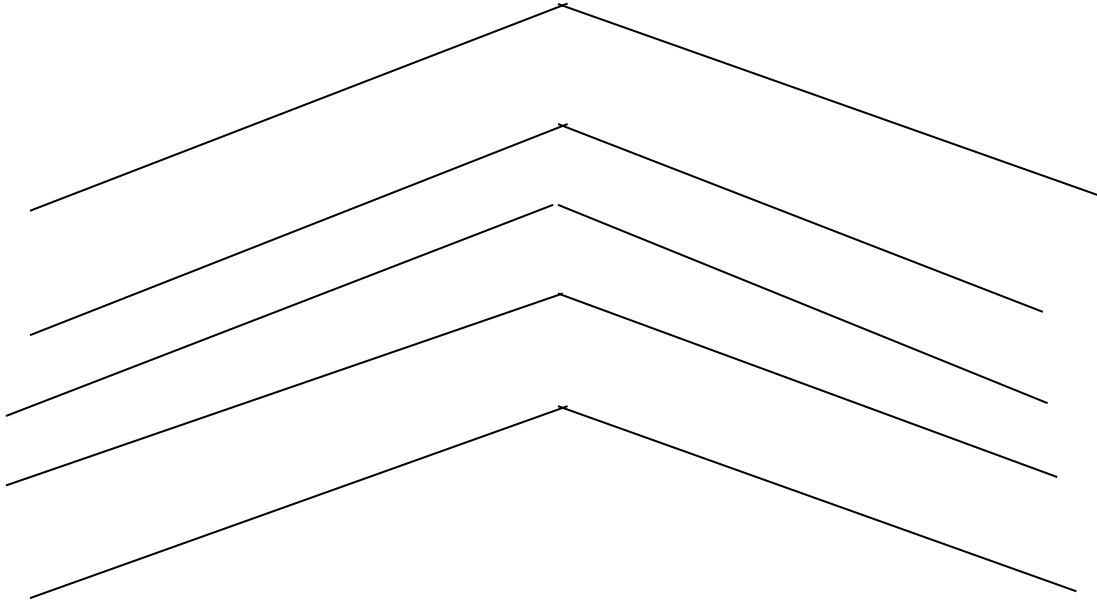**BANGLADESH TECHNICAL EDUCATION BOARD**

4- YEAR

DIPLOMA IN TEXTILE ENGINEERING PROGRAM

SYLLABUS

1ST SEMESTER

BANGLADESH TECHNICAL EDUCATION BOARD

BANGLADESH TECHNICAL EDUCATION BOARD

4-YEAR

DIPLOMA IN TEXTILE ENGINEERING PROGRAM

SYLLABUS

FIRST SEMESTER

Textile Diploma

							MARKS				
FIRST SEMESTER											
Sl. No	Subject code	Name of the subject	T	P	C	Theory		Practical		Total	
						Cont. assess.	Final exam.	Cont. assess.	Final exam.		
1	1911	Textile Raw Material-I	2	0	2	20	80	-	-	100	
2	1912	General Textile Process-I	3	3	4	30	120	25	25	200	
3	1011	Engineering Drawing	0	6	2	-	-	50	50	100	
4	5911	Mathematics-I	3	3	4	30	120	50	-	200	
5	5913	Chemistry	3	3	4	30	120	25	25	200	
6	5711	Bangla	2	2	3	20	80	25	25	150	
7	7011	Basic Workshop practice	0	6	2	-	-	50	50	100	
8	5812	Physical Education, Life Skill Development	0	2	1	-	-	25	25	50	
		TOTAL	**13**	**25**	**22**	**130**	**520**	**250**	**200**	**1100**	

1911   **TEXTILE RAW MATERIALS-I**

T P C
2 0 2

AIMS

1. To enable the students a clear idea of textile raw materials.
2. To develop the basic knowledge of different natural textile fibres.
3. To develop the knowledge of different natural fibres properties.
4. To develop the knowledge of natural filament yarn production.

SHORT DESCRIPTION

To understand the basic concepts of Cotton fibres; Jute fibres; Linen and Heamp fibre; Sisal and coir fibres; Wool fibres; Silk fibres.

DETAIL DESCRIPTION

<u>Theory</u>

1. Understand the Textile raw materials.
1.1 State the term ''textile raw materials''.
1.2 State the purposes of different textile raw materials.
1.3 Describe the characteristics of textile fibre.
1.4 Mention the classification of textile fibres with examples.
1.5 Mention the classification of natural fibres with examples.
1.6 Describe the qualities natural & manmade fibres
1.7 Distinguish between natural and manmade fibres.

<u>Natural fibres</u>

2. Understand the cotton fibre.
2.1 Describe the history of cotton fibre.
2.2 Describe the cultivation & harvesting of cotton fibre.
2.3 Define grading of cotton fibres.
2.4 Describe the points to be considered for cotton grading.
2.5 Mention the different systems of grading.
2.6 Mention the chemical composition of cotton fibre.
2.7 Describe the characteristics features of cotton fibre.
2.8 Describe the physical properties of cotton fibre.
2.9 Describe the chemical properties of cotton fibre.
2.10 Mention defects of cotton fibre.
2.11 Discuss the physical and chemical structure of cotton.

3. Understand the jute fibre.
3.1 Describe the history of jute fibre.
3.2 Describe the cultivation & rotting of jute fibre
3.3 Mention the botanical name of jute fibre.
3.4 Describe the classification of jute fibre.
3.5 Describe the grading of jute fibre.
3.6 Mention the defects in jute fibre.
3.7 Describe the physical properties of jute fibre.
3.8 Describe the chemical properties of jute fibre.

4. **Understand the linen/flax fibre.**
   4.1   Describe the history of linen fibre.
   4.2   Describe the cultivation and harvesting of linen/flax fibre.
   4.3   Describe the retting of linen/flax fibre.
   4.4   Mention the classification of linen/flax fibre.
   4.5   Mention the composition of linen/flax fibre.
   4.6   Describe the physical properties of linen/flax fibre.
   4.7   Describe the chemical properties of linen/flax fibre.

