

**References:**

1. Margaret M. Maison. Examine your English. Orient Longman: New Delhi, 1964.
2. M. Ashraf Rizvi. Effective Technical Communication. Mc-Graw Hill: Delhi, 2002.
3. John Nielson. Effective Communication Skills. Xlibris, 2008.
4. Oxford Dictionary
5. Roget's Thesaurus of English Words and Phrases
6. Collin's English Dictionary

**Course Outcomes:**

At the end of the study of this course, the students will be able to

CO1: Develop basic speaking and writing skills including proper usage of language and vocabulary so that they can become highly confident and skilled speakers and writers.

CO2: Communicate effectively in presentations, interviews and other forms of oral Communication.

CO3: Draft emails and letters professionally.

CO4: Develop non-verbal communication such as proper use of body language and gestures.

CO5: Develop skills and confidence to communicate effectively in presentation, interviews and other forms of oral communication.



Course Title	: ENGINEERING GRAPHICS				
Course Code	: 25ES101	L	T	P	C
Course Category	: ENGINEERING SCIENCE	0	0	3	1.5

**Course Objectives :**

The course on **Engineering Graphics** aims to develop the ability to visualize, interpret, and create technical drawings essential for engineering design and communication. By the end of the course, students will be able to create precise technical drawings, read and interpret engineering blueprints, and apply graphical principles to real-world engineering applications.

**Unit - I Basic Elements of Drawing 06 Hours**

Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering Different types of lines and their use; Plain scale, Diagonal scale.

**Unit - II Geometrical construction and curves 06 Hours**

Construction of polygons, Conic sections including the Ellipse (Oblong and Concentric circle method), Parabola (Oblong and Tangent Method), Rectangular Hyperbola (General method only).

**Unit - III Projection of Points, Lines, Surfaces 12 Hours**

Projection and its classifications; Principles of Orthographic Projections-Conventions - 1st and 3rd angle projection, Projections of Points and lines inclined to both planes; Projections of planes (Rectangle, pentagon, Hexagon, Circle etc.) inclined Planes - Auxiliary Planes.

**Unit - IV Orthographic Projection 09 Hours**

Conversion of pictorial view into Orthographic Views – object containing plain surfaces, slanting surfaces, slots, ribs, cylindrical surfaces. (use First Angle Projection method only).

**Unit - V Isometric Projections 12 Hours**

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.

**Total 45 Hours****Text books:**

1. Pradeep Jain, Ankita Maheswari, A.P. Gautam, Engineering Graphics & Design, Khanna Publishing House.
2. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House.
3. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH.
4. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education.




5. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers.
6. Corresponding set of CAD Software Theory and User Manuals.

**Course Outcomes:**

At the end of the study of this course, the students will be able to

- CO1 Select and construct appropriate drawing scales, use drawing equipment's, and understand Indian Standards of engineering drawing.
- CO2 Draw views of given object and components.
- CO3 Sketch orthographic projections into isometric projections and vice versa.
- CO4 Sketch Isometric projection.
- CO5 Apply computer aided drafting tools to create 2D engineering drawings.

Course Title	: <b>ENGINEERING WORKSHOP LAB</b>				
Course Code	: <b>25ES103</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
Course Category	: <b>ENGINEERING SCIENCE</b>	0	0	3	1.5

**Course Objectives :**

This **Practice** course aims to provide students with fundamental knowledge and hands-on experience in basic manufacturing and fabrication processes. The course familiarizes students with various workshop tools, equipment, and safety practices essential for engineering applications.

**Unit - I Carpentry****09 Hours**

1. Demonstration of different wood working tools / machines.
2. Demonstration of different wood working processes, like planing, marking, chiseling, grooving, turning of wood etc.
3. One simple job involving any one joint like mortise and tenon dovetail, bridle, half lap etc.

**Unit - II Fitting****09 Hours**

1. Demonstration of different fitting tools and drilling machines and power tools.
2. Demonstration of different operations like chipping, filing, drilling, tapping, sawing, cutting etc.
3. One simple fitting job involving practice of chipping, filing, drilling, tapping, cutting etc.

**Unit - III Sheet metal working****09 Hours**

1. Demonstration of different sheet metal tools / machines.
2. Demonstration of different sheet metal operations like sheet cutting, bending, edging, end curling, lancing, soldering, brazing, and riveting.




- One simple job involving sheet metal operations and soldering and riveting.

**Unit - IV Welding****09 Hours**

- Demonstration of different welding tools / machines.
- Demonstration on Arc Welding, Gas Welding, MIG, TIG welding, gas cutting and rebuilding of broken parts with welding.
- One simple job involving butt and lap joint by Gas welding and SMAW.

**Unit - V Electrical house wiring****09 Hours**

Practice on simple lamp circuits:

- One lamp controlled by one switch by surface conduit wiring
- Lamp circuits- connection of lamp and socket by separate switches
- Connection of Fluorescent lamp/tube light
- Simple lamp circuits-install bedroom lighting
- Simple soldering exercises to be executed to understand the basic process of soldering.

**Total 45 Hours****Course Outcomes:**

At the end of the study of this course, the students will be able to

- CO1 Acquire skills in basic engineering practice to identify, select and use various marking, measuring, and holding, striking and cutting tools & equipment's and machines.
- CO2 Interpret job drawing and complete jobs as per specifications in allotted time.
- CO3 Explain the functions, applications, and safety aspects of various wiring systems used in domestic installations.

Course Title	: <b>APPLIED CHEMISTRY LAB</b>				
Course Code	: <b>25BS109</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
Course Category	: <b>BASIC SCIENCE</b>	0	0	2	1

**Course Objectives :**

The **Applied Chemistry Lab** course aims to provide students with hands-on experience in fundamental chemical principles and their practical applications in engineering and technology. Students will gain proficiency in handling laboratory equipment, preparing chemical solutions, and performing qualitative and quantitative analyses.

**List of Practical's (to perform minimum 10 practical's)**

- To determine the concentration/Molarity of given  $\text{KMnO}_4$  titrating against standard solution of Oxalic Acid.




