

# **REVISED COURSE CURRICULUM FOR FIRST SEMESTER**

**(COMMON TO ALL BRANCHES OF ENGINEERING COURSES)**

**W.E.F. 2023-24**



**BOARD OF TECHNICAL EDUCATION**

**MUNI MAYA RAM MARG**

**PITAMPURA, DELHI-110034**

# **First Year Curriculum Structure Common to All Branches**

- 1. Computer Engineering**
- 2. Electronics & Communication Engineering**
- 3. Information Technology Enabled Services And Management**
- 4. Instrumentation & Control Engineering**
- 5. Electronic Engineering (Digital Electronics)**
- 6. Medical Electronics**
- 7. Electrical Engineering**
- 8. Civil Engineering**
- 9. Mechanical Engineering**
- 10. IC Manufacturing**

| Sl. No | Category of Course          | Code No. | Course Title                        | Hours per week |   |   | Total contact hrs/week | Credits   |
|--------|-----------------------------|----------|-------------------------------------|----------------|---|---|------------------------|-----------|
|        |                             |          |                                     | L              | T | P |                        |           |
| 1.     | Basic Science               | BS101    | Mathematics-I                       | 3              | 1 | 0 | 4                      | 4         |
| 2.     | Basic Science               | BS103    | Applied Physics-I                   | 2              | 1 | 0 | 3                      | 3         |
| 3.     | Basic Science               | BS105    | Applied Chemistry                   | 2              | 1 | 0 | 3                      | 3         |
| 4.     | Humanities & Social Science | HS101    | Communication Skills in English     | 3              | 0 | 0 | 4                      | 3         |
| 5.     | Engineering Science         | ES101    | Engineering Graphics                | 0              | 0 | 3 | 3                      | 1.5       |
| 6.     | Engineering Science         | ES103    | Engineering Workshop Technology     | 1              | 0 | 3 | 4                      | 2.5       |
| 7.     | Basic Science               | BS107    | Applied Physics-I Lab               | 0              | 0 | 2 | 2                      | 1         |
| 8.     | Basic Science               | BS109    | Applied Chemistry Lab               | 0              | 0 | 2 | 2                      | 1         |
| 9.     | Humanities & Social Science | HS103    | Sports and Yoga                     | 0              | 0 | 2 | 2                      | 1         |
| 10.    | Humanities & Social Science | HS105    | Communication Skills in English Lab | 0              | 0 | 2 | 2                      | 1         |
|        | <b>Total Credits</b>        |          |                                     |                |   |   |                        | <b>21</b> |

**Detailed First Year Curriculum Contents**  
**SEMESTER - I**

|                   |   |                 |
|-------------------|---|-----------------|
| Course Code       | : | BS101           |
| Course Title      | : | Mathematics- I  |
| Number of Credits | : | 4 (L:3,T:1,P:0) |
| Prerequisites     | ; | NIL             |
| Course Category   | : | BS              |

**Course Objectives:**

This course is designed to give a comprehensive coverage at an introductory level to the subject of Trigonometry, Differential Calculus and Basic elements of algebra.

**Course Content:**

**UNIT - I: Trigonometry**

Concept of angles, measurement of angles in degrees, grades and radians and their conversions, T-Ratios of Allied angles (without proof), Sum, difference formulae and their applications (without proof). Product formulae (Transformation of product to sum, difference and vice versa). T- Ratios of multiple angles, sub-multiple angles (2A, 3A, A/2). Graphs of  $\sin x$ ,  $\cos x$ ,  $\tan x$  and  $e^x$ .

**UNIT-II: Differential Calculus**

Definition of function; Concept of limits. Four standard limits  $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a}$ ,  $\lim_{x \rightarrow 0} \frac{\sin x}{x}$ ,

$$\lim_{x \rightarrow a} \left( \frac{a^x - 1}{x} \right) \text{ and } \lim_{x \rightarrow a} (1 + x)^{\frac{1}{x}}$$

Differentiation by definition of  $x^n$ ,  $\sin x$ ,  $\cos x$ ,  $\tan x$ ,  $e^x$  and  $\log_a x$ . Differentiation of sum, product and quotient of functions. Differentiation of function of a function. Differentiation of trigonometric and inverse trigonometric functions, Logarithmic differentiation, Exponential functions.

**UNIT - III: Algebra**

**Complex Numbers:** Definition, real and imaginary parts of a Complex number, polar and Cartesian, representation of a complex number and its conversion from one form to other, conjugate of a complex number, modulus and amplitude of a complex number Addition, Subtraction, Multiplication and Division of a complex number. De-moivre's theorem, its application.

**Partial fractions:** Definition of polynomial fraction proper & improper fractions and definition of partial fractions. To resolve proper fraction into partial fraction with denominator containing non-repeated linear factors, repeated linear factors and irreducible non-repeated quadratic factors. To resolve improper fraction into partial fraction.

**References:**

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. V. Sundaram, R. Balasubramanian, K.A. Lakshminarayanan, Engineering Mathematics, 6/e., Vikas Publishing House.

5. Reena Garg & Chandrika Prasad, Advanced Engineering Mathematics, Khanna Publishing House, New Delhi

**Course Outcomes:**

By the end of the course, the students are expected to learn

- (i) The students are expected to acquire necessary background in Trigonometry to appreciate the importance of the geometric study as well as for the calculation and the mathematical analysis.
- (ii) The ability to find the effects of changing conditions on a system.
- (iii) Complex numbers enter into studies of physical phenomena in ways that most people cannot imagine.
- (iv) The partial fraction decomposition lies in the fact that it provides an algorithm for computing the antiderivative of a rational function.