5. **Understand the hemp fibre.**
   5.1   Describe the history of hemp fibre.
   5.2   Describe the cultivation and harvesting of hemp fibre.
   5.3   Describe the retting of hemp fibre.
   5.4   Mention the classification of hemp fibre.
   5.5   Mention the composition of hemp fibre.
   5.6   Mention the physical properties of hemp fibre.
   5.7   Describe the chemical properties of hemp fibre.

6. **Understand the sisal and coir fibre.**
   6.1   Describe the cultivation of sisal and coir fibre.
   6.2   Mention the composition of sisal and coir fibre.
   6.3   Describe the properties of sisal and coir fibre.
   6.4   Describe the end-uses of sisal and coir fibre.

Animal fibres.

7. **Understand the wool fibre.**
   7.1   Describe the history of wool fibres.
   7.2   Mention the classification of wool fibre.
   7.3   Describe the grading of wool fibre.
   7.4   State the physical characteristics of wool fibre
   7.5   Describe the preparatory process of wool fibre.
   7.6   Mention the physical properties of wool fibre.
   7.7   Describe the chemical properties of wool fibre.

8. **Understand the silk fibre.**
   8.1   Describe the history of silk fibre.
   8.2   Describe production system of cocoons.
   8.3   Describe the silk production in Bangladesh.
   8.4   Mention the composition of silk fibre.
   8.5   Mention the classification of silk fibre.
   8.6   Describe the degumming of silk fibre.
   8.7   Mention the physical properties of silk fibre.
   8.8   Describe the chemical properties of silk fibre.

REFERENCE BOOKS
1. Textile science   E.P.G   Gohl
2. Textile Fiber of Fabric   Bernard P. Corbman
3. Textile fibres Dr. V. A. Shenai
4. Textile fibre (BTEB)-   Engr. Md. Mohibul Islam

GENERAL TEXTILE PROCESSES-I

AIMS

To Provide the Students with an opportunity to acquire Preliminary Knowledge, Skill and attitude in the area of yarn manufacture and fabric manufacture.

SHORT DESCRIPTION

To understand the flow-chart of yarn manufacturing; Ginning; Mixing and Blending; Blow-Room; Batch & Batching; Cotton & Jute carding; Cotton and Jute drawing & doubling; Lap forming; Combing; Simplex; Ring frame; Jute spinning frame; Yarn numbering system. To understand the basic concepts of Winding; Warping; Sizing; Drafting & Denting; Weaving and knitting.

DETAIL DESCRIPTION
YARN MANUFACTURING

Theory

1. Understand the flow-chart of yarn manufacturing.
  1.1 Define flow-chart and its importance.
  1.2 Mention the flow-chart of cotton yarn (Carded) Manufacturing.
  1.3 Mention the flow-chart of cotton yarn (Combed) Manufacturing.
  1.4 Mention the flow-chart of rotor yarn spinning.
  1.5 Mention the flow-chart of Jute yarn Manufacturing.
  1.6 Mention the flow-chart of carpet backing cloth (CBC) or Hessian warp.
  1.7 Mention the flow-chart of sacking warp yarn.
  1.8 Mention the flow-chart of sacking weft yarn.

2. Understand ginning.
  2.1 Define ginning.
  2.2 State the objectives of ginning.
  2.3 Mention the types of ginning machines.

3. Understand mixing and blending.
  3.1 Define mixing and blending.
  3.2 Mention the objectives of mixing and blending.
  3.3 Mention the types of mixing and blending.
  3.4 State the main factors to be consider for mixing and blending procedure.

4. Understand basic things of Blow-room.
  4.1 State the term ''Blow-room''.
  4.2 Mention the functions of Blow-room.
  4.3 List the blending and mixing machineries of Blow-room.
  4.4 List the opening and cleaning machineries of Blow-room.

5. Understand Batch & Batching.
  5.1 Define batch & batching.
  5.2 Describe jute emulsion.
  5.3 Define Softening.
  5.4 Mention the objectives of softening.
  5.5 Name the machines used for softening.

6. Understand cotton & jute carding.
  6.1 Define carding.

6.2   Mention the purposes of carding.
6.3   Name the types of carding machine used in cotton & jute yarn processing.
6.4   List the main parts of cotton & jute carding machines.

7.   Understand cotton and jute drawing & doubling.
7.1   Define drawing & doubling.
7.2   State the objectives of drawing.
7.3   List the main parts of cotton drawing frame.
7.4   State the purposes of jute drawing frame.
7.5   Mention the functions of jute drawing frame.
7.6   Give the classification of jute drawing frames.
7.7   List the main parts of different jute drawing frame.

8.   Understand the basic concepts of lap forming and combing.
8.1   State the purposes of mini-lap preparation.
8.2   List the lap forming machines.
8.3   State the term combing.
8.4   Mention the purposes of combing.
8.5   Mention the necessities of combing.

9.   Understand the basic ideas of simplex and spinning frame (Jute and Cotton).
9.1   State the purposes of simplex.
9.2   Mention the functions of simplex.
9.3   List the main parts of simplex machine.
9.4   State the purposes of ring frame.
9.5   Mention the functions of ring frame.
9.6   List the main parts of ring frame.
9.7   State the purposes of jute spinning frame.
9.8   Mention the functions of jute spinning frame.
9.9   Classify different types of jute spinning frames.
9.10   List the main parts of jute spinning frame.

10.   Understand yarn numbering system.
10.1   Define linear density.
10.2   Classify the different yarn numbering systems.
10.3   Define English count, Jute counting, Tex & Denier.

FABRIC MANUFACTURING

11.   Understand the basic ideas of winding.
11.1   Define winding.
11.2   Mention the objectives of winding.
11.3   Mention the types of winding.
11.4   Mention the different type of wound packages.

12.   Understand the concept of warping.
12.1   Define warping.
12.2   Mention the objectives of warping.
12.3   Mention the types of warping.