2. Volumetric estimation of total hardness of given water sample using standard EDTA solution.
3. Determine the TDS of given water sample.
4. Determination of strength of given solution of HCl or H<sub>2</sub>SO<sub>4</sub> with standard Sodium Carbonate solution.
5. Check the pH of solutions of Sodium Carbonate (0.1 M), Sodium Hydroxide (0.1M), potassium hydroxide (0.1M), Ferric Chloride (0.1M), Oxalic Acid (0.1M), Hydrochloric Acid and Acetic Acid.
6. Test for functional group present in organic compounds- unsaturation, Alcoholic OH, Phenolic OH, Aldehyde, Carboxylic Acid, Amine.

**Perform qualitative analysis to find out the presence of cations and anions in a given water soluble salt. The following ions need to be determined:**

7. Cation: Lead, Copper, Aluminium, Arsenic
8. Anions: Carbonate, Nitrate, Sulphate, Chloride.
9. Characteristic test for Carbohydrate, Fat and Proteins in given samples.
10. Find the variation of cell potential in  $Zn | Zn^{2+} || Cu^{2+} | Cu$  with change in Concentration of Electrolytes (CuSO<sub>4</sub> or ZnSO<sub>4</sub>) at room temperature.
11. Determine Viscosity by Ostwald's Viscometer.
12. Neutralization reaction of NaOH vs C<sub>2</sub>H<sub>2</sub>O<sub>4</sub>.
13. Estimate the strength of Hydrogen Peroxide.
14. Estimate the Available Chlorine present in given bleaching solution.

**Total 30 Hours**

**Text books:**

1. Text book of Chemistry for Class XI & XII (Part-I, Part-II); N.C.E.R.T., Delhi.
2. Dr. G. H. Hugarand, Prof A. Pathak, Applied Chemistry Laboratory Practices, Vol. I and Vol. II, NITTTTR, Chandigarh, Publications, 2013-14.
3. Agnihotri, Rajesh, Chemistry for Engineers, Wiley India Pvt.Ltd.,2014.

**Course Outcomes:**

At the end of the study of this course, the students will be able to

- CO1 Explain different methods of quantitative analysis and describe quantitative analysis of water sample.
- CO2 Identify different organic sample used in developing dyes and recipes and find out methods to determine percentage of food stuffs in food samples commercially.
- CO3 Determine pH for organic, inorganic samples that helps in domestically as well as commercially used.



Course Title	: SPORTS AND YOGA				
Course Code	: 25HS103	L	T	P	C
Course Category	: HUMANITIES & SOCIAL SCIENCE	0	0	2	1

**Course Objectives :**

To make the students understand the importance of sound health and fitness principles as they relate to better health and to expose the students to a variety of physical and yogic activities aimed at stimulating their continued inquiry about Yoga, physical education, health and fitness.

**Unit - I Introduction to Physical Education**

Meaning & definition of Physical Education, Aims & Objectives of Physical Education, Changing trends in Physical Education.

**Unit - II Olympic Movement**

Ancient & Modern Olympics (Summer & Winter), Olympic Symbols, Ideals, Objectives & Values, Awards and Honours in the field of Sports in India (Dronacharya Award, Arjuna Award, Dhyanchand Award, Major Dhyan chand Khel Ratna Award etc.)

**Unit - III Physical Fitness, Wellness & Lifestyle**

Meaning & Importance of Physical Fitness & Wellness, Components of Physical fitness, Components of Health related fitness, Components of wellness, Preventing Health Threats through Lifestyle Change, Concept of Positive Lifestyle.

**Unit - IV Fundamentals Of Anatomy & Physiology In Physical Education, Sports And Yoga**

Define Anatomy, Physiology & Its Importance, Effect of exercise on the functioning of Various Body Systems. (Circulatory System, Respiratory System, Neuro-Muscular System etc.)

**Unit - V Kinesiology, Biomechanics & Sports**

Meaning & Importance of Kinesiology & Biomechanics in Physical Edu. & Sports, Newton's Law of Motion & its application in sports, Friction and its effects in Sports.

**Unit – VI Postures**

Meaning and Concept of Postures, Causes of Bad Posture, Advantages & disadvantages of weight training, Concept & advantages of Correct Posture. Common Postural Deformities – Knock Knee; Flat Foot; Round Shoulders, Lordosis, Kyphosis, Bow Legs and Scoliosis, Corrective Measures for Postural Deformities.

**Unit - VII Yoga**

Meaning & Importance of Yoga, Elements of Yoga, Introduction - Asanas, Pranayama, Meditation & Yogic Kriyas, Yoga for concentration & related Asanas (Sukhasana; Tadasana; Padmasana & Shashankasana) Relaxation Techniques for improving concentration - Yog-nidra.




### Unit – VIII Yoga & Lifestyle

Asanas as preventive measures- Hypertension: Tadasana, Vajrasana, Pavan Muktasana, Ardha Chakrasana, Bhujangasana, Sharasana. Obesity: Procedure, Benefits & contraindications for Vajrasana, Hastasana, Trikonasana, Ardh Matsyendrasana. Back Pain: Tadasana, Ardh Matsyendrasana, Vakrasana, Shalabhasana, Bhujangasana. Diabetes: Procedure, Benefits & contraindications for Bhujangasana, Paschimottasana, Pavan Muktasana, Ardh Matsyendrasana. Asthema: Procedure, Benefits & contraindications for Sukhasana, Chakrasana, Gomukhasana, Parvatasana, Bhujangasana, Paschimottasana, Matsyasana.

### Unit - IX Training and Planning in Sports

Meaning of Training-Warming up and limbering down Skill, Technique & Style Meaning and Objectives of Planning. Tournament – Knock-Out, League/Round Robin & Combination.

### Unit - X Psychology & Sports

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

### Unit - XI Doping

Meaning and Concept of Doping, Prohibited Substances & Methods Side Effects of Prohibited Substances.

### Unit - XII Sports Medicine

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

### Unit - XIII Sports / Games

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

**Total 45 Hours**

### 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).

### Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Practice Physical activities and Hatha Yoga focusing on yoga for strength, flexibility, and relaxation.