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|                   |   |                           |
|-------------------|---|---------------------------|
| Course Code       | : | BS103                     |
| Course Title      | : | Applied Physics –I        |
| Number of Credits | : | 3 (L: 2, T: 1, P: 0)      |
| Prerequisites     | : | High School Level Physics |
| Course Category   | : | BS                        |

**Course Objectives:**

Applied Physics includes the study of a large number of diverse topics all related to materials/things that exist in the world around us. It aims to give an understanding of this world both by observation and by prediction of the way in which such objects behave. Concrete use of physical principles and analysis in various fields of engineering and technology are given prominence in the course content. 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.

**Teaching Approach:**

- Teachers should give examples from daily routine as well as, engineering/technology applications on various concepts and principles in each topic so that students are able to understand and grasp these concepts and principles. In all contents, SI units should be followed.
- Use of demonstration can make the subject interesting and develop scientific temper in the students. Student activities should be planned on all the topics.
- Activity- Theory - Demonstrate/practice approach may be followed throughout the course so that learning may be outcome and employability based.

**Course Content:**

**Unit 1: Physical world, Units and Measurements**

Physical quantities; fundamental and derived, 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, measuring instruments, least count, types of measurement (direct, indirect), Errors in measurements (systematic and random), absolute error, relative error, error propagation, error estimation and significant figures.

**Unit 2: Force and Motion**

Scalar and Vector quantities – examples, representation of vector, types of vectors. Addition and Subtraction of Vectors, Triangle and Parallelogram law (Statement only), Scalar and Vector Product, Resolution of a Vector and its application to inclined plane and lawn roller. Force, Momentum, Statement and derivation of conservation of linear momentum, its applications such as recoil of gun, rockets, Impulse and its applications.

Circular motion, definition of angular displacement, angular velocity, angular acceleration, frequency, time period, Relation between linear and angular velocity, linear acceleration and angular acceleration (related numerical), Centripetal and Centrifugal forces with live examples, Expression and applications such as banking of roads and bending of cyclist.

**Unit 3: Work, Power and Energy**

Work: Concept and units, examples of zero work, positive work and negative work

Friction: concept, types, laws of limiting friction, coefficient of friction, reducing friction and its

engineering applications, Work done in moving an object on horizontal and inclined plane for rough and plane surfaces and related applications.

Energy and its units, kinetic energy, gravitational potential energy with examples and derivations, mechanical energy, conservation of mechanical energy for freely falling bodies, transformation of energy (examples).

Power and its units, power and work relationship, calculation of power (numerical problems).

#### **Unit 4: Rotational Motion**

Translational and rotational motions with examples, Definition of torque and angular momentum and their examples, Conservation of angular momentum (quantitative) and its applications.

Moment of inertia and its physical significance, radius of gyration for rigid body, Theorems of parallel and perpendicular axes (statements only), Moment of inertia of rod, disc, ring and sphere (hollow and solid); (Formulae only).

#### **Unit 5: Properties of Matter**

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

Pressure: definition, units, atmospheric pressure, gauge pressure, absolute pressure, Fortin's Barometer and its applications.

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

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

Hydrodynamics: Fluid motion, stream line and turbulent flow, Reynold's number Equation of continuity, Bernoulli's Theorem (only formula and numericals) and its applications.

#### **Unit 6: Heat and Thermometry**

Concept of heat and temperature, modes of heat transfer (conduction, convection and radiation with examples), specific heats, scales of temperature and their relationship, Types of Thermometer (Mercury thermometer, Bimetallic thermometer, Platinum resistance thermometer, Pyrometer) and their uses.

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

#### **Learning Outcome:**

After undergoing this subject, the student will be able to:

- Identify physical quantities, select their units for use in engineering solutions, and make measurements with accuracy by minimizing different types of errors.
- Represent physical quantities as scalar and vectors and solve real life relevant problems.
- Analyse type of motions and apply the formulation to understand banking of roads/railway tracks and conservation of momentum principle to describe rocket propulsion, recoil of gun etc.
- Define scientific work, energy and power and their units. Drive relationships for work, energy and power and solve related problems.
- Describe forms of friction and methods to minimize friction between different surfaces.
- State the principle of conservation of energy. Identify various forms of energy, and energy transformations.
- Compare and relate physical properties associated with linear motion and rotational motion and apply conservation of angular momentum principle to known problems.
- Describe the phenomenon of surface tension, effects of temperature on surface tension and solve

statics problems that involve surface tension related forces.

- Describe the viscosity of liquids, coefficient of viscosity and the various factors affecting its value. Determine viscosity of an unknown fluid using Stokes' Law and the terminal velocity.
- Define stress and strain. State Hooke's law and elastic limits, stress-strain diagram, determine; (a) the modulus of elasticity, (b) the yield strength (c) the tensile strength, and (d) estimate the percent elongation.
- Illustrate 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 methods for reducing heat losses and mode of heat transfer between bodies at different temperatures.
- State specific heats and measure the specific heat capacity of solids and liquids.

### References:

1. Text Book of Physics for Class XI& XII (Part-I, Part-II); N.C.E.R.T., Delhi
2. Applied Physics, Vol. I and Vol. II, TTTI Publications, Tata McGraw Hill, Delhi.
3. Concepts in Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi
4. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi
5. Engineering Physics by DK Bhhatacharya & PoonamTandan; Oxford University Press, New Delhi
6. Comprehensive Practical Physics, Vol, I & II, JN Jaiswal, Laxmi Publications (P) Ltd., New Delhi
7. Practical Physics by C. L. Arora, S. Chand Publication.
8. Basic Applied Physics by H.R. Meena, Dr. N. Pant, Suhani Publications, Delhi
9. Basic Applied Physics by Dr. P. Kaur, Amit Sharma, Satya Prakashan, Delhi
10. Applied Physics Vol.-I, Vol.-II by Vibha Jain, Dhanpat Rai & Co.