13.   Understand the basic things of sizing.
13.1   Define sizing.
13.2   State the purposes of sizing.
13.3   List different sizing ingredients.
13.4   Mention the pure sizing recipe.

14.   Understand the basic things of drafting and denting.
  14.1 State drafting and denting.
  14.2 Mention the purposes of drafting and denting.
  14.3 Mention the types of drafting & denting.

15.   Understand the basic ideas of weaving and knitting.
  15.1 Define weaving.
  15.2 Mention the flow-chart of weaving.
  15.3 State the sequence of weaving process.
  15.4 Classify the different types of looms.
  15.5 Define knitting.
  15.6 Classify the knitting systems.
  15.7 Differentiate between knitting & weaving.
  15.8 List the warp and weft knitting machines.

Practical

Yarn manufacture :

1.   Identify yarn manufacturing machines.
2.   Prepare batch & emulsion.
3.   Show the fibre path through a cotton carding machine.
4.   Show the fibre path through a jute breaker card machine.
5.   Show the fibre path through a jute finisher card machine.
6.   Show the fibre path through a cotton drawing frame.
7.   Show the fibre path through a jute drawing frame.
8.   Show the fibre path through simplex machine.
9.   Show the fibre path through ring spinning frame
10. Show the fibre path through jute spinning frame.

Fabric Manufacture :

1.   Practice cone, pirn, cheese, spool & cop winding.
2.   Practice warps preperation.
3.   Practice drafting.
4.   Practice denting through a reed..
5.   Identify the different working parts of hand loom.
6.   Identify the different working parts of power loom.
7.   Identify the different working parts of circular knitting machine
8.   Identify the different working parts of a flat knitting machine.
9.   Identify the different accessories used in textile processing viz. can, bobbin, pirn, cone, cheese, spool, cop, shuttle, needle, etc.

REFERENCE BOOKS

1.   Fibre Science   -R Gopalak rishnar
2.   Manual of cotton Spinning volume-II &III   -Byerley and Buckley
3.   Technology of Textile Processing volume-III-Dr. V.A. Shenai
3.   General Textile Processing (BTEB)   -Engr. Alauddin Khalifa

1011	**ENGINEERING DRAWING**	**T**	**P**	**C**
		0	**6**	**2**

OBJECTIVES

- To develop the ability to use various drawing instruments and materials.
- To enable in constructing and using various types of scales in drawing.
- To provide the ability to construct various geometrical figures.
- To enable to adopt various symbols used in drawing.
- To provide the skill of freehand sketching with shades and shadows.
- To provide the basic skill of drawing orthographic views.

SHORT   DESCRIPTION

Drawing instruments and their uses; Lettering, numbering and constructing title strip; Adopting alphabet of lines and dimensioning; Constructing scales; Constructing geometrical figures; Constructing conic sections; Adopting symbols; Freehand sketching (with shades and shadows), Drawing orthographic views.

DETAIL DESCRIPTION

DRAWING INSTRUMENTS AND MATERIALS

1   Practice with drawing instruments and materials for basic drawing   technique.
- 1.1   Identify the different types of drawing instruments.
- 1.2   Use different types of drafting equipment.
- 1.3   Use different types of drafting software.
- 1.4   Identify the standard sizes of drawing board and sheets.
- 1.5   Draw the border lines in drawing sheets following standard rule.
- 1.6   Draw horizontal, vertical and inclined lines with the help of set squares and T-square.
- 1.7   Draw 15 degree, 75 degree, 105 degree and 120 degree angles with the help of set squares.
- 1.8   Use lettering guide, template, scale pantograph and French curve.

LETTERING NUMBERING AND TITLE STRIP

2   Letter and number freehand and with instruments.
- 2.1   Identify the necessity of good lettering in engineering drawing.
- 2.2   Draw freehand single stroke vertical letters from A to Z (upper and lower case) and numbers 0 to 9.
- 2.3   Draw freehand inclined (65 degree to 75 degree) single stroke letters from A to Z (upper and lower case) and numbers from 0 to 9.
- 2.4   Draw block letters (Gothic) using 5 : 4 and 7 : 5 proportions and height.
- 2.5   Select a suitable size of letters and write a few sentences using all the letters selecting suitable scale.
- 2.6   Draw title strip with proper placement using suitable size of letters and measurements.

ALPHABET OF LINES AND DIMENSIONING
3   Adopt the alphabet of lines.
   3.1   Select different lines in drawing.
   3.2   Use center line, hidden line, phantom line, break line, dimension line, extension line, section line and cutting plane line.
   3.3   Use different thickness of line to emphasize a part of drawing.
   3.4   Select recommended grades of pencils for various types of lines for engineering drawing.

4   Adopt the elements and theory of dimensioning.
   4.1   Put dimensions in engineering drawing according to an accepted standard.
   4.2   Identify the elements of dimensions from a given dimensioned drawing.
   4.3   Apply aligned and unidirectional system of dimensioning.
   4.4   Draw size and location of dimension, continuous dimension, staggered dimension and dimensioning in limited space.
   4.5   Add necessary dimension to a given drawing with suitable arrows.

CONSTRUCTION OF SCALE
5   Prepare scale for drawing application.
   5.1   Calculate representative fraction and interpret a scale reading.
   5.2   Use different types of scale to find full size dimension.
   5.3   Draw a plain scale to show meters, centimeters and millimeters of a given distance on object.
   5.4   Draw a diagonal scale to show three units having given RF.
   5.5   Read particular distance on plain and diagonal scale.
   5.6   Use scale of chord.
   5.7   Draw angle of 49 degree, 78 degree and 95 degree with the help of scale of chord.

GEOMETRICAL CONSTRUCTIONS
6   Construct geometric figures (lines, triangles & squares).
   6.1   Divide given straight line into any number of equal parts.
   6.2   Draw perpendicular when the given point is at or near the end of the line.
   6.3   Bisect a given angle.
   6.4   Trisect a given angle.
   6.5   Draw a straight line parallel to given straight line at some given distance.
   6.6   Draw a square on a given straight line.