- CO2 Learn techniques for increasing concentration and decreasing anxiety which leads to stronger academic performance.
- CO3 Learn breathing exercises and healthy fitness activities
- CO4 Explain the importance and benefits of basic yoga practices and physical activities for enhancing strength, flexibility, balance, and coordination.
- CO5 Perform yoga movements in various combination and forms.
- CO6 Assess current personal fitness levels
- CO7 Identify opportunities for participation in yoga and sports activities.
- CO8 Develop understanding of health-related fitness components: cardiorespiratory endurance, flexibility and body composition etc.
- CO9 Improve personal fitness through participation in sports and yogic activities.
- CO10 Develop understanding of psychological problems associated with the age and lifestyle.
- CO11 Demonstrate an understanding of sound nutritional practices as related to health and physical performance.
- CO12 Assess yoga activities in terms of fitness value.
- CO13 Identify and apply injury prevention principles related to yoga and physical fitness activities and correctly apply biomechanical and physiological principles related to exercise and training.

Course Title	: <b>COMMUNICATION SKILLS IN ENGLISH LAB</b>				
Course Code	: <b>25HS105</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
Course Category	: <b>HUMANITIES &amp; SOCIAL SCIENCE</b>	0	0	2	1

### Course Objectives :

This lab course aims at actively involving students in various activities to improve their communication skills with an emphasis on developing personality of the students. Thus, the objectives of this course are to develop listening skills for enhancing communication, to develop speaking skills with a focus on correct pronunciation and fluency and to introduce the need for Personality development-Focus will be on developing certain qualities which will aid students in handling personal and career challenges, leadership skills etc. for that purpose group discussion, extempore and other activities should be conducted during lab classes.

#### Unit - I Listening Skills

**07 Hours**

Listening Process and Practice: Introduction to recorded lectures, poems, interviews and speeches, listening tests.

#### Unit - II Introductions to Phonetics

**08 Hours**

Sounds: consonant, vowel, diphthongs etc. Transcription of words (IPA), weak forms. Syllable division, word stress, intonation, voice etc.




**Unit - III Speaking Skills**

**08 Hours**

Standard and formal speech: Group discussion, oral presentations, public speaking, business presentations etc. Conversation practice and role playing, mock interviews etc.

**Unit - IV Building Vocabulary**

**07 Hours**

Construction of words, phrasal verbs, foreign phrases, Etymological study of words idioms and phrases. Jargon/ Register related to organizational set up, word exercises and word games to enhance self-expression and vocabulary of participants.

**Total 30 Hours**

**Text books:**

1. Daniel Jones. The Pronunciation of English. Cambridge: Cambridge University Press 1956.
2. James Hartman & etal. Ed. English Pronouncing Dictionary. Cambridge University Press, 2006.
3. Kulbhushan Kamar. Effective Communication Skills, Khanna Publishing House. New Delhi (Revised Ed. 2018).

**References:**

1. J.D.O'Connor, Better English Pronunciation. Cambridge: Cambridge University Press, 1980.
2. Lindley Murray, An English Grammar: Comprehending Principles and Rules, London: Wilson and Sons, 1908.
3. Margaret M. Maison. Examine your English. Orient Longman: New Delhi: 1964.
4. J.Sethi & et al. A Practical Course in English Pronunciation. New Delhi: PrenticeHall, 2004.
5. Pfeiffer. William Sanborn and TVS Padmaja. Technical Communication A Practical Approach, 6th ed. Delhi: Pearson 2007.

**Course Outcomes:**

At the end of the study of this course, the students will be able to

- CO1 Apply language skills to read, write, and speak English in common social and workplace situations.
- CO2 Demonstrate comprehension of spoken English by listening carefully and interpreting others' viewpoints respectfully.
- CO3 Identify key elements of effective listening such as attention, comprehension, and response.



Course Title	: ENVIRONMENTAL SCIENCE				
Course Code	: 25AU102	L	T	P	C
Course Category	: AUDIT	2	0	0	0

**Course Objectives :**

The **Environmental Science** course aims to create awareness and understanding of the fundamental concepts of the environment, ecosystems, and the impact of human activities on natural resources. It focuses on educating students about environmental challenges such as pollution, climate change, biodiversity loss, and sustainable development.

**Unit - I Eco System****09 Hours**

Structure of ecosystem, Biotic & Abiotic components Food chain and food web. Aquatic (Lentic and Lotic) and terrestrial ecosystem. Carbon, Nitrogen, Sulphur, Phosphorus cycle. Global warming -Causes, effects, process, Green House Effect, Ozone depletion.

**Unit - II Air and Noise Pollution****09 Hours**

Definition of pollution and pollutant, Natural and manmade sources of air pollution (Refrigerants, I.C., Boiler) Air Pollutants: Types, Particulate Pollutants: Effects and control (Bag filter, Cyclone separator, Electrostatic Precipitator) Gaseous Pollution Control: Absorber, Catalytic Converter, Effects of air pollution due to Refrigerants, I.C., Boiler Noise pollution: sources of pollution, measurement of pollution level, Effects of Noise pollution, Noise pollution (Regulation and Control) Rules, 2000.

**Unit - III Water and Soil Pollution****09 Hours**

Sources of water pollution, Types of water pollutants, Characteristics of water pollutants, Turbidity, pH, total suspended solids, total solids BOD and COD: Definition, calculation Waste Water Treatment: Primary methods: sedimentation, froth floatation, Secondary methods: Activated sludge treatment, Trickling filter, Bioreactor, Tertiary Method: Membrane separation technology, RO (reverse osmosis). Causes, Effects and Preventive measures of Soil Pollution: Causes-Excessive use of Fertilizers, Pesticides and Insecticides, Irrigation, E-Waste.

**Unit - IV Renewable Sources of Energy****09 Hours**

Solar Energy: Basics of Solar energy, Flat plate collector (Liquid & Air). Theory of flat plate collector, Importance of coating, Advanced collector: Solar pond, Solar water heater, solar dryer, Solar stills. Biomass: Overview of biomass as energy source, Thermal characteristics of biomass as fuel, Anaerobic digestion. Biogas production mechanism. Utilization and storage of biogas. Wind energy: Current status and future prospects of wind energy, Wind energy in India, Environmental benefits and problem of wind energy. New Energy Sources: Need of new sources, Different types new energy sources, Applications of (Hydrogen energy, Ocean energy resources, Tidal energy conversion.) Concept, origin and power plants of geothermal energy.