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|-------------------|---|---------------------------|
| Course Code       | : | BS105                     |
| Course Title      | : | Applied Chemistry         |
| Number of Credits | : | 3 (L: 2, T: 1, P: 0)      |
| Prerequisites     | : | High School Level Physics |
| Course Category   | : | BS                        |

**Course Objectives:**

There are numerous number materials are used in fabricating and manufacturing devices for the comfort of life. The selection, characterization and suitability assessment of natural raw materials essentially requires principles and concepts of Applied Chemistry for technicians. On successful completion of this course content will enable technicians to understand, ascertain and analyse and properties of natural raw materials require for producing economical and eco-friendly finished products.

- Solve various engineering problems applying the basic knowledge of atomic structure and chemical bonding.
- Use relevant water treatment method to solve domestic and industrial problems.
- Solve the engineering problems using knowledge of engineering materials and properties.
- Use relevant fuel and lubricants for domestic and industrial applications
- Solve the engineering problems using concept of Electrochemistry and corrosion.

**Course Content:**

**Unit 1 Atomic Structure, periodic properties of elements :**

- Rutherford model structure of atom, Bohr theory of H atom. Quantum numbers and their significance, de-broglie equation and uncertainty principle. Electronic configuration 1 to 30 elements, periodic law, periodic table periodicity in properties like atomic radii and volume ionic radii, ionization energy and electron affinity. Division of elements of s, p, d and f block.

**Unit 2 Chemical bonding:**

- Electrovalent, Covalent and coordinate bond and their properties. Metallic bonding and properties (like texture , conductance , lusture , ductility and malleability ) orbital concept of covalence ,hybridization sp,sp<sup>2</sup>,sp<sup>3</sup> ( simple treatment).

**Unit 3 Water:**

- Hard and soft water, causes of hardness of water, types of hardness - temporary and permanent hardness, Expression of hardness of water, ppm unit of hardness. , Removal of hardness of removal of temporary hardness by boiling and Clark's method; removal of permanent hardness of water by Ion -Exchange method, Disadvantages of hard water, boiler problems caused by hard water: scale and sludge formation, printing and foaming, caustic embrittlement, pH value.

**Unit 4 Metals, alloys and Corrosion :**

- Metal, non-metals and metalloids. Conductors, semiconductors, insulators. Bond theory of solids, classification and necessity for making alloys, brass, bronze, gun metal and Duralumin. Effect of carbon nickel, chromium, manganese on steel. Corrosion definition, dry and wet corrosion, factor effecting rate of corrosion. Method of prevention of corrosion

## **Unit 5 Engineering Materials [Plastic and lubricants]:**

- Polymers and plastics: definition of polymer and plastic, Addition and condensation polymerization, thermoplastic and thermosetting polymers, preparation, properties and uses of polythene, PVC, Nylon-66 and Bakelite, Definition and functions of a good lubricant, classification of lubricants with examples

### **Suggested Sessional work:**

#### **Unit 1 & 2: Atomic Structure, Chemical Bonding and Solutions**

Assignments: Writing electronic configuration of elements up to atomic number 30 ( $Z=30$ ). Numerical on molarity, ppm, mass percentage, volume percentage and mole fraction of given solution.

#### **Seminar:**

1. Quantum numbers,
  2. Discuss the metallic properties such as malleability, ductility, hardness, high melting point, conductance of heat and electricity, magnetic properties of metals.
- Projects: Model of molecules  $\text{BeCl}_2$ ,  $\text{BF}_3$ ,  $\text{CH}_4$ ,  $\text{NH}_3$ ,  $\text{H}_2\text{O}$ .

#### **Unit 3: Water**

Assignments: Simple problems on hardness calculation.

#### **Seminar:**

1. Quality and quantity requirement of water in house and industry.
  2. Quality of control measures of effluents (BOD & COD).
- Projects: Collect water samples from different water sources and measure of hardness of water.

#### **Unit 4: Metals, alloys and Corrosion**

Assignments: Preparation of table showing different ores of iron, copper and aluminium metals along with their chemical compositions and classify in to oxide sulphide halide ores.  
Simple problems on Faradays laws of electrolysis

#### **Seminar:**

1. Corrosion rate and units.
  2. Corrosion preventions.
  3. Discuss the chemical reactions taking place in blast furnace in extraction of Fe, Cu and Al metals.
- Projects: Make table showing place of availability of different ores in India and show places on India map.  
Mapping of area in India prone to corrosion, Collection of data of various electrochemical cells, batteries used in equipment and devices and available in market. Visit to sites such as Railway station to watch corrosion area in railways and research establishment in and around the institution.

#### **Unit 5: Engineering Materials [Plastic and lubricants]:**

Projects: Mapping of energy resources in India. Collection of data of various lubricants available in the market.

### **Learning Outcomes**

At the end of the course student will be able to:

1. Understand the classification and general properties of engineering materials such as metal, alloys, glasses, cement, refractory and composite materials using knowledge of chemical bonding.
2. Understand and assess the suitability of water source for domestic and industrial application, effluents and minimize water pollution.