7   Construct geometric figures (circles and regular polygons).
   7.1   Draw regular polygons i.e. pentagon, hexagon and octagon having given one side.
   7.2   Locate the center of circle and arc.
   7.3   Inscribe circle in triangles.
   7.4   Inscribe a circle about a triangle.
   7.5   Divide a triangle into any number of equal parts.
   7.6   Draw an equilateral triangle equal in area of a square.
   7.7   Determine the length of the circumference of circle.

CONIC SECTIONS
8   Construct conic sections.
   8.1   Draw an ellipse by concentric circle method.
   8.2   Draw an ellipse by parallelogram method.
   8.3   Draw an ellipse by four center method.
   8.4   Draw a parabola having given foci and directrix.
   8.5   Draw a parabola from given abscissa and ordinate.

SYMBOLS

9   Adopt standard symbols in drawing.
    9.1   Identify symbols used in drawing.
    9.2   Draw a legend using symbols of different engineering materials.
    9.3   Draw the symbols of different plumbing fittings and fixtures used in drawing.
    9.4   Draw the symbols of different electrical fittings and fixtures used in drawing.
    9.5   Interpret information from drawing containing standard symbols.

FREEHAND SKETCHING (WITH SHADES AND SHADOWS)

10   Sketch freehand with shades and shadows.
    10.1   Produce freehand sketches of the following with shade and shadow technique:

a.	Book	g	Bib-cock
b.	Brick		Bench vice
c.	Step	h	Open box
d.	Cylinder	i	Electric lamps
e.	Hand	j	Electric switches
f.	tubewell	k	Electric fan
	Spade with handle	l	Nuts and bolts
	Pipe wrench		

    10.2   Use different materials and methods of shading and shadowing freehand sketches.

ORTHOGRAPHIC PROJECTION

Translate pictorial views of simple objects into orthographic views.

    Identify different planes.
    Draw third angle orthographic views of simple objects.
    Draw first and third angle views of a simple object and add proper dimensions.
    Solve missing Luis problems of different objective.

REFERENCE BOOKS

1   Geometrical Drawing
                  —   I H Morris
2   Prathamic Engineering Drawing
                  —   Hemanta Kumar Bhattacharia

OBJECTIVES

- To acquaint the students with the basic terminology of Algebra.
- To be able to understand the complex numbers (J-operator) which are being used in electrical engineering
- To be able to understand the binomial expansion.
- To be able to use the knowledge of trigonometry in solving problems of engineering importance.

SHORT DESCRIPTION

<u>Algebra</u>: Set, Indices, Logarithms, AP & GP, Polynomials & polynomial equations, Complex number, Permutation & Combination, Binomial theorem for positive integral Index and negative & fractional index.

<u>Trigonometry</u>: Ratio of associated angles, Compound angles, Transformation formulae, multiple angles and Sub-multiple angles.

DETAIL DESCRIPTION

<u>Algebra</u>**:**

1   Apply the concept of set in solving problem.
     1.1   Define set, sub-set and universal set.
     1.2   Define the different types of number set.
     1.3   Define union of set, intersection of set, complement of set, power set, disjoint set.
     1.4   Prove (using Venn diagram) the relation of following types where A, B and C are any set.
           i) $A \cup (B \cup C) = (A \cup B) \cap (A \cup C)$

           ii) $(A \cup B)^c = A^c \cap B^c$

           iii) $(A \cap B)^c = A^c \cup B^c$

     1.5   Find the number of elements in the union of two sets.
     1.6   Solve the problems using above.
2   Apply the laws of indices in solving mathematical problem.
     2.1   State the laws of indices.

     2.2   Apply the laws of indices to solve the problem.

     2.3   Perform algebraic operation on surd.

     2.4   Use the scientific calculator in solving the problems of indices.

LOGARITHIMS

3   Apply the concept of logarithms.
     3.1   Define logarithm.
     3.2   Prove the following laws of logarithm.
           a) $\log_a (m \times n) = \log_a m + \log_a n$

b) $Log_a \left(\dfrac{m}{n}\right) = Log_a\ m - Log_a\ n$

c) $Log_a\ (m)^n = n\ Log_a\ m$

d) $Log_b\ a \times Log_a\ b = 1$

e) $Log_a\ 1 = O$

3.3   Solve problems using 3.2.
3.4   State the difference between Naperion and common logarithms.

4   Understand the concept of AP & GP.
4.1   Define AP and common difference.

4.2   Find last term and sum of n terms, given first term and common difference.

4.3   Define GP and common ratio.

4.4   Find the sum of n terms given first and common ratio.

5   Apply the concept of polynomial in solving the problems.
5.1 Define polynomials and polynomial equation.
5.2 Explain the roots and co-efficient of polynomial equations.
5.3 Find the relation between roots and co-efficient of the polynomial equations.
5.4 Determine the roots and their nature of quadratic polynomial equations.
5.5 Form the equation when the roots of the quadratic polynomial equations are given.
5.6 Find the condition of the common roots of quadratic polynomial equations.
5.7 Solve the problems related to the above.

6   Understand the concept of complex numbers.
6.1 Define complex numbers.
6.2 Perform algebraic operation (addition, subtraction, multiplication, division, square root) with complex
        number of the form a+jb.
6.3 Find the cube roots of unity.
6.4 Apply the properties of cube root of unity in solving problems.

7   Apply the concept of permutation & Combination.
7.1 Explain permutation.
7.2 Find the number of permutation of n things taken r at a time when,
        i) things are all different.
        ii) things are not all different.
7.3 Solve problems of the related to permutation :
        i)   be arranged so that the vowels may never be separated.
                From 10 man and 6 women a committee of 7 is to be formed. In how many ways can

                this be done so as to include at least two women in the committee.

7.4   Explain combination.
7.5   Find the number of combination of n different things taken r at a time.
7.6   Explain ^nC_r, ^nC_n , $^nC_0$
7.7   Find the number of combination of n things taken r at a time in which p particular things

        i) Always occur   ii) never occur.