**Unit - V Solid Waste Management, ISO 14000 & Environmental Management****09 Hours**



Solid waste generation- Sources and characteristics of Municipal solid waste, E- waste, biomedical waste. Metallic wastes and Non-Metallic wastes (lubricants, plastics, rubber) from industries. Collection and disposal: MSW (3R principles, energy recovery, sanitary landfill), Hazardous waste Air quality act 2004, air pollution control act 1981 and water pollution and control act 1996. Structure and role of Central and state pollution control board. Concept of Carbon Credit, Carbon Footprint. Environmental management in fabrication industry. ISO14000: Implementation in industries, Benefits.

**Total 45 Hours**

**Text books:**

1. S.C. Sharma & M.P. Poonia, Environmental Studies, Khanna Publishing House, New Delhi.
2. C.N. R. Rao, Understanding Chemistry, Universities Press (India) Pvt. Ltd., 2011.
3. Arceivala, Soli Asolekar, Shyam, Waste Water Treatment for Pollution Control and Reuse, Mc-Graw Hill Education India Pvt. Ltd., New York, 2007, ISBN:978-07-062099.
4. Nazaroff, William, Cohen, Lisa, Environmental Engineering Science, Wiley, New York, 2000, ISBN 10: 0471144940.
5. O.P. Gupta, Elements of Environmental Pollution Control, Khanna Publishing House, New Delhi.
6. Rao, C. S., Environmental Pollution Control and Engineering, New Age International Publication.

**Course Outcomes:**

At the end of the study of this course, the students will be able to

- CO1 Solve various engineering problems applying ecosystem to produce eco-friendly products.
- CO2 Explain the principles and working of common air and noise pollution control methods to solve domestic and industrial problems
- CO3 Explain the principles and working of common water and soil control method to solve domestic and industrial problems.
- CO4 Describe the characteristics, advantages, and limitations of various energy sources for different applications for domestic and industrial applications.
- CO5 Solve local solid and e-waste problems.



## SEMESTER – II

Course Title	: MATHEMATICS-II				
Course Code	: 25BS102	L	T	P	C
Course Category	: BASIC SCIENCE	3	1	0	4

**Course Objectives :**

This course is designed to give a comprehensive coverage at an introductory level to the subject of advanced Algebra, Integral Calculus, Co- ordinate geometry, Vector algebra and some advance Statistics.

**Unit - I Algebra -II****10 Hours**

Introduction to matrix, rows, columns, identify specific element in matrix, transpose of matrix, some special type of matrices – row matrix, column matrix, null, singleton, scalar, Identity, square Diagonal Matrices (upper and lower triangular matrix). Algebraic operations of matrix- addition, subtraction, scalar multiplication with matrix, matrix multiplication.

Determinant of a matrix of order two and three. Singular and non-singular matrix, Minors and Cofactors, Adjoint and Inverse of a Matrix, Applications of Determinants and Matrices, convert simultaneous linear equation of 2 and 3 variables in matrix form- Solution of system of linear equations (Cramer's rule only).

**Unit - II Integral Calculus****14 Hours**

Integration as inverse operation of differentiation. Integration Using by some standard and Trigonometric Identities, Integration by Substitution, Integration by Parts. Concept of finite integral (some examples), Geometric interpretation of Definite Integral (not for examinations), Use of formulas  $\int_0^{\pi} \sin^n x dx$ ,  $\int_0^{\pi} \cos^n x dx$  for solving problems (where  $m$  and  $n$  are positive integers).

**Unit - III Co- Ordinate Geometry****12 Hours**

Points on Cartesian plane, distance between two points, section formula, midpoint formula, collinear points. Basic properties to identify different types of triangles and quadrilaterals.

Equation of straight line in various standard forms (without proof), intersection of two straight lines, angle between two lines. Parallel and perpendicular lines, perpendicular distance formula.

General equation of a circle and its characteristics, method of finding centre and radius from a given equation of circle. To find the equation of a circle, given centre and radius coordinates of end points of a diameter. Definition of Conic (Parabola, Ellipse, Hyperbola) their standard equation without proof.

**Unit - IV Vector Algebra****10 Hours**

Points in two and three dimensional plane, Concept of direction. Introduction to vectors, magnitude of vector, unit vector, position vectors, types of vectors. Addition of vectors – triangle law, parallelogram law, subtraction of vector, properties of vector addition,




Multiplication of a Vector by a Scalar, Components of a vector, Vector joining two points. Scalar (or dot) product of two vectors, Projection of a vector on a line, Vector (or cross) product of two vectors, angle between two vectors, area of triangle and parallelogram using vector.

**Unit - V Statistics-2 and SQC****14 Hours**

Variance (population and sample), Standard Deviation (Concept, Formula and Calculation), Coefficient of Variation (CV%) (Definition importance and Applications).

Concept of samples, types of samples, Control charts for measurements ( $\bar{X}$  and  $R$  charts). Control charts for attributes ( $p$ ,  $c$  and  $np$  charts), Tolerance limits.

**Total 60 Hours****Text books:**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi, 40th Edition, 2007.
2. G. B. Thomas, R. L. Finney, Calculus and Analytic Geometry, Addison Wesley, 9th Edition, 1995.
3. S.S. Sabharwal, Sunita Jain, Eagle Parkashan, Applied Mathematics, Vol. I & II, Jalandhar.
4. Mathematics NCERT Textbook for Class XI, 2024-25 Edition.
5. Mathematics NCERT Textbook for Class XII part I, 2024-25 Edition.
6. Mathematics NCERT Textbook for Class XII part II, 2024-25 Edition.