3. Qualitatively analyze the engineering materials and understand their properties and applications.
4. Choose fuel and lubricants suitable for economical industrial processing to obtain eco-friendly finished products.
5. Ascertain construction, mechanism efficiency of electrochemical cells, solar cell fuel cells
6. Understand corrosion and develop economical prevention techniques.

**References/Suggested Learning Resources:**

**(a) Books :**

1. Text Book of Chemistry for Class XI& XII (Part-I, Part-II); N.C.E.R.T., Delhi, 2017-18.
2. Agarwal, & Shikha, Engineering Chemistry, Cambridge University Press; New Delhi, 2015.
3. C. N. R. Rao, Understanding Chemistry, Universities Press (India) Pvt. Ltd., 2011.
4. Dara, S. S. & Dr. S. S. Umare, Engineering Chemistry, S. Chand. Publication, New Delhi, New Delhi, 2015.
5. Jain & Jain, Engineering Chemistry, Dhanpat Rai and Sons; New Delhi, 2015.
6. Dr. Vairam, S., Engineering Chemistry, Wiley India Pvt.Ltd., New Delhi, 2013.
7. Dr. G. H. Hugar & Prof A. N. Pathak, Applied Chemistry Laboratory Practices, Vol. I and Vol. II, NITTTTR, Chandigarh, Publications, 2013-14.
8. Agnihotri, Rajesh, Chemistry for Engineers, Wiley India Pvt. Ltd., 2014.

**(b) Open source software and website address:**

1. [www.chemguide.co.uk/atommenu.html](http://www.chemguide.co.uk/atommenu.html) (Atomic structure and chemical bonding)
2. [www.visionlearning.com](http://www.visionlearning.com) (Atomic structure and chemical bonding)
3. [www.chem1.com](http://www.chem1.com) (Atomic structure and chemical bonding)
4. <https://www.wastewaterelearning.com/elearning/> (Water Treatment)
5. [www.capital-refractories.com](http://www.capital-refractories.com) (Metals, Alloys, Cement, and Refractory Materials)
6. [www.em-ea.org/guide%20books/book-2/2.1%20fuels%20and%20combustion.pdf](http://www.em-ea.org/guide%20books/book-2/2.1%20fuels%20and%20combustion.pdf) (Fuel and Combustion)
7. [www.chemcollective.org](http://www.chemcollective.org) (Metals, Alloys)
8. [www.wqa.org](http://www.wqa.org)(Water Treatment)

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|-------------------|---|---------------------------------|
| Course Code       | : | HS101                           |
| Course Title      | : | Communication Skills in English |
| Number of Credits | : | 3 (L: 3, T: 0, P: 0)            |
| Prerequisites     | : | NIL                             |
| Course Category   | : | HS                              |

**Course Objectives:**

Communication skills play an important role in career development. This course aims at introducing basic concepts of communication skills with an emphasis on developing personality of the students.

Thus, the main objectives of this course are:

- To develop confidence in speaking English with correct pronunciation.
- To develop communication skills of the students i.e. listening, speaking, reading and writing skills.
- 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.

**Course Content**

**Unit-1 Communication: Theory and Practice**

- Basics of communication: Introduction, meaning and definition, Importance of communication, process of communication etc.
- Types of communication: formal and informal, verbal, non-verbal and written, Barriers to effective communication, ways to overcome barriers.
- 7 Cs for effective communication (considerate, concrete, concise, clear, complete, correct, courteous).
- Art of Effective communication,
  - o Choosing words
  - o Voice
  - o Modulation
  - o Clarity
  - o Time
  - o Simplification of words
- Technical Communication.

**Unit-2 Soft Skills for Professional Excellence**

- Introduction: 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.
- Case Studies.

**Unit-3: Reading Comprehension**

Short questions and Long (70-80 words)

Texts:

**Section-1**

“The Gift of the Magi” by O. Henry

“Uncle Podger Hangs a Picture” Jerome K. Jerome

**Section-2**

Reference to context and question-answers

Stopping by Woods on a Snowy Evening by Robert Frost,  
Where the Mind is Without Fear by Rabindranath Tagore,

#### **Unit-4: Professional Writing**

1. The art of précis writing,
2. Letters: business and personnel,
3. Drafting e-mail, notices, minutes of a meeting etc.
4. Write C.V..
5. Filling-up different forms such as banks and on-line forms for placement etc.

#### **Unit-5: Vocabulary and Grammar**

One-word substitution, Idioms and phrases etc.

Parts of speech, active and passive voice, tenses etc., Punctuation

#### **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. Kulbhushan Kumar, *Effective Communication Skills*, Khanna Publishing House, New Delhi (Revised Edition 2018)
4. Margaret M. Maison. *Examine your English*. Orient Longman: New Delhi, 1964.
5. M. Ashraf Rizvi. *Effective Technical Communication*. Mc-Graw Hill: Delhi, 2002.
6. John Nielson. *Effective Communication Skills*. Xlibris, 2008.
7. *Oxford Dictionary*
8. *Roget's Thesaurus of English Words and Phrases*
9. *Collin's English Dictionary*

#### **Course outcomes:**

At the end of this course, the participants will:

- 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.
- Be informed of the latest trends in basic verbal activities such as presentations, facing interviews and other forms of oral communication.
- Also develop skills of group presentation and communication in team.
- Develop non-verbal communication such as proper use of body language and gestures.