7.8   Establish   i) $^nC_r = {}^nC_{n-r}$

12

ii) $^{n}C_{r} + {^{n}C_{r-1}} = {^{n+1}C_{r}}$

7.9 Solve problems related to combination.

8 **Apply the concept of binomial theorem.**

8.1 State binomial expression.

8.2 Find the general term, middle term, equidistant term and term independent of x.

8.3 Use binomial theorem to find the value of

i) $(0.9998)^{2}$, correct to six places of decimal .

ii) $(1 + \sqrt{2})^{5} - (1 - \sqrt{2})^{5}$

8.4 Express the binomial theorem for negative and fractional index.

8.5 Solve problems of the following types:

$$\text{Expand i)} \ (1\text{-nx})\text{-}\frac{1}{n} \quad \text{ii)} \ \frac{1}{4.08}$$

9 **Apply the concept of associated angles.**
9.1 Define associated angles.
9.2 Find the sign of trigonometrical function in different quadrants.
9.3 Calculate trigonometrical ratios of associated angle.
9.4 Solve the problems using above.

10 **Apply the principle of trigonometrical ratios of compound angles.**
10.1 Define compound angles.
10.2 Establish the following relation geometrically for acute angles.
i) $\sin (A \pm B) = \sin A \cos B \pm \cos A \sin B$.

ii) $\cos (A \pm B) = \cos A \cos B \pm \sin A \sin B$.

10.3 Deduce formula for tan $(A \pm B)$, Cot $(A \pm B)$.
10.4 Apply the identities to work out the problems:
i) find the value of sin 75 ^{0}, tan 75 ^{0}.

ii) show that $\dfrac{\sin 75^{0} + \sin 15^{0}}{\sin 75^{0} - \sin 15^{0}} = \sqrt{3}$

iii) if $\alpha + \beta = \theta$, $\tan\alpha + \tan\beta = b$, $\cot\alpha + \cot\beta = a$,

show that $(a - b) = ab \cot \theta$.

11 **Apply sum and product formula of trigonometrical ratios.**
11.1 Express sum or difference of two sines and cosines as a product and vice-versa .
11.2 Solve problems of the followings types:
i) show that, sin 55 ^{o} + cos 55° $= \sqrt{2} \cos 10^{0}$

ii) prove that, cos 80^{0} cos 60^{0} cos 40^{0} cos 20^{0} $= \dfrac{1}{16}$

12   Apply the concept of ratios of multiple angles.

12.1   State the identities for sin 2A, cos 2A and tan 2A.

12.2   Deduce formula for sin 3A, cos 3A and tan 3A.

12.3   Solve the problems of the followings types.

i) express cos 5θ in terms of cos θ .

ii) if tan α = 2 tan β, show that, tan $(\alpha + \beta) = \dfrac{3 \sin 2\alpha}{1+3 \cos 2\alpha}$

13   Apply the concept of ratios of sub-multiple angles.

13.1   Find mathematically the identities for sin α , cos α and tan α in terms of $\dfrac{\alpha}{2}$ and $\dfrac{\alpha}{3}$

13.2   Solve the problems of the type :
find the value of cos 3^0 , cos 6^0 , cos 9^0 , cos 18 ^{0}, cos 36^0, etc.

OBJECTIVES

- To provide the students a background of basic science required for understanding technology subjects.

- To develop a working knowledge of common engineering and industrial materials including physical and chemical properties and to enable to determine through experiments the properties of such materials.

- To develop a basic knowledge and concept of chemical reactions of common engineering and industrial materials.

- To develop through experiments the understanding of fundamental scientific concept which will provide a common base for further studies in science and technology?

SHORT DESCRIPTION

Role of Chemistry in the field of engineering and technology; Matter and its changes; Symbol, valence and chemical equations; Different types of chemical reactions; Catalyst and Catalysis; Acid, Base and Salt; Properties of gases; Dalton atomic theory; Avogadro's hypothesis; Laws of chemical equivalent; Atomic Mass and molecular mass; Atomic structure; Quantum numbers; Periodic table; Oxidation & Reduction; Chemical bond; Electrolytic conductance and electrolysis; Acid base equilibrium; Water; Metals; Concept of Organic Chemistry; Aliphatic Hydrocarbon and Alcohols.

DETAIL DESCRIPTION
Theory: MATTER AND ITS CHANGES
1   Symbol, Valency & Chemical Equation

1.1   Define matter, element, compound, mixtures, solutions and suspensions.
1.2   Distinguish between, "atoms and molecules", "physical change and chemical change", "exothermic and endothermic changes and reactions".
1.3   Identify exothermic and endothermic reactions from a given list of reactions.
1.4   Define symbol and formula, valence of elements and radicals.
1.5   Discuss the variations of valence with examples.
1.6   Define active and latent valence.
1.7   Define chemical equation.
1.8   Explain the full meaning of a given chemical equation.

DIFFERENT TYPES OF CHEMICAL REACTIONS, CATALIST & CATALYSIS
2   Understand the concept of chemical reactions.
2.1   Define chemical reaction.
2.2   Name the methods of bringing about chemical reaction.
2.3   Give examples of different types of chemical reactions with suitable examples.
2.4   Define catalysis and catalyst.
2.5   Mention different types of catalyst with examples.
2.6   List five uses of catalysts in industries.

ACID, BASE & SALT
3   Understand acid, base and salt.
3.1   Define acid, base and salt.
3.2   List five properties of acid, base and salt.
3.3   Classify salts according to their chemical properties.
3.4   Explain basicity of an acid and acidity of a base.

STATES OF MATTER
4   Understand properties of gases.
 4.1   Identify the basic properties of gases.
 4.2   Define Boyls law & Charls law, absolute temperature S.T. P /N.T.P
 4.3   Deduce the relationship between pressure, volume and temperature of a gas to establish Boyle's Law, Charle's law and the law of pressure.
 4.4   Combine the gas laws to establish the gas equation.
 4.5   Establish the partial pressure of mixed gases using Dalton's law of partial pressure.
 4.6   Solve problems in relation to pressure, volume, temperature and partial pressure of a mixture of gases.