**References:**

1. Comprehensive Mathematics, Vol. I & II by Laxmi Publications, Delhi.
2. K. Hoffman and R. Kunze: Linear Algebra.
3. Reena Garg & Chandrika Prasad, Advanced Engineering Mathematics, Khanna Publishing House, New Delhi.
4. Johnson, R.A., Miller, I and Freund J, "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.
5. J R Nagla, Statistics for Textile Engineers, Woodhead, 2014.
6. Das, B.C., & Mukherjee, B.N. – Vector Analysis (U.N. Dhur & Sons)

**Course Outcomes:**

At the end of the study of this course, the students will be able to

- CO1 Identify specific elements in a matrix and perform basic algebraic operations such as addition, subtraction, scalar multiplication, and matrix multiplication.
- CO2 Apply Integration for cumulative effect.
- CO3 Relate the connection between algebra and geometry through graphs of lines and curves.
- CO4 Learn to view vectors geometrically and graph them and learn about the applications of vectors.
- CO5 Apply the concepts of statistics in solving real life problems.



Course Title	: APPLIED PHYSICS				
Course Code	: 25BS103	L	T	P	C
Course Category	: BASIC SCIENCE	2	1	0	3

**Course Objectives :**

The course will help the diploma engineers to apply the basic concepts and principles to solve broad-based engineering problems and to understand different technology based applications.

**Unit - I Physical World, Units and Measurements****09 Hours**

Physical quantities; fundamental and derived units, Units and systems of units (FPS, CGS and SI units), Dimensions and dimensional formulae of physical quantities, Principle of homogeneity of dimensions, Dimensional equations and their applications (conversion from one system of units to other, checking of dimensional equations and derivation of simple equations), Limitations of dimensional analysis.

Measurements: Need of measuring instruments, least count, types of measurement (direct, indirect), Errors in measurements (systematic and random), absolute error, relative error, error estimation and significant figures.

**Unit - II Properties of Matter****09 Hours**

Elasticity: Definition of stress and strain, moduli of elasticity, Hooke's law, significance of stress-strain curve.

Viscosity and coefficient of viscosity: Terminal velocity, Stoke's law and effect of temperature on viscosity.

Surface tension: concept, units, cohesive and adhesive forces, angle of contact, Ascent Formula (No derivation), effect of temperature and impurity on surface tension.

Newton's laws of Gravitation, Universal Gravitational constant, Acceleration due to gravity and its variation on/ above/ below Earth's surface.

**Unit - III Heat and Temperature****07 Hours**

Concept of heat and temperature, modes of heat transfer (conduction, convection and radiation with examples), scales of temperature and their relationship.

Expansion of solids, liquids and gases, coefficient of linear, surface and cubical expansions and relation amongst them, Co-efficient of thermal conductivity, engineering applications.

**Unit - IV Wave Motion and Optics****10 Hours**

Simple Harmonic Motion (definition and example only), Wave motion, transverse and longitudinal waves with examples, definitions of wave velocity, frequency and wave length and their relationship, amplitude, phase, phase difference, Free damped and forced vibrations with examples, resonance.




Basic optical laws; reflection and refraction, refractive index, Total internal reflection, Critical angle, Lens and image formation by lens, lens formula, power of lens and magnification. Refraction through a prism, angle of deviation, Dispersion of light by prism. Lasers: laser characteristics, applications of lasers.

**Unit - V Electricity and Electronics****10 Hours**

Electric Current and its units, potential difference, Resistance and its units, series and parallel combination of resistances. Ohm's law and its verification, Heating effect of current, Electric power, Electric energy and its units.

Insulator, semi-conductor, conductor, intrinsic and extrinsic semiconductors, p-n junction, junction diode, forward and reverse bias and V-I characteristics, Transistor: description and three terminals, Working of PNP and NPN. Transistor connections: CB and CE connection (description and circuit diagram only).

**Total 45 Hours****Text books:**

1. Text Book of Physics for Class XI & XII (Part-I, Part-II); N.C.E.R.T., Delhi
2. New Simplified Physics by SI Arora for Class XI & XII (VOL-1, VOL-2), Dhanpat Rai & CO.
3. Concepts of Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi
4. A TEXT BOOK of Optics, N. Subramanyam, Brij Lal, MN Avahanulu, S Chand and Company Ltd.
5. Nootan CBSE Board Physics Text Book For Class 11<sup>th</sup> and 12<sup>th</sup>, By Kumar-Mittal - Nageen Prakashan.

**References:**

1. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi.
2. Engineering Physics by DK Bhattacharya & Poonam Tandan; Oxford University Press, New Delhi.
3. Modern approach to Applied Physics-I and II, AS Vasudeva, Modern Publishers.
4. Schaum's outline of applied physics / 4th edition by Arthur Beiser.

**Course Outcomes:**

At the end of the study of this course, the students will be able to

- CO1 Identify physical quantities, select their units for use in engineering solutions, and make measurements with accuracy by minimizing different types of errors.
- CO2 Explain Hooke's law and its significance and describe the viscosity of liquids, coefficient of viscosity and the various factors affecting its value and determine viscosity of an unknown fluid using Stokes' Law and the terminal velocity.
- CO3 Define the terms; heat and temperature, measure temperature in various processes on different scales (Celsius, Fahrenheit, and Kelvin etc.). Distinguish between conduction, convection and radiation; identify different.



- CO4 Define wave parameters: frequency, amplitude, wavelength, and velocity. Understand the formation of Image by lens and related numerical and illustrate the dispersion of light by prism.
- CO5 State Ohm's law, calculate the equivalent resistance of a variety of resistor combinations. Determine the energy consumed by an appliance. Differentiate insulators, conductors and semiconductors. Understand the working of NPN & PNP transistor.

Course Title	: <b>INTRODUCTION TO IT SYSTEM</b>				
Course Code	: <b>25ES102</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
Course Category	: <b>ENGINEERING SCIENCE</b>	3	0	0	3

### Course Objectives :

This course is intended to make new students comfortable with computing environment, computer programming languages, operating system, database terminology, basics of information technology, its role and present scenario and basics of multimedia.

### Unit - I Computer Basics & Internet Knowledge 12 Hours

Components of computer: Central Processing Unit, Computer Memory and Storage, Input Output Media and other Peripheral Devices, Digital India portals(state and national portal) and college portals.

