**Hu-101: Communication in English-I**

1.0 Contents: Revision of the basic language skills

(Grammar, punctuation and vocabulary)

1.1 Task: Grammar-

· Subject-verb agreement

· Tense-present, past and future

· Voice-active and passive

· Relative clauses for sentence contraction

· Prepositions of time and place

· Modes-making polite statements

· Discourse markers

· Comparing x with y

· Cause and effect

Punctuation- Full stop, Comma, Semicolon, Colon, Inverted Commas, Note of Interrogation

Vocabulary- Technical, Semi-technical and general words

Word formation-verbs to nouns, adjectives to nouns

Suffixes and Prefixes

Nominal compounds

2.0 Content: Reading (Comprehension)

2.1 Tasks: Pre-reading activities for

Scanning- requiring the students to locate, as fast as they can a specific fact or a single word

Skinning-(reading to get overall information)-

Requiring students to glance quickly and locate facts which are expressed in sentences rather than in single words, or to say briefly what a text is all about

Detailed reading activities or intense reading for guessing the meanings of unknown difficult words from the context

Understanding the main information in the text

Structuring important information

Throwing away the non-required words or information

Using non-text information

Inferencing and Evaluating

3.0 Content: Listening

3.1 Tasks: Listening for specific information (the date and time of Joint Entrance Examination)

Listening for general understanding (topic, purpose, major idea, supporting ideas)

Intense listening (take class- notes, identify topic, topic development, key lexical items, function of intonation pitch, pitch, volume, pace, repetition)

Predictive listening

Inferential listening

4.0 Content: Speaking

4.1 Tasks: Eliciting-information, directions, clarification, help

Expressing-thanks, requirements, opinions, confirmation, apology, want/need, information, complaints, reasons/justifications

Reporting-description, decisions

Narrating-sequence of events

Facing-job interviews

**Sc-103: Chemistry – I**

Unit-1: States of matter, Gas laws, Ideal gas equation, Gas constant, Dalton’s law of partial pressure, Grahm’s law of diffusion, Avogadro’s hypothesis and its applications, Mole concept and problems.

Unit-2: Chemical equation-definition, qualitative and quantitative Significance, limitations, balancing by partial and ion-electron method, electronic concept of oxidation and reduction, Stoichiometric calculations, weight, weight-volume.

Unit-3: Acids, bases and salts, Theories of acids and bases- Arrhenius, Bronsted-Lowry, Lewis theory, Strong acids and strong bases, conjugate acid-base pair, classification of salts, hydrolysis of salts and its effect.

Unit-4 : Atomic structure: Discovery of sub-atomic particles, Rutherford’s Model, Bohr’s Model, Quantum theory, Atomic spectra, Dual nature of electron, uncertainty principle, Quantum number, Aufbau principle, Hund’s rule, Pauli’s exclusion principle, electronic configuration.

Unit-5: Modern Periodic table, Periodic properties, size of atoms (atomic and ionic radii), Ionization energies, electron affinity, electro-negativity, characteristics of transition metals.

Unit-6: Chemical bonding: electronic theory of valency, Ionic, covalent and co-ordinate covalent bonds, characteristics of ionic and covalent compounds, Hydrogen bonding.

Unit-7: Chemical equilibrium: Law of mass action, equilibrium constant, factors effecting equilibrium, Le-Chatellier’s principle and its applications, ionic equilibrium, PH value, dissociation of acids and bases, common ion effect, buffer solution, solubility product and its applications.

Unit-8: Electrolysis: Laws of electrolysis, problems, Industrial application of electrolysis (extraction and purification of metals, electroplating and galvanization).

Unit-9: Acidimetry and alkalimetry, equivalent weights of acids and bases, standard solution, normal solution and molar solution, concentration terms-normality, molarity, gm/l, ppm, normality equation, acid-base titration, choice of indicators.

Unit-10: Catalysis: definition, type of catalyst, industrial applications in manufacture of NH3, H2SO4 by contact process, cracking.