DALTON'S ATOMIC THEORY & AVOGADRO'S HYPOTHESIS
5   Understand Dalton's atomic theory & Avogadro's hypothesis
 5.1   List the four postulates of Dalton's atomic theory.
 5.2   Explain at least five limitations of Dalton's atomic theory.
 5.3   State Avogadro's hypothesis.
 5.4   Explain Avogadro's constant.
 5.5   Explain five applications of Avogadro's hypothesis in Chemistry.
 5.6   Solve problems using the knowledge of Avogadro's hypothesis.

6   Understand chemical equivalent, Atomic & molecular Mass.
 6.1   Define the chemical equivalent of an element, a compound, a radical, an acid an alkali and a salt.
 6.2   Explain the variations in chemical equivalent of an element.
 6.3   Define atomic mass and molecular Mass.
 6.4   Establish a relationship among chemical equivalent, valence and atomic   Mass.
 6.5   Solve problems to find out atomic Mass, chemical equivalent and valency.

7   Understand the modern concept of atomic structure.
 7.1   State the fundamental particles of atom.
 7.2   Explain the following terms:
   i) Atomic number ii) Isotopes   iii) Isobar iv) Gram-atom
   v) Mass Number and vi) Gram molecular Mass, vii) Mole viii) ISO tone.
 7.3   Describe Rutherford's and Bohr's atomic model.

8   Understand the quantum numbers.
 8.1   Define quantum numbers.
 8.2   Explain the significance of the following quantum numbers:
   i)   Principal quantum number
   ii) Subsidiary quantum number
   iii) Magnetic quantum number
   iv) Spin quantum number
 8.3   Explain the Paula's exclusion principle.
 8.4   Explain the probability distribution of electrons round the nucleus.
 8.5   Define orbit and orbital.

9   Understand the modern periodic table.
 9.1   State the periodic law of elements.
 9.2   Describe the modern long periodic table.
 9.3   Explain the limitations of periodic table.
 9.4   Give the Name of IA, VII-A and Zero group elements.

10   Understand oxidation and reduction.
 10.1   Explain the modern concepts of oxidation and reduction with examples.
 10.2   Explain "oxidizing agent" and "reducing agents" with examples.

10.3   Explain the oxidation and reduction takes place simultaneously.
        10.4 Explain the oxidation number and oxidation state.
10.5   Write the oxidation number of an element from its compounds.

11   Understand the modern concept of chemical bonds.
11.1   Define chemical bond.
11.2   List the different types of bonds.
11.3   Explain the modern concept of ionic bonds.
11.4   Explain the co-valet bonds, co-ordinate bond, Sigma bond, Pie bond.

12   Understand the fundamentals of electrolysis.
12.1   Define electrolysis.
12.2   Differentiate between electrical conductor and electrolyte.
12.3   Explain the process of electrolysis.
12.4   Explain Faraday's laws of electrolysis.
12.5   List at least four Industrial applications of electrolysis.

13   Understand pH value, Acidimetry and Alkalimetry.
13.1   Define pH, acidimetric and alkalimetry.
13.2   Explain pH scale and its uses.
13.3   Explain acid base titration.
13.4   Explain the method of preparation of normal solutions.
13.5   Define of indicators and their uses.
13.6   Explain buffer solutions and their working mechanism.

14   Understand oxides and hydroxides.
14.1   Define oxide and hydroxide.
14.2   Describe the classification of oxides and hydroxides.
14.3   Explain different types of oxides and hydroxides with examples.

15   Understand the chemical process involved in water treatment.
15.1   Distinguish between hard water and soft water.
15.2   Differentiate between temporary and permanent hardness of water.
15.3   List at least three disadvantages and three advantages of using hard water.
15.4   Describe the Permuted process of softening hard water by explaining the reactions
        that take place.
15.5   Explain the ion exchange resin process of softening water.
15.6   Describe chemical tests of water.

16 Understand the extraction and refining process for Iron, Copper, Zinc and Aluminum.
16.1   Compare the properties of metal and non-metal.
16.2   Define (i) ores (ii) roasting (iii) calcinations (iv) smelting (v) alloy (vi) slag, (vii) Flux.
16.3   Give names and formulae of important ores of Iron, Copper, Aluminum and Zinc.
16.4   Describe the manufacturing process of iron and copper from its ore.
16.5   Compare the properties of (i) Cast Iron (ii) iron (iii) Steel (iv) Wrought Iron.

17 Understand the concept of Organic Chemistry and organic compounds.
17.1   Define Organic Chemistry.
17.2   Distinguish between organic and inorganic compounds.
17.3   Explain homologous series of organic compounds.
17.4   List the molecular and structural formulae of methane, ethane, propane and butane.
17.5   Explain functional groups of organic compounds.

18   Understand the aliphatic hydrocarbons and the alcohols.
18.1   Define hydrocarbon, saturated and unsaturated hydrocarbons.

18.2   Define alkenes, alkene's and alkynes.
18.3   Explain commons system, derived system and IUPAC system of nomenclature
        of organic compounds.
18.4   Define Alcohols.
18.5   Explain the classification of alcohol.
18.6   Define the term Enzyme, Fermentation, De-carbonization, Power Alcohol, Absolute Alcohol.

PRACTICAL ;

OBSERVATION AND MEASUREMENT
1. Measure the pH value of unknown solutions to classify them as neutral, acidic or alkalis.
2. Prepare a decinormal solution of sodium carbonate.
3. Determine the unknown strength of an acid, Solve by a standard alkalis solution with a suitable indicator.