Basics Internet skills-understanding browser, Evolution of Computers, Classification of Computer, Generations of Computers, The Computer system, Applications of Computers.

INTERNET: Applications of Internet – Getting connected to Internet – World Wide Web (www) – E-mail– Creating E-mail id, Sending, Receiving and Attaching Document.

### Unit - II Operating System 08 Hours

Operating system-Introduction, Types of operating system, DOS, Linux, UNIX, MS Windows. UNIX shell commands, shell and kernel, OS Installation (Linux and MS Windows).

### Unit - III Open Office & AI 08 Hours

Working with Office Tools: Writer, open office spreadsheet (Calc), open office impress (MS-office) Artificial Intelligence – Definition – Types – History – Structure of AI – Goals – Importance – Techniques.

### Unit - IV HTML & CSS for Web Designing 09 Hours

Introduction to HTML- Basic structure of an HTML -Creating an HTML document -Mark up Tags- Heading-Paragraphs-HTML Tags-Elements of HTML




Introduction to Cascading Style Sheets- Creating Style Sheet - CSS Properties - CSS Styling(Background, Text Format, Controlling Fonts) - Working with block elements and objects - Working with Lists and Tables - CSS Id and Class .

**Unit - V C Programming Language****08 Hours**

Program- Introduction to C-Variables, Constants & Data types- C operators - I/O statements - Control Statements- User defined functions, Basic conditional statements, Simple C Programs.

**Total 45 Hours****Text books:**

1. Introduction to Information Technology-ITL Education solutions limited, PEARSON.
2. Fundamentals of Information Technology, Alexis Leon, Mathews Leon, (Leon VIKAS).
3. Introduction to Information Technology, Khanna Publishing Co.(P)Ltd.
4. A Textbook of Basic C Programming – Vikash kumar Gupta, Khanna Publication.
5. Web Designing & Publishing –T Bajaji publication

**Course Outcomes:**

At the end of the study of this course, the students will be able to

CO1 Identify computer system components and the concept of the Internet and how it works.

CO2 Explain the purpose, functions and components of an operating system, different types of operating systems and installation steps.

CO3 Explain the Office tools and the fundamentals of AI.

CO4 Structure web pages using elements like headings, paragraphs, lists, tables and forms.

CO5 Explain the fundamental concepts of C, including syntax, data types, and operators.

Course Title	: <b>FUNDAMENTALS OF ELECTRICAL, ELECTRONICS ENGINEERING</b>				
Course Code	: <b>25ES104</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
Course Category	: <b>ENGINEERING SCIENCE</b>	2	1	0	3

**Course Objectives :**

To provide basic knowledge of the different elements and concepts of electrical engineering field and to learn basic concepts of various active and passive electronic components, signals, op-amp and their applications, digital electronics and their applications to help students deal with electrical and electronics engineering principles and applications in industrial processes of different fields




**Unit - I Overview of Digital Electronics, Electronics Components & Signals 09 Hours**

Passive & Active components: Resistors, Capacitors, Inductors. Source transformation: current to voltage & voltage to current, P-N junction Diode, FET, BJT, flip flop -introduction. Ohms law, Types of signal waveform, Ideal/non- ideal voltage/current source, Independent /dependent voltage /current source, Basic Logic Gates.

**Unit - II Overview of Analog Circuits 09 Hours**

Operational amplifier –Ideal op-Amp, Practical op-amp, open loop & closed loop configuration. Block diagram of op-Amp, Application of op-amp as amplifier, adder, differentiator and integrator.

**Unit - III Electric and Magnetic Circuits 09 Hours**

EMF, Current, Potential Difference, Power and Energy, M.M.F, Magnetic force, permeability, reluctance, leakage factor, BH curve. Faraday's law of electromagnetic induction, dynamically induced EMF, statically induced EMF, equation of self and mutual inductance, Analogy between electric and magnetic circuits.

**Unit - IV Electrical AC Circuits 09 Hours**

Cycle, Frequency, Periodic time, Amplitude, RMS value, Average value, Peak value, Form factor, Peak factor, Impedance, phase angle and power factor. Mathematical and phasor representation of alternating EMF and current, voltage and current relationship in star delta connection, AC in resistors, inductor and capacitors, AC in R-L series, R-C series, Power in AC Circuit, power triangle.

**Unit - V Transformer and Motors 09 Hours**

Transformer-General construction and principle of different types of Transformers, Emf equation and transformation ratio of transformer, Autotransformer-Basics. Introduction, construction and working principle of Induction Motor and DC motor.

**Total 45 Hours****References:**

1. RituSahdev, Basic Electrical Engineering, Khanna Publishing House.
2. Therja, B.L., Electrical Technology Vol-I, S. Chand Publications, New Delhi.
3. Therja, B.L., Electrical Technology Vol-II, S. Chand Publications, New Delhi.
4. Sexena, S. B. Lal, Fundamentals of Electrical Engineering, Cambridge University Press.
5. Jegathesan, V., Basic Electrical and Electronics Engineering, Wiley India, New Delhi.
6. Electrical safety Handbook, by John Cadick, Mary capelli-Schellpfeffer, Dennis K. Neitzel, AI Winfield, The McGraw-Hill companies.

**Course Outcomes:**

At the end of the study of this course, the students will be able to

- CO1 Identify system components and working principles of electrical components, Signals and IC.



- CO2 Explain the basics of op-amp.
- CO3 Explain fundamental concepts of electric and magnetic circuits.
- CO4 Describe AC Circuit Fundamentals.
- CO5 Describe Electromagnetic Principles, motors and Transformer Working.

Course Title	: ENGINEERING MECHANICS				
Course Code	: 25ES106	L	T	P	C
Course Category	: ENGINEERING SCIENCE	2	1	0	3

### Course Objectives :

To obtain resultant of various forces. To calculate support reactions through conditions of various structures. To understand role of friction in equilibrium problems, and to know fundamental laws of machine and their applications to various engineering problems.