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|                   |   |                        |
|-------------------|---|------------------------|
| Course Code       | : | ES101                  |
| Course Title      | : | Engineering Graphics   |
| Number of Credits | : | 1.5 (L: 0, T: 0, P: 3) |
| Prerequisites     | : | NIL                    |
| Course Category   | : | ES                     |

### Course Objectives:

- To understand the language of graphics which is used to express ideas, convey instructions while carrying out engineering jobs.
- To develop drafting and sketching skills, to know the applications of drawing equipments, and get familiarize with Indian Standards related to engineering drawings.
- To develop skills to visualize actual object or a part of it, on the basis of drawings.
- To develop skills to translate ideas into sketches and to draw and read various engineering curves, projections and dimensioning styles.
- To understand the basic commands and develop basic skills related to computer aided drafting, of how to draw, modify, and edit basic shapes (2D), using AUTOCAD.

### Course Content

#### Unit – I Basic elements of Drawing

- Drawing Instruments and supporting materials: method to use them with applications.
- Convention of lines and their applications.
- Representative Fractions – reduced, enlarged and full size scales; Engineering Scales such as plain and diagonal scale.
- Dimensioning techniques as per SP-46:2003 – types and applications of chain, parallel and coordinate dimensioning.
- Geometrical and Tangency constructions. (Redraw the figure)

#### Unit – II Orthographic projections

- Introduction of projections-orthographic, perspective, isometric and oblique: concept and applications. (No question to be asked in examination).
- Introduction to orthographic projection, First angle and Third angle method, their symbols.
- Conversion of pictorial view into Orthographic Views – object containing plain surfaces, slanting surfaces, slots, ribs, cylindrical surfaces. (use First Angle Projection method only)

#### Unit – III Isometric Projections

- Introduction to isometric projections.
- Isometric scale and Natural scale.
- Isometric view and isometric projection.
- Illustrative problems related to objects containing lines, circles and arcs shape only.
- Conversion of orthographic views into isometric view/projection.

#### Unit – IV Free Hand Sketches of engineering elements

- Free hand sketches of machine elements: Thread profiles, nuts, bolts, studs, set screws, washer, Locking arrangements. (For branches other than mechanical Engineering, the teacher should select branch specific elements for free hand sketching)
- Free hand sketches of orthographic view (on squared graph paper) and isometric view (on isometric grid paper)

### Unit – V Computer aided drafting interface

- Computer Aided Drafting: concept.
- Hardware and various CAD software available.
- System requirements and Understanding the interface.
- Components of AutoCAD software window: Title bar, standard tool bar, menu bar, object properties tool bar, draw tool bar, modify tool bar, cursor cross hair. Command window, status bar, drawing area, UCS icon.
- File features: New file, Saving the file, Opening an existing drawing file, Creating templates, Quit.
- Setting up new drawing: Units, Limits, Grid, Snap.
- Undoing and redoing action.

### Unit – VI Computer aided drafting

- Draw basic entities like Line, Circle, Arc, Polygon, Ellipse, Rectangle, Multiline, PolyLine.
- Method of Specifying points: Absolute coordinates, Relative Cartesian and Polar coordinates.
- Modify and edit commands like trim, extend, delete, copy, offset, array, block, layers.
- Dimensioning: Linear, Horizontal Vertical, Aligned, Rotated, Baseline, Continuous, Diameter, Radius, Angular Dimensions.
- Dim scale variable.
- Editing dimensions.
- Text: Single line Text, Multiline text.
- Standard sizes of sheet. Selecting Various plotting parameters such as Paper size, paper units, Drawing orientation, plot scale, plot offset, plot area, print preview.

| S. No. | Practical Exercises  | Unit No.   | Approx. Hrs. |
|--------|--|------------|--------------|
| 1      | Draw horizontal, Vertical, 30 degree, 45 degree, 60 and 75 degrees lines, different types of lines, dimensioning styles using Tee and Set squares/ drafter. (do this exercise in sketch book)                                    | I          | 02           |
| 2      | Write alphabets and numerical (Vertical only) (do this exercise in sketch book)  | I          | 02           |
| 3      | Draw regular geometric constructions and redraw the given figure (do this exercise in sketch book) Part I  | II         | 02           |
| 4      | Draw regular geometric construction and redraw the given figure (do this exercise in sketch book) Part II  | II         | 02           |
| 5      | Draw a problem on orthographic projections using first angle method of projection having plain surfaces and slanting. Part I   | III        | 02           |
| 6      | Draw another problem on orthographic projections using first angle method of projection having slanting surfaces with slots. Part II   | III        | 02           |
| 7      | Draw two problems on orthographic projections using first angle method of projection having cylindrical surfaces, ribs. Part I   | III        | 02           |
| 8      | Draw two problems on Isometric view of simple objects having plain and slanting surface by using natural scale. Part I   | IV         | 02           |
| 9      | Draw some problems on Isometric projection of simple objects having cylindrical surface by using isometric scale. Part I   | IV         | 02           |
| 10     | Draw free hand sketches/ conventional representation of machine elements in sketch book such as thread profiles, nuts, bolts, studs, set screws, washers, Locking arrangements. Part I   | V          | 02           |
| 11     | Problem based Learning: Given the orthographic views of at least three objects with few missing lines, the student will try to imagine the corresponding objects, complete the views and draw these views in sketch book. Part I | III, II, V | 02           |

| S. No. | Practical Exercises  | Unit No. | Approx. Hrs. |
|--------|--|----------|--------------|
| 12     | Draw basic 2D entities like: Rectangle, Rhombus, Polygon using AutoCAD (Print out should be a part of progressive assessment). Part I  | V        | 02           |
| 13     | Draw basic 2D entities like: Circles, Arcs, circular using AutoCAD (Printout should be a part of progressive assessment). Part II  | V        | 02           |
| 14     | Draw basic 2D entities like: Circular and rectangular array using AutoCAD (Printout should be a part of progressive assessment). Part III  | V        | 02           |
| 15     | Draw blocks of 2D entities comprises of Rectangle, Rhombus, Polygon, Circles, Arcs, circular and rectangular array, blocks using AutoCAD (Print out should be a part of progressive assessment). Part IV | V        | 02           |
| 16     | Draw basic branch specific components in 2D using AutoCAD (Print out should be a part of term work). Part I  | VI       | 02           |
| 17     | Draw complex branch specific components in 2D using AutoCAD (Print should be a part of progressive assessment). Part I   | VI       | 02           |
|        | <b>TOTAL</b>   |          | <b>34</b>    |