Unit-11: Water: Causes of hardness of water, removal of hardness by permutite process, de-ionisation of water, effect of water in boiler preparation of boiler-feed water, preparation of Municipal water with block-diagram, Estimation of hardness of water by EDTA-method.

**Sc-104: Applied Physics-I**

1. **UNITS & DIMENSION**
   1. Fundamental and derived units with particular reference to S.I. units, illustration.
   2. Explanation of dimension: Dimensional equation of physical quantities with examples.
2. **BASIC MECHANICS**
   1. Introduction to scalar and vector quantities, victor addition, subtraction, multiplication and resolution of victor (details not necessary).
   2. Numerical problems on equation of motion (deduction of equation of motion not necessary).
   3. Newton’s Law of motion, definition of force momentum, mass and weight, impulse, principle of conservation of linear momentum.
   4. Circular motion, angular velocity, centripetal and centrifugal force motion round a curve track.
   5. Work, power and Energy: Definition, dimensions, mathematical relation, potential and kinetic energy, their mathematical relations, principle of conservation of energy and its proof in case of free falling body.
   6. Simple harmonic motion and it geometrical representation, derivation of its equation, definition of amplitude, time period, frequency, phase etc. mathematics relations, unit simple pendulum and second pendulum.
3. **GRAVITY AND GRAVITATION**
   1. Newton’s Law of Gravitation; gravity; acceleration due to gravity, relation between G & g and their units, center of gravity and center of mass

**4.0 PROPERTIES OF SOLID**

4.1 Elasticity, explanation of stress strain Hook’s Law, Elastic limit and modulus of elasticity, poison’s ration, their units and numerical problems.

**5.0 PROPERTIES OF LIQOUIDS**

5.1 Thrust and pressure, Law of liquid pressure, Pascal’s law and Hydraulic press. Specific gravity and density, Archimedes’ principle, Determination of specific Gravity and Volume, numerical problems.

**6.0 PROPERTIES OF GAS**

6.1 Atmospheric pressure, Torricelli’s Experiment, Barometer, Fortin’s barometer. Concept of pump and siphon.

**7.0 HEAT & THERMODYNAMICS**

7.1 Concept of heat and temperature, measurement of Temperature, basic criteria. Thermometer its interval and fixed points, different scales and their relationship.

7.2 Thermal Expansion, Expansions of solids: linear, superficial and cubical expansion, their co-efficient. With their relationship, expansion of liquid, anomalous expansion of water (experimental determination not necessary)

7.3 Measurement of Heat: quantity of heat, unit of heat: joule and calorie, specific heat, water equivalent measurement of specific heat, principle of calorimetry, numerical problems.

7.4 Change of State of Matter: melting and freezing point, latent heat, freezing point of solutions, melting and boiling point, difference between evaporation depends.

7.5 Hygrometry: Moisture in the atmosphere, relative humidity.

7.6 Transmission of Heat: Conduction, convection and radiation; thermal conductivity, Searle’s experiment, thermopile.

7.7 Joule’s law of Heating, mechanical equivalent of heat and its determination.

**8.0 SOUND**

8.1 Wave Motion: Transverse and longitudinal wave, relation between wavelength and frequency and time periods.

8.2 production and propagation of sound wave, Expression of velocity of sound in air, Newton’s formula and Laplace’s correction, Effect of temperature, pressure etc. On velocity of sound.