### Unit - I Basics of Mechanics and Force System

09 Hours

Significance and relevance of Mechanics, Applied mechanics, Statics, Dynamics. Space, time, mass, particle, flexible body and rigid body. Scalar and vector quantity.

Introduction to Dynamics – speed, velocity and acceleration. Equation of linear motion. Motion under gravity and acceleration due to gravity. Simple numerical problems.

Force–unit, characteristics and effects of a force, Principle of transmissibility of force, Force system and its classification.

Composition of forces– Resultant, analytical method for determination of resultant for concurrent, and parallel co-planar force systems – Law of triangle, parallelogram and polygon of forces.

Resolution of a force- Orthogonal components of a force, moment of a force, Varignon's Theorem.

### Unit - II Equilibrium

09 Hours

Equilibrium and Equilibrant, Free body and Free body diagram (concept only), Condition(s) of equilibrium.

Lami's Theorem– statement and explanation, Application for various simple engineering problems.

Types of beams, supports (simple, hinged, roller and fixed) and loads acting on beam (vertical and inclined point load, uniformly distributed load).

Beam reaction for cantilever, simply supported beam without overhang – subjected to combination of Point load and uniformly distributed load.




**Unit - III Friction**

**09 Hours**

Friction and its relevance in engineering, types and laws of friction, limiting equilibrium, limiting friction, co-efficient of friction, angle of friction, angle of repose, relation between co-efficient of friction and angle of friction.

Equilibrium of bodies on level surface subjected to force parallel and inclined to plane. Equilibrium of bodies on inclined plane (single object) subjected to force parallel to the plane only.

**Unit - IV Centroid and Centre of Gravity**

**09 Hours**

Centroid of geometrical plane figures (square, rectangle, triangle, circle, semi-circle, quarter circle) Centroid of composite figures composed of not more than three geometrical figures.

Centre of Gravity of simple solids (cube, cuboid, cone, cylinder) Centre of Gravity of composite solids composed of not more than two simple solids.

**Unit - V Simple Lifting Machine**

**09 Hours**

Simple lifting machine, load, effort, mechanical advantage, applications and advantages. Velocity ratio, efficiency of machines, law of machine. Ideal machine, friction in machine, maximum Mechanical advantage and efficiency, reversible and non-reversible machines, conditions for reversibility.

Velocity ratios of simple axle and wheel, Differential axle and wheel, Simple screw jack, and Worm and Worm wheel.

**Total 45 Hours**

**Text books:**

1. Ghosh, B.B, Engineering Mechanics, Vikas Publishing House Pvt. Ltd.
2. D.S. Bedi, Engineering Mechanics, Khanna Publications, New Delhi (2008).
3. Khurmi, R.S., Applied Mechanics, S.Chand & Co. New Delhi.
4. Bansal RK, A text book of Engineering Mechanics, Laxmi Publications.

**References:**

1. Ramamrutham, Engineering Mechanics, S.Chand & Co. New Delhi.
2. Dhade, Jamadar & Walawelkar, Fundamental of Applied Mechanics, Pune Vidhyarthi Gruh.
3. Ram, H.D.; Chauhan, A.K., Foundations and Applications of Applied Mechanics, Cambridge University Press.
4. Meriam, J.L., Kraige, L.G., Engineering Mechanics-Statics, Vol. I, Wiley.

**Course Outcomes:**

At the end of the study of this course, the students will be able to

CO1 Identify the force systems for given conditions by applying the basics of mechanics.

CO2 Determine unknown force(s) of different engineering systems.



- CO3 Apply the principles of friction in various conditions for useful purposes.
- CO4 Find the centroid and centre of gravity of various components in engineering systems.
- CO5 Select the relevant simple lifting machine(s) for given purpose.

Course Title	: APPLIED PHYSICS LAB				
Course Code	: 25BS107	L	T	P	C
Course Category	: BASIC SCIENCE	0	0	2	1

### Course Objectives :

Study of Applied Physics aims to give an understanding of physical world by observations and predictions. Concrete use of physical principles and analysis in various fields of engineering and technology is very prominence. The course aims to supplement the factual knowledge gained in the lecture by first hand manipulation of apparatus. This will develop scientific temper and help to apply the basic concepts and principles in solving engineering and technology based problems. In addition, students get necessary confidence in handling equipment and thus learn various skills in measurement.

### List of Practical's (to perform minimum 10 practical's)

- To measure length, radius of a given cylindrical object (test tube and beaker) using a Vernier Caliper and find volume of each object.
- To determine diameter of a wire and thickness of cardboard using a screw gauge.
- To determine force constant of a spring using Hooke's Law.
- To determine the surface tension of water by capillary rise method.
- To find the moment of inertia of a fly wheel.
- To find the viscosity of a given liquid (Glycerine) by Stoke's law.
- To measure room temperature and temperature of a hot bath using mercury thermometer and convert it into different scales.
- Using a Simple Pendulum plot  $L - T$  and  $L - T^2$  graphs, hence find the effective length of second's pendulum using appropriate graph.
- To study the relation between frequency and length of a given wire under constant tension using sonometer.
- To determine focal length and magnifying power of a convex lens.
- To measure wavelength of a He-Ne/diode laser using a diffraction grating.
- To verify Ohm's law by plotting graph between current and potential difference.
- To verify laws of resistances in series and parallel combination.
- To draw V-I characteristics of a semiconductor diode and determine its knee voltage.

**Total 30 Hours**

### Text books:




1. Text Book of Physics for Class XI& XII (Part-I, Part-II); N.C.E.R.T., Delhi
2. Comprehensive Practical Physics, Vol, I & II, JN Jaiswal, Laxmi Publications (P)Ltd.
3. Practical Physics by C. L. Arora, S. Chand Publication.

**Course Outcomes:**

At the end of the study of this course, the students will be able to

- CO1 Select right kind of measuring tools (Meter scale, Vernier caliper, Screw gauge, etc.) for determining dimensions of physical quantities and make measurements with accuracy and precision.
- CO2 Measure temperature under different conditions and different scales of temperature measurements. Apply knowledge of optics to determine focal length and magnifying power of optical lenses.
- CO3 Verify Ohm's law for flow of current, verify laws of series and parallel combination of resistances. Understand the characteristics of a semiconductor diode and determine the knee voltage.

