Course Name: **Communication Skills**
Course Code: **HS-101**
Course Type: **Core**

Contact Hours/Week: **2L + 1T** Course Credits: **03**

Course Objectives

- To develop independent perspective through critical thinking
- To communicate their perspective in clear and correctly articulated language through LSRW skills
- To instill a lifelong habit of language learning

Unit Number	Course Content	Lectures
UNIT-01	**Introduction:** Role of Effective Communication Skills for an Engineer, Theories of acquiring and learning English as a Second language, Challenges in learning language and means to overcome these.	**02L**
UNIT-02	**Communication process**: Types and modes of communication, Formal and Informal Communication, Process, Channels and levels of communication in Organizations , Intrapersonal and interpersonal communication, Common frame of reference and Context for effective communication, Verbal and Non verbal communication, Interpreting non-verbal communication, Barriers to effective communication	**06L**
UNIT-03	**Effective Listening Skills:** What does listening mean? Types of listening, Strategies for effective listening, Listening for specific purposes, Listening process and barriers to listening, Leadership and role of effective listening, Problems in comprehension and retention, note taking, Exposure to recorded audio/visual text for listening	**02L**
UNIT-04	**Effective Speaking Skills** **Interviews and Group discussion:** Telephonic and personal interviews, Pre-Interview planning SWOT analysis, Building self-confidence, Developing Emotional intelligence, Preparing for current topics, Group Discussion as an interviewing tool **Public speaking**: Become aware of personal speech habits and characteristics. Improving non-verbal cues, voice, diction and other mechanics of speech. Speech preparation and presentation techniques, Audience awareness and self-awareness, Cultivating poise and self-confidence. Presenting a variety of speeches (informative, persuasive, demonstrative, special occasion, etc.)	**06L**
UNIT-05	**Reading Skills:** Need and process, Approach to different reading materials, Purposes of reading, Different reading strategies: Skimming, Scanning Predicting, Inferring from the context Reading, Comprehension, Vocabulary expansion through reading	**02L**
UNIT-06	**Writing Skills:** Need and strategy, Developing Style of Writing, Role of appropriateness, brevity and clarity in writing, Cohesion and Coherence, Paragraph writing, Vocabulary building (roots, prefixes, suffixes) SOP, Resume/CV, Job applications **Report writing**: Importance of Technical Report Writing, Types of Reports, Objectivity in Report Writing, Collection of Data for Report writing	**06L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Identify the importance of Communication Skills
CO2: Apply Critical Thinking to what they read, listen to and observe
CO3: Apply principles of effective LSRW Skills in professional and Social Communication
CO4: Assess the verbal and non-verbal messages effectively

Books and References

1. Business Communication Today by Bovee, Courtland, L., John V. Thill and Barbara E. Schatzman: Pearson Education: Delhi.
2. The Definitive Book of Body Language by Allan Pease and Barbara Pease. Manjul Publishing House: New Delhi.
3. Communication for Business by Shirley Taylor. Longman: New Delhi.
4. Technical Communication: Principles and Practice by Meenakshi Raman and Sangeeta Sharma. Oxford University Press: New Delhi.

Course Name: **Materials Science and Engineering**
Course Code: **MS-101**
Course Type: **Core**

Contact Hours/Week: **3L** Course Credits: **03**

Course Objectives

- To impart knowledge about the structure of materials
- To introduce fundamental concepts relevant to phase diagrams, phase transformations and heat treatment of metals and alloys
- To enable the students to understand properties of engineering materials

Unit Number	Course Content	Lectures
UNIT-01	**Introduction:** Why study materials science and engineering? Review of basic types of interatomic bonds, Classification of materials, Processing/structure/properties/ performance correlations	**03L**
UNIT-02	**Structure and Imperfections:** Lattices, Unit cells,Miller indices of directions and planes for cubic and hexagonal systems, Closepacking in solids, Common metallic structures,Voidsin close-packed structures, Common ceramics structures – NaCl, CsCl, Diamond Cubic, Zinc Blende, Wurtzite, Rutile, Fluorite, Fullerenes, Spinel, Perovskite, etc., Polycrystalline materials, X-Ray diffraction for determination of crystal structures,Solid state diffusion – Ficks laws of diffusion, Diffusion mechanisms, Temperature dependendence of diffusivity, Defects in crystals - Point defects, Dislocations, Grain boundaries and Surfaces, Noncrystalline solids, Polymeric materials	**09L**
UNIT-03	**Phase Diagrams:** Phase rule, Solid solutions, Hume-Rothery rules, Intermediate phases and compounds, Unary and binary phase diagrams, Isomorphous and eutectic systems, Lever rule, Typical phasediagrams: Fe-C, Cu-Ni, Cu-Zn, Al-Cu, Al-Si and Pb-Sn.	**03L**
UNIT-04	**Phase Transformations and Heat Treatment:** Classification of phase transformations, Liquid to solid transformation, Homogeneous and heterogeneous Nucleation, Kinetic considerations in solid state transformations, Microstructure and property changes in iron-carbon alloys, Isothermal transformation diagrams, Continuous cooling diagrams, Annealing, normalizing, hardening andtempering of steels and their effect on properties, Hardness andhardenability. Quenching media, Martempering and austempering, Surface hardening— carburizing, nitriding, carbonitriding, flame and induction hardening, Precipitation and age hardening	**09L**
UNIT-05	**Properties of Materials:** *Mechanical Properties:* Stress-strain response of metallic, ceramic and polymermaterials, yield strength, tensile strength and modulus of elasticity, toughness, plastic deformation, fatigue, creep and fracture; *Electronic Properties:* Free electron theory, Fermi energy, density of states, elementsof band theory, semiconductors, Hall effect, dielectric behaviour, piezo, ferro,pyroelectricmaterials; *Magnetic Properties:* Origin of magnetism in metallic and ceramic materials, paramagnetism, diamagnetism, ferro andferrimagnetism; *Thermal Properties:* Specific heat, thermal conductivity and thermal expansion,thermoelectricity; *Optical Properties:* Refractive index, absorption and transmission of electromagnetic radiation in solids, electrooptic and magnetoopticmaterials, spontaneous and stimulated emission, gas and solid state lasers	**12L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Classify various engineering materials and explain their structure and imperfections
CO2: Draw some typical phase diagrams and discuss their distinctive features
CO3: Explain Isothermal transformation and continuous cooling diagrams of steels
CO4: Describe various heat treatment processes
CO5: Briefly discuss properties of engineering materials and correlate them to their internal structures

Books and References

1. Materials Science and Engineering, An Introduction by William D. Callister, Jr. and David G. Rethwisch,John Wiley and Sons, Inc.
2. Materials Science and Engineering by William F. Smith, McGraw Hill Education.
3. Modern Physical Metallurgy by R. E. Smallman, Butterwort- Heinemann.
4. Physical Metallurgy: Principles and Practice by V. Raghvan, PHI Learning Private Ltd.