QUALITATIVE ANALYSIS OF KNOWN SALTS
4. Perform test tube tests for the known salt samples Copper salt, Iron salt, Lead salt, Aluminum
   salt, Ammonium salt, etc.
5. Perform charcoal oxidation and reduction test for the different salt e.g. such as Lead salt, Copper salt,
   Iron salt, Calcium salt, etc.
6. Perform tests to detect unknown basic radicals e.g. Lead, Copper, Iron Calcium, Zinc,
   Aluminium, Ammonium and Sodium.
7. Perform tests to detect unknown acid radicals e.g. chloride, nitrate, carbonate and sulphate.

D‡Ïk¨

1| fvlv `¶Zv mg~‡ni (Language skills) cÖv‡hvwMK †hvM¨Zv AR©b |

2| evsjv mwnZ¨ cVb- cvV‡bi gva¨‡g evOvjx RvZxqZv‡eva, †`k †cÖg, ˆbwZKZv, gy³wPšÍv I g~j¨ †iv‡ai D‡b¥l NUv‡bv|

msw¶ß weeiYx

evsjv fvlv t gvZ…fvlv I m„RbkxjZv ; Mí, KweZv, cÖeba , bvUK I Dcb¨vm msKjb Ges evsjv fvlv ixwZi wewfbœZv evbvb NwUZ mgm¨v I D”PviY KxwZ© weiPb I cÎ iPbv|

ZvwË¡K Ask

wek` weeiYx

1   **evsjv fvlvi wbfz©j cÖ‡qvM t**

    K) evsjA fvlv t fvlvi ms½vu, evsjv fvlvi DrcwË I µg weKvk, evsjv fvlv ixwZ- mvay, PwjZ ixwZ I AvÂwjK ev Dcfvlv (ms½vu, ˆewkó¨, cv_©K¨¨ I D`vniY)

    L) evsjv evbvb I D”PviY wewa t ¯^ieY©, e¨ÄbeY© I hy³ e‡Y©i MVb †KŠkj , bvg,D”PviYiY I D`vniY; evsjv GKv‡Wgxi cÖwgZ evbvb ixwZ RvZxq wk·vµg I cvV¨ cy¯ÍK †ev‡W©I evbvb ixwZ,D”PviY ixwZ I D”PviY m~Î – evsjAD”PviYi‡Yi ixwZ mg~n, eûj cÖPwjZ wKQy k‡ãi evbvb ID”PviYiY evbv‡bi Aï×, ev‡K¨ c‡`I c`-cÖ‡qvM I c` web¨v‡m f~j , mvay I PwjZ ixwZi wgk¨YRwbZ fyj|

    M) weiPb t fvem¤cÖmvib, mvivsg I mvigg©Z; cÖwZ‡e`b iPbv|

    N) cÎ iPbv t e¨w³MZ, mvgvwRK, `vßwiK, msev`cÎ cÖKvk Dc‡hvMx, ¯§viK wjwc, gvb cÎ Av‡e`b cÎ-cÖvwZôvwbK, PvKzwii Av‡e`b, Rxeb e„ËvšÍ BZ¨vw`|

2   **evsjv mvwnZ¨ t**

    K) KweZv

    e½ fvlv- gvB‡Kj gaymyab `Ë

    ‡mvbvi Zix – iex›`ªbv_ VvKzi

    gvbyl- KvRx bRi“j Bmjvg

    evsjvi gyL Avwg †`wLqvwQ- Rxebvb›` `vk

    L) †QvU Mí t

    ‡LvKveveyi cÖZ¨veZ©©b -iex››`ª VvKzi

    g‡nk - kir P›`ª P‡Uªvcvcva¨vq

    GKz‡ki Mí - Rwni ivqnvb

    M) cÖeÜ t

    Aav½x - †eMg †iv‡Kqv mvLvIqvZ †nv‡mb

    Rxeb I e„¶ - †gvZv‡ni †nv‡mb †PŠayix

    ms¯‹…wZ - Aveyj dRj

    N) GKvwÜKv t

        gvbyl - gybxi †PŠayix

    O) gyw³hy‡×i Dcb¨vm t (†h †Kvb GKwU)

    1.Av¸‡bi cikgwb- ûgvq~b Avn‡g`

    2.Rbbx mvnwmbx - 1971 -Avwbmyj nK

e¨envwiK Ask

1. wba©vwiZ e³…Zv t wewf&b RvZxq w`em welqK - weRq w`em GKz‡k †deªª"qvwi –AvšÍRv©wZK gvZ…fvlv w`em, ¯^vaxbZv w`em, 15 AvM÷-RvZxq †kvK w`em, †g w`em|
cÖvwZôvwbK e³…Zv Ñ bevMZ wk¶‡Ki eiY, we`vqx QvΠ‡`I D‡Ï‡k¨ e³…Zv, wk¶v gš¿x/ gnvcwiPvjK/ †Pqvig¨vb Gi AvMgb Dcj‡¶ e³…Zv|

2. Ave„wË t
evukx - iex›ªbv_ VvKzi
KvÛvix ûwkqvi - KvRx bRi"j Bmjvg
nvq wPj- Rxebvb›` `vk
cÖwZ`vb - Rmxg DwÏb
wmuwo - myK&všÍ fÆvPvh©
†Zvgv‡K cvIqvi Rb¨ †n ¯^vaxbZv - kvgmyj ingvb
eY©gvjv Avgvi `ytwLbx eY©gvjv -kvgmyi ingvb
wPwV `Ë - gnv‡e mvnv|

3. weZK© t
weÁvb Avk©xev` bv Awfkvc|
QvÎ ivRbxwZ wbqš¿B cÖÖK…Z MYZš¿ cÖwZôvi c_| Bs‡iwR gva¨g wk¶v c×wZ RvZxqZv‡eva I †`k‡cÖg m„wói cÖavb AšÍivq|
cÖÖhyw³i weKvkB cÖÖK…wZ webv‡ki GKgvÎ Kvib| ms¯‹…wZB AvaywbK gvby‡li ag©| gyw³hy‡×I †PZbvB Amv¤cÖ`vwqK evsjv‡k cÖvwZôvi g~jgš¿| AvKvk ms¯‹…ywZ hye mgv‡Ri ˆbwZK Ae¶qi g~j KviY| Pvj‡Ki AmZ©KZvB moK `yN©Ubvi cÖvbZMg KviY|

4. Dcw¯'wZ e³…Zv t
welqe¯' Db¥¥y³|

5. cÖwZ‡e`b Dc¯'vcb t
D×Zb KZ…c‡¶i Kv‡Q Dc¯'vcY
msev`c‡Î cÖÖKv‡ki Rb¨ †cÖiY

7011	**BASIC WORKSHOP PRACTICE**	**T**	**P**	**C**
		0	**6**	**2**

AIMS

To provide the students with an opportunity to acquire knowledge and skills to

- perform different metal & fitting works.
- perform basic welding works.
- Use and take care of fitting and welding tools & equipment.