Course Title	: <b>INTRODUCTION TO IT SYSTEM LAB</b>				
Course Code	: <b>25ES108</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
Course Category	: <b>ENGINEERING SCIENCE</b>	0	0	2	1

**Course Objectives :**

This Lab course is intended to practice whatever is taught in theory class of "Introduction to IT systems" and become proficient in using computing environment basic computer skills, basic application software tools, computer hardware, cyber security features, etc.

**List of Practical's (to perform minimum 10 practical's)**

1. Browser features, browsing, using various search engines, writing search queries.
2. Visit various e-governance/Digital India portals; understand their features and services offered.
3. Read Wikipedia pages on computer hardware components, look at those components in lab, identify them, recognize various ports/interfaces and related cables, etc.
4. Install Linux and windows operating system on lab machine and explore various options.
5. Connect various peripherals (printer, scanner, etc.) to computer; explore various features of peripheral and their device driver software.
6. Practice HTML commands, try them with various values make your own Webpage.
7. Explore feature of Open Office tools, create documents, Presentations, and Resume using these features, do it multiple times.
8. Explore security features of Operating Systems and Tools, try using them and see what happens.
9. Practice simple C programs.




This is a skill course .More you practice, better it will be.

**Total 30 Hours**

### References:

1. R.S Salaria, Computer Fundamentals, Khanna Publishing House.
2. Ramesh Bangia, PC Software Made Easy-The PC Course Kit, Khanna Publishing House.
3. Web design with HTML & CSS- Prem Kumar.

### Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Comfortably work on computer, install and configure OS.

CO2 Assemble a PC and connect it to external devices.

CO3 Write documents, create worksheets, prepare presentation, protect information and computer from basics abuses/attacks.

Course Title	: <b>FUNDAMENTAL OF ELECTRICAL AND ELECTRONICS ENGINEERING LAB</b>				
Course Code	: <b>25ES110</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
Course Category	: <b>ENGINEERING SCIENCE</b>	0	0	2	1

### Course Objectives :

The practical in this section are to be developed and assessed in the student for the attainment of the competency in Electrical machines and electronics components.

### List of Practical's (to perform minimum 10 practical's)

1. Determine the permeability of magnetic material by plotting its B-H curve.
2. Measure voltage, current and power in 1-phase circuit with resistive load.
3. Measure voltage, current and power in R-L-C Series circuit with and without capacitor.
4. Connect single phase transformer and measure input and output Quantities.
5. Determine the transformation ratio (K) of 1-phase transformer.
6. Connect resistors in series and parallel combinations on bread board and measure its value using Multimeter.
7. Identify various active and passive electronic components in the given circuit.
8. Use LCR-Q tester to measure the value of given capacitor and inductor.
9. Determine the value of given resistor using digital Multimeter to confirm with colour code.
10. Test the performance of P-N junction diode.
11. To measure the 3-phase induction motor line and phase voltage and current values.
12. Identify the three terminals of transistor using digital Multimeter.
13. Test the performance of transistor switch circuit.
14. Test OP-Amp as amplifier, Integrator and differentiator.




15. Logic gate verification using trainer kit.

**Total 30 Hours****References:**

1. Fundamentals of electrical and electrical engineering with lab manual –susan s Mathew.
2. Electronics lab manual by KA Navas.
3. Electronic devices and circuit laboratory manual –Srinivasa Murthy.

**Course Outcomes:**

At the end of the study of this course, the students will be able to

- CO1 Explain the working principles and functions of simple electric circuits and common electrical machines.
- CO2 Describe the characteristics and behavior of signal waveforms, electric and magnetic circuits, and the significance of the B-H Curve in magnetism.
- CO3 Explain the working principles, characteristics, and functions of different types of OP-AMPs and control systems.

Course Title	: <b>ENGINEERING MECHANICS LAB</b>				
Course Code	: <b>25ES112</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
Course Category	: <b>ENGINEERING SCIENCE</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**Course Objectives :**

Following are the objectives of this course: To obtain resultant of various forces, to calculate support reactions through conditions of equilibrium for various structures, to understand role of friction in equilibrium problems, to understand the fundamental laws of machines and their applications to various engineering problems.

**List of Practical's (to perform minimum 10 practical's)**

1. To study various equipment related to Engineering Mechanics.
2. Determine resultant of concurrent force system applying Law of Polygon of forces using force table.
3. Determine resultant of concurrent force system graphically.
4. Determine resultant of parallel force system graphically.
5. Verify Lami's theorem.
6. Study forces in various members of Jib crane.
7. Determine support reactions for simply supported beam.
8. Obtain support reactions of beam using graphical method.
9. Determine coefficient of friction for motion on horizontal and inclined plane.
10. Determine centroid of geometrical plane figures
11. To find the M.A., V.R., Efficiency and law of machine for Differential Axle and Wheel.




12. To find the M.A., V.R., Efficiency and law of machine for Simple Screw Jack.
13. Derive Law of machine using Single purchase crab.
14. Derive Law of machine using double purchase crab.
15. Derive Law of machine using Weston's differential or wormed geared pulley block.

**Total 30 Hours**

**References:**

1. Ramamrutham, Engineering Mechanics, S. Chand & Co. New Delhi.
2. Dhade, Jamadar & Walawelkar, Fundamental of Applied Mechanics, Pune Vidhyarthi Gruh.
3. Ram, H. D.; Chauhan, A. K., Foundations and Applications of Applied Mechanics, Cambridge University Press.
4. Meriam, J. L., Kraige, L.G., Engineering Mechanics- Statics, Vol. I, Wiley Publication, New Delhi.

**Course Outcomes:**

At the end of the study of this course, the students will be able to

- CO1 Predict the force systems for given conditions by applying the basics of mechanics and find unknown force(s) of different engineering systems.
- CO2 Apply the principles of friction in various conditions for useful purposes.
- CO3 Find the centroid and centre of gravity of various components in engineering systems and predict the relevant simple lifting machine(s) for given purposes.