### SUGGESTED LEARNING RESOURCES

1. Bureau of Indian Standards. *Engineering Drawing Practice for Schools and Colleges IS: Sp-46*. BIS. Government of India, Third Reprint, October 1998; ISBN: 81-7061-091-2.
2. Bhatt, N. D. *Engineering Drawing*. Charotar Publishing House, Anand, Gujrat 2010; ISBN: 978-93-80358-17-8.
3. Jain & Gautam, *Engineering Graphics & Design*, Khanna Publishing House, New Delhi (ISBN: 978-93-86173-478)
4. Jolhe, D. A. *Engineering Drawing*. Tata McGraw Hill Edu. New Delhi, 2010; ISBN: 978-0-07-064837-1
5. Dhawan, R. K. *Engineering Drawing*. S. Chand and Company, New Delhi; ISBN: 81-219-1431-0.
6. Shah, P. J. *Engineering Drawing*. S. Chand and Company, New Delhi, 2008, ISBN:81-219-2964-4.
7. Kulkarni, D. M.; Rastogi, A. P.; Sarkar, A. K. *Engineering Graphics with AutoCAD*. PHI Learning Private Limited-New Delhi (2010); ISBN: 978-8120337831.
8. Jeyapooan, T. *Essentials of Engineering Drawing and Graphics using AutoCAD*. Vikas Publishing House Pvt. Ltd, Noida, 2011; ISBN: 978-8125953005.
9. Autodesk. *AutoCAD User Guide*. Autodesk Press, USA, 2015.
10. Sham, Tickoo. *AutoCAD 2016 for Engineers and Designers*. Dreamtech Press; Galgotia Publication, New Delhi, 2015; ISBN 978-9351199113.

### Software/Learning Websites

1. <https://www.youtube.com/watch?v=TJ4jGyD-WCw>
2. [https://www.youtube.com/watch?v=dmt6\\_n7Sgcg](https://www.youtube.com/watch?v=dmt6_n7Sgcg)
3. [https://www.youtube.com/watch?v=\\_MQScnLXL0M](https://www.youtube.com/watch?v=_MQScnLXL0M)
4. <https://www.youtube.com/watch?v=3WXPanCq9LI>
5. <https://www.youtube.com/watch?v=fvjk7PlxAuo>
6. <http://www.me.umn.edu/coursesme2011/handouts/engg%20graphics.pdf>
7. <https://www.machinedesignonline.com>

### Course Outcomes

Following outcomes will be achieved:

1. Select and construct appropriate drawing scales, use drawing equipment's, and understand Indian Standards of engineering drawing
2. Draw views of given object and components 3) Sketch orthographic projections into isometric projections and vice versa.
3. Apply computer aided drafting tools to create 2D engineering drawings

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|                   |   |                                 |
|-------------------|---|---------------------------------|
| Course Code       | : | ES103                           |
| Course Title      | : | Engineering Workshop Technology |
| Number of Credits | : | 2.5 (L: 1, T: 0, P: 3)          |
| Prerequisites     | : | NIL                             |
| Course Category   | : | ES                              |

### Course Objectives:

- To understand basic engineering processes for manufacturing and assembly.
- To understand, identify, select and use various marking, measuring, and holding, striking and cutting tools and equipment's
- To understand and interpret job drawings, produce jobs, and inspect the job for specified dimensions
- To understand the various types of wiring systems and acquire skills in house wiring
- To understand, operate, control different machines and equipment's adopting safety practices

### Course Content:

| S. No.     | Details Of Practical Content   |
|------------|--|
| <b>I</b>   | <b>Carpentry:</b> i) Demonstration of different wood working tools / machines. ii) Demonstration of different wood working processes, like planing, marking, chiseling, grooving, turning of wood etc. iii) One simple job involving any one joint like mortise and tenon dovetail, bridle, half lap etc.                  |
| <b>II</b>  | <b>Fitting:</b> i) Demonstration of different fitting tools and drilling machines and power tools ii) Demonstration of different operations like chipping, filing, drilling, tapping, sawing, cutting etc. iii) One simple fitting job involving practice of chipping, filing, drilling, tapping, cutting etc              |
| <b>III</b> | <b>Welding:</b> i) Demonstration of different welding tools / machines. ii) Demonstration on Arc Welding, Gas Welding, MIG, MAG welding, gas cutting and rebuilding of broken parts with welding. iii) One simple job involving butt and lap joint   |
| <b>IV</b>  | <b>Sheet Metal Working:</b> i) Demonstration of different sheet metal tools / machines. ii) Demonstration of different sheet metal operations like sheet cutting, bending, edging, end curling, lancing, soldering, brazing, and riveting. iii) One simple job involving sheet metal operations and soldering and riveting |
| <b>V</b>   | <b>Painting &amp; Polishing:</b> i) Safety precaution of the concern shop ii) Demonstration o the various tools of Painting shop iii) Job-1: To prepare a rectangular wooden block surface polishing Job-2: Wooden surface to apply primer & paint it with brush Job-3: Do same for the metal surface                      |
| <b>VI</b>  | <b>Pipe Assembly:</b> i) Instrument nad Functions of tools used in Pipe Fitting ii) Various type of Pipes to transport Steam, Water, Fluid (Oil), Gas etc. iii) Introduction & Functions of Elbow, Nipple, Socket, Union, Coupling, Tee, Cross, Flange etc.  |