8.3 Reflection of sound and its application of sound, echo, reverberation.

8.4 Musical Sound and noise, characteristics of musical sound, Doppler’s effect (Mathematical expression not necessary).

**Sc-102: Mathematics-I**

1. Laws of indices, problems
2. Imaginary and complex numbers
   1. Definition, geometrical representation of complex numbers (Argand Diagram/Z-plane/Complex plane).
   2. Complex numbers in different forms, Conjugate of a complex number
   3. Algebraic operations on complex numbers under any form.
   4. Cube root of unity and their properties.
3. Variation:
   1. Direct, indirect and joint variation, Mathematical problems of variation.
4. Progressions:
   1. Arithmetic and geometric progressions
   2. A.P. and G.P. series and their sum to n terms.
   3. Sum of infinity of G.P. series
5. Theory of Quadratic Equations and Expressions
   1. Nature of roots, Sum and product of roots, Formation of quadratic equation
6. Graphs
   1. Graphical solution of simultaneous equation
   2. Graphical solution of linear and a quadratic equation
7. Permutation and Combination
   1. Permutation and combination definition, Fundamental principle, Factorial notation
   2. Deduction of formula on permutation and combination
   3. Permutation and combination under different conditions (simple cases)
8. Logarithm:
   1. Definition and illustration of logarithm
   2. Laws of logarithm
9. Exponential Series
   1. Introduction of and problems.
10. Determinant of third order:
    1. Introduction and definition, Minors and cofactors of a determinant, Properties of determinants.
    2. Solutions of simultaneous linear equations by Cramer’s Rule.
11. Trigonometry:
    1. Measurement of an angle and its definition: definition of a radian, relationship between degree and radian; simple problems (revision).
    2. Compound angles: Practice on compound angles.
12. Associated angles: Practice on associated angles.
13. Transformation of product and sum:
    1. Transformation of sum and difference
    2. Transformation of sum or difference into products
14. Multiple angles and sub-multiple angles.
    1. Deduction formulae on multiple and sub-multiple angles.
15. Mensurations:
    1. Polygons: its concept and applications
    2. Area of regular figures and polygons of n sides
    3. Area of regular hexagon and octagon
16. Curvilinear and rectilinear figures:
    1. Area of Curvilinear figures under Simpson’s one third rule.
17. Volume and Surface area of regular solid figures such as Prism, Cylinder, Sphere, Cone, Pyramid
    1. Frustum of cone and pyramid

**W-101: Basic Workshop Practice-I**

1. CARPENTRY SHOP
   1. Shop Talk
      1. Introduction
      2. Safety Precautions
      3. Classification of wood
      4. Grain of wood
      5. Carpentry tools and their uses

Marking tools: Pencil, scratch awl, short blade knife, marking gauge

Measuring tools: bench rule, steel tape, try square, combination square, protractor

Cutting tools; handsaw, chisel (firmer, dovetail, moruse), jack plane, files (half round and flat), hand drill, borer.

Working tables & Vices, mallet, hammer, nails, screws, screw drivers.

* + 1. Methods of marking.
    2. Carpentry joints:

Butt joint with nail (for making box)

Dado joint (for making shelves etc.)

Lap joint (for frames, legs etc.)

Mortoise & Tenon joint (chair, table etc.)

Dovetail joint (for drawer, box, furniture corner)

* 1. Practice
     1. Marking, sawing, planning, squaring, filing, chiseling, nailing.
     2. Making of lap joint
     3. Making a through Mortoise and Tenon joint.
     4. Making of Dovetail joint
  2. Test and Viva Voce
* Identify soft and hard wood
* List the common shapes and sizes of timber
* Select and use proper marking and measuring tools for a job.
* Use of holding tool for a job
* Use of planning tool for a job
* Select proper cutting tools for a job
* Select and use proper drilling and boring tools
* Select proper joints for various furniture / jobs.
* Perform marking for various joints
* Make any join following proper steps.

2.0.0 FITTING SHOP

2.1.1 Introduction and its importance

2.1.2 Safety procedures

2.1.3 Common marking equipment and tools and their uses:

Scale, marking gauge, try-square, calipers (outside and inside), spring divider, surface plate, V-block, centre punch.

2.1.4 Fitting shop tools and equipment – their uses & specifications: files, hack-saw and blades, chisels, hammer, bench vice.

2.1.5 Hand Drill, machine drill; different drill bits; coolants, description, uses and specifications.

2.1.6 Common engineering materials, like cast iron, cast steel, mild steel and high carbon steel – how to identify them.

2.1.7 Introduction to other common metals and alloys like copper, brass/gunmetal, aluminium and its alloys, stainless steel etc.