SHORT DESCRIPTION

Fitting : Safety Precautions, Common hand tools; Measuring instruments; Laying out; Sawing, chipping, filing, grinding and finishing, drilling and thread cutting;
Welding : Arc welding; Gas welding; Welding with non-ferrous metal; Resistance welding.

Practical :
1   Understand the safely productions in Fitting & welding shop:
    1.1.   State general safety precaution in Fitting shop.
    1.2.   State general safety precaution in welding shop.
    1.3.   State the importance of good house keeping.

2   Demonstrate the application of basic metal working hand tools.
    2.1   Identify common hand tools used for metal and fitting works.
    2.2   Check hand tools for sharpness.
    2.3   Carryout minor maintenance and sharpening of tools used for fitting works.
    2.4   Follow safety procedure during working in the fitting shop.

3   Demonstrate the application of measuring instruments and gages for bench work.
    3.1   Identify the measuring and layout tools.
    3.2   Take measurement with vernier caliper and micrometer.
    3.3   Measure and layout a fitting job.
    3.4   Check/measure with gages (sheet and wire gage, drill gage, etc).

4   Demonstrate the application of machines and equipment for fitting works.
    4.1   Identify machines and equipment for specific use.
    4.2   Take care and maintenance of machines and equipment used in the fitting shop.

5   Show skill in sawing, chipping, filing, drilling and reaming.
    5.1   Identify the operations of sawing, chipping, filing, drilling and reaming.
    5.2   Perform sawing, chipping, filing, drilling and reaming operations.
    5.3   Make a job involving sawing, chipping, filing, drilling and reaming operations (Hinge, Angle gage, etc).
    5.4   Follow safety procedures during sawing, chipping, filing, drilling and reaming.

6   Show skill in cutting threads.
    6.1   Identify the taps and dies.
    6.2   Cut internal and external threads with tap and die.

6.3   Follow safety procedures during working with taps and dies.

7   Show skill in making sheet metal jobs.
7.1   Select appropriate sheet metal.
7.2   Select tools and equipment for sheet metal works.
7.3   Layout the sheet for jobs.(Development Drawing)
7.4   Make wire edge.
7.5   Make seam joint.
7.6   Make mug/measuring can/sugar scoup, etc.

8   Show skill in making pipe and duct.
8.1   Estimate the sheets required for pipe and duct.
8.2   Layout a sheet for pipe and duct.
8.3   Make pipe and duct.
8.4   Take care during making pipe and duct.

9   Show skill in soldering and brazing.
9.1   Select tools and equipment for soldering and brazing.
9.2   Make soldering and brazing joint.
9.3   Take care during soldering and brazing.

10   Show skill in arc welding.
10.1   Select welding tools and equipment.
10.2   Prepare work piece for welding joint.
10.3   Select proper current and voltage for arc welding.
10.4   Select appropriate electrodes.
10.5   Make arc welding joints (Lap, Butt, Tee, Corner, etc.)
10.6   Follow safe working procedures during arc welding.

11   Show skill in welding by gas.
11.1   Select tools and equipment for gas welding and gas cutting.
11.2   Select appropriate filler rod and flux.
11.3   Select appropriate flame for welding and cutting.
11.4   Make gas welding joints (Lap, Butt, Tee, Corner, etc.)
11.5   Follow safe working procedures during arc welding.

12   Show skill in resistance welding.
12.1   Identify the resistance welding machines.
12.2   Identify accessories and tools for resistance welding.
12.3   Make spot welding joints.
12.4   Follow safe working procedures during working with spot welding machine.

REFERENCE BOOKS

1   Basic Sheet Metal Practice
                        —   J. W. Giachino
2   Prathomic Fitting Sikkha
                        —   Hemanta Kumar Bhattacharia
3   Welding Principles for Engineers
                        —   Morris
4   Metal Fabrication
                        —   Robert L. O'con
5   Sheet Metal Work
                        —   Blackburn & Cassidy

5812   PHYSICAL EDUCATION AND LIFE SKILL DEVELOPMENT

T	P	C
0	2	1

OBJECTIVES
- To enhance body fitness.
- To make aware of first aid procedure.
- To acquaint with the common games and sports.
- To develop life skill

SHORT DESCRIPTION
Warming up; Yoga; Muscle developing with equipment; First aid; Games & sports; life skill development.

DETAIL DESCRIPTION
   1. National Anthem and Assembly
   Make assembly
   Recitation of national anthem
   National anthem in music
2. Warming up
   2.1.   General Warming-up :
   Head rotation, Hand rotation, Side twisting, Toe touching, Hip rotation, Keen twisting, Ankle twisting, Push up & Sit up.

   2.2.   Squad Drill :
   Line, File, Attention, Stand at easy, Stand easy, Left turn, Right turn, About turn, Mark time, Quick march, Right wheel, Left wheel, Open order march & Closed order march.
   2.3.   Specific warming up :
   Legs raising one by one, Legs raising in slanting position, Knee bending and nose touching, Heels raising, Toes touching & Laying position.

   2.4.   Mass Physical Exercise (Free hand) :
   Hand raising, Side twisting, Front & back bending, Front curl, Straight arms curl two hands, Hands raising overhead and Push up & Push down.

3. Yoga
   2.1   Dhyanasan :
   Shabasan, Padmasan, Gomukhasan