### References:

1. S.K. Hajara Chaudhary, Workshop Technology, Media Promoter and Publishers, New Delhi, 2015
2. B.S. Raghuwanshi, Workshop Technology, Dhanpat Rai and sons, New Delhi 2014
3. K. Venkat Reddy, Workshop Practice Manual, BS Publications, Hyderabad 2014
4. Kents Mechanical Engineering Hand book, John Wiley and Sons, New York

**Course outcomes:**

At the end of the course, the student will be able to:

|     |   |
|-----|---|
| C01 | Acquire skills in basic engineering practice to identify, select and use various marking, measuring, and holding, striking and cutting tools & equipment's and machines |
| C02 | Understand job drawing and complete jobs as per specifications in allotted time   |
| C03 | Inspect the job for the desired dimensions and shape  |
| C04 | Operate, control different machines and equipment's adopting safety practices   |

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|                   |   |                       |
|-------------------|---|-----------------------|
| Course Code       | : | BS107                 |
| Course Title      | : | Applied Physics-I Lab |
| Number of Credits | : | 1 (L: 0, T: 0, P: 2)  |
| Prerequisites     | : | NIL                   |
| Course Category   | : | BS                    |

### 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 prominent. 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/Activities (To perform any 08 practical's).

1. To measure length, radius of a given cylinder, a test tube and a beaker using a Vernier caliper and find volume of each object.
2. To determine diameter of a wire, a solid ball and thickness of cardboard using a screw gauge.
3. To determine radius of curvature of a convex and a concave mirror/surface using a spherometer.
4. To verify triangle and parallelogram law of forces.
5. To determine force constant of a spring using Hook's Law.
6. To verify law of conservation of mechanical energy (PE to KE).
7. To find the viscosity of a given liquid (Glycerin) by Stoke's law.
8. To find the coefficient of linear expansion of the material of a rod.
9. To determine atmospheric pressure at a place using Fortin's barometer.
10. To measure room temperature and temperature of a hot bath using mercury thermometer and convert it into different scales.

### Learning Outcome:

After undergoing this lab work, the student will be able to:

- Select right kind of measuring tools (Meter scale, Vernier caliper, Screw gauge, Spherometer etc.) for determining dimensions of physical quantities and make measurements with accuracy and precision.
- Differentiate various shapes and determine dimensions of plane, curved and regular surfaces/bodies.
- Apply and Verify laws of forces and determine resultant force acting on a body.
- Appreciate role of friction and measure co-efficient of friction between different surfaces.
- Describe and verify Hook's law and determine force constant of spring body.
- Identify various forms of energy, energy transformations and verify law of conservation of energy.
- Understand rotational motion and determine M.I. of a rotating body (flywheel)
- Understand Stoke's law for viscous liquids and determine viscosity of a given liquid.
- Understand how materials expand on heating and determine linear expansion coefficient for a given material rod.
- Understand working and use Fortin's barometers for determining pressure at a place.
- Understand use of thermometers to measure temperature under different conditions and different scales of temperature measurements.

## **SUGGESTED STUDENT ACTIVITIES & STRATEGIES**

Apart from classroom and laboratory learning following are the suggested student related activities which can be undertaken to accelerate the attainment of various outcomes of the course

- a. Make survey of different physical products and compare the following points
  - Measurements of dimensions
  - Properties
  - Applications
- b. Library survey regarding engineering materials/products used in different industries
- c. Seminar on any relevant topic.

Teachers should use the following strategies to achieve the various outcomes of the course.

- Different methods of teaching and media to be used to attain classroom attention.
- Massive open online courses (MOOCs) may be used to teach various topics/sub topics.
- 15-20% of the topics which are relatively simpler or descriptive in nature should be given to the students for self-learning and assess the development of competency through classroom presentations.
- Micro-projects may be given to group of students for hand-on experiences.

### **References:**

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.
4. e-books/e-tools/ learning physics software/YouTube videos/websites etc.

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|                   |   |                       |
|-------------------|---|-----------------------|
| Course Code       | : | BS109                 |
| Course Title      | : | Applied Chemistry Lab |
| Number of Credits | : | 1 (L: 0, T: 0, P: 2)  |
| Prerequisites     | : | NIL                   |
| Course Category   | : | BS                    |

### Course Objectives:

There are numerous number of materials used in fabricating and manufacturing devices for the comfort of life. The selection, characterization and suitability assessment of natural raw materials essentially requires principles and concepts of Applied Chemistry for technicians. The course aims to supplement the factual knowledge gained in the lectures by first hand manipulation of processes and apparatus. This will develop scientific temper and help to apply the basic concepts and principles in solving engineering problems.

### LIST OF PRACTICALS:

1. To find out the strength in grams per litre of an unknown solution of Sodium Hydroxide using a standard (N/10) Oxalic Acid solution.
2. To find out the total alkalinity in parts per million (ppm) of a water sample with the help of standard Sulphuric Acid solution.
3. To determine the Viscosity of a Lubricating Oil using a Redwood Viscometer.
4. To determine the pH of different solutions using a digital pH meter.
5. To prepare a sample of bathing/washing soap.