2.1.8 Familiarization with various forms and shapes of materials like sheet, plate, bars (round, square), flats, wires, angle, channel, beam, tubes, pipes, hollow section, extruded sections, casting, forging, machined components etc.

2.2.0 Practice:

2.2.1 Marking, sawing, Chipping, filing and Fitting

2.2.2 Marking-Drilling, Countersinking

2.2.3 Making a key way and key.

2.2.4 Identify proper raw material for doing a job

2.2.5 Select and use proper holding tools for doing a job

2.2.6 Select and use proper marking and measuring tools for doing a job.

2.2.7 Select and use proper cutting tools for doing a job

2.2.8 Select and use proper finishing tools for doing a job.

2.2.9 Perform basic operations – marking, sawing, chipping, filing, drilling

2.3.0 Perform a job according to the specification

3.0.0 SMITHY SHOP

3.1.1 Introduction to Black Smithy and Forging, difference between Black Smithy and Forging shop work.

3.1.2 Safety precautions

3.1.3 Common tools and equipment – description and uses: Anvil, swage block, sledge hammer, tong (different types), fullers flatter, swage tools, hot and cold chisels.

3.1.4 Smithy Hearth, different parts of hearth and their functions, controlling air and fuel, method of lighting a hearth.

3.1.5 Colours of steel at different temperatures.

3.1.6 Operations like drawing, upsetting, fullering, flattering, swaging, bending, twisting, cutting.

3.2.0 Practice

3.2.1 Heating job in a hearth

3.2.2 Drawing down of a mild steel rod to square shape and then to an octagonal shape.

3.2.3 Upsetting & flattening of a M.S. rod to a hexagonal/square bolt.

3.2.4 Bending of a rod to ring shape of required size.

3.2.5 Select and use proper tools and equipment for black smithy job

3.2.6 Heat up a job in a smith’s hearth

3.2.7 Perform the basic forging operations – drawing, upsetting, swaging, bending, cutting.

3.2.8 Perform a job according to the specification.

3.3.0 VIVA VOCE AND TEST

**Me-101: Engineering Drawing**

1. **INTRODUCTION**

1.1 Drafting as medium of communication and expression in Technology and Engineering.

1.2 Use and care of Drawing Instrument.

1.3 Types of lines and dimensioning as per 15696/72.

**2.0** **LETTERING SCALES**

2.1 Single stroke lettering straight and inclined by graph and free hand letters and digits as per 15696/72.

2.2 Scale- Scale of drawing, R.F.

2.3 Simple problems on plain, diagonal and comparative scale.

Assignments.

**3.0 GEOMETRICAL CONSTRUCTIONS**

3.1 Freehand curves and freehand drawing.

3.2 Construction of triangles, perpendicular and of angle 30, 40, 60 and 90 degree.

**4.0 ORTHOGRAPHIC PROJECTION**

4.1 Top view, front view and side view of simple objects, block and machine parts with dimensional scale.

Assignments.

**5.0 PROJECTION OF POINTS, LINES AND PLANES**

5.1 Plane, normal oblique persecico of lines and planes in H.P and V.P and Adial planes.

**6.0 PROJECTION OF SOLID (SIMPLE)**

6.1 Projections of scales parallel to one and inclined to others.

6.2 Projection of solids inclined to both.

Assignments.

**7.0 ISOMETRIC PROJECTION**

7.1 Isometric projection to true scale isometric scale.

**8.0 THREAD PROFILES (REF IS-2043 IS-554 etc)**

**9.0 SCREWED FASTENINGS**

9.1 Representation of external and internal threaded assembly symbolic, Desentative of threads.

9.2 Representation of screws, bolts, nuts and cutter.

**10.0 RIVETED JOINTS**

10.1 Top and sectional view of lap and butt joints with single and double covers.

**11.0 SECTIONING-I**

11.1 Sectioning front, top and side views (with dimensions and cutting plane lines) as per IS-696 for simple parts and blocks.