### Teachers should use the following strategies to achieve the various outcomes of the course.

- Different methods of teaching and media to be used to attain classroom attention.
- Massive open online courses (MOOCs) may be used to teach various topics/sub topics.
- 15-20% of the topics which are relatively simpler or descriptive in nature should be given to the students for self-learning and assess the development of competency through classroom presentations.
- Micro-projects may be given to group of students for hand-on experiences
- Encouraging students to visit to sites such as Railway station and research establishment around the institution.

### Learning Outcomes:

At the end of the course student will be able to:

- To express quantitative measurements accurately.
- To practice and adapt good measuring techniques.
- To use various apparatus for precise measurements.
- To understand and differentiate different methods of quantitative analysis.
- To know and understand principles of quantitative analysis using instruments.
- To construct different electrochemical cells used in developing batteries.
- To understand and appreciate methods of corrosion abetments.

### Reference Books:

1. Text Book of Chemistry for Class XI & XII (Part-I, Part-II); N.C.E.R.T., Delhi, 2017-18.
2. Dr. G. H. Hugar and Prof A. N. Pathak, Applied Chemistry Laboratory Practices, Vol. I and Vol. II, NITTTR, Chandigarh, Publications, 2013-14.
3. Agnihotri, Rajesh, Chemistry for Engineers, Wiley India Pvt.Ltd., 2014.
4. Jain & Jain, Engineering Chemistry, Dhanpat Rai and Sons; New Delhi, 2015.

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|                   |   |                      |
|-------------------|---|----------------------|
| Course Code       | : | HS103                |
| Course Title      | : | Sports and Yoga      |
| Number of Credits | : | 1 (L: 0, T: 0, P: 2) |
| Prerequisites     | : | NIL                  |
| Course Category   | : | HS                   |

**Course Objectives:**

- To make the students understand the importance of sound health and fitness principles as they relate to better health.
- 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.
- To create a safe, progressive, methodical and efficient activity based plan to enhance improvement and minimize risk of injury.
- To develop among students an appreciation of physical activity as a lifetime pursuit and a means to better health.

**Course Content:**

- **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, Dhyanchand 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.
- **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.
- **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 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.

- 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.

**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:**

On successful completion of the course the students will be able to:

- (i) Practice Physical activities and Hatha Yoga focusing on yoga for strength, flexibility, and relaxation.
- (ii) Learn techniques for increasing concentration and decreasing anxiety which leads to stronger academic performance.
- (iii) Learn breathing exercises and healthy fitness activities
- (iv) Understand basic skills associated with yoga and physical activities including strength and flexibility, balance and coordination.
- (v) Perform yoga movements in various combination and forms.
- (vi) Assess current personal fitness levels.
- (vii) Identify opportunities for participation in yoga and sports activities.
- (viii) Develop understanding of health-related fitness components: cardiorespiratory endurance, flexibility and body composition etc.
- (ix) Improve personal fitness through participation in sports and yogic activities.
- (x) Develop understanding of psychological problems associated with the age and lifestyle. Demonstrate an understanding of sound nutritional practices as related to health and physical performance.
- (xii) Assess yoga activities in terms of fitness value.
- (xiii) Identify and apply injury prevention principles related to yoga and physical fitness activities.
- (xiv) Understand and correctly apply biomechanical and physiological principles related to exercise and training.

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|                   |   |                                      |
|-------------------|---|--------------------------------------|
| Course Code       | : | HS105                                |
| Course Title      | : | Communication Skills in English -Lab |
| Number of Credits | : | 1 (L: 0, T: 0, P: 2)                 |
| Prerequisites     | : | NIL                                  |
| Course Category   | : | HS                                   |

**Course Objectives:**

Communication skills play an important role in career development. 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:

1. To develop listening skills for enhancing communication.
2. To develop speaking skills with a focus on correct pronunciation and fluency.
3. 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.

**Course Content:**

**Unit I Listening Skills**

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

**Unit II Speaking Skills**

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

**Unit III Building vocabulary**

Word exercises and word games to enhance self-expression and vocabulary of participants.

**Recommended Readings:**

1. Daniel Jones. *The Pronunciation of English*. Cambridge: Cambridge University Press, 1956.
2. James Hartman & et al. Ed. *English Pronouncing Dictionary*. Cambridge: Cambridge University Press, 2006.
3. Kulbhushan Kumar, *Effective Communication Skills*, Khanna Publishing House, New Delhi (Revised Ed. 2018)
4. J.D.O'Connor. *Better English Pronunciation*. Cambridge: Cambridge University Press, 1980.
5. Lindley Murray. *An English Grammar: Comprehending Principles and Rules*. London: Wilson and Sons, 1908.
6. Margaret M. Maison. *Examine your English*. Orient Longman: New Delhi, 1964.
7. J.Sethi & et al. *A Practice Course in English Pronunciation*. New Delhi: Prentice Hall, 2004.
8. Pfeiffer, William Sanborn and T.V.S Padmaja. *Technical Communication: A Practical Approach*. 6<sup>th</sup> ed. Delhi: Pearson, 2007.

**Learning Outcome:**

- At the end of this course the students will be able to communicate effectively with an increase in their confidence to read, write and speak English fluently.
- They will also demonstrate a significant increase in word power.

- The variety of exercises and activities that will be conducted in the Language Lab will develop their skills needed to participate in a conversation like listening carefully and respectfully to others' viewpoints; articulating their own ideas and questions clearly and over all students will be able to prepare, organize, and deliver an engaging oral presentation.
- They will also develop non-verbal communication such as proper use of body language and gestures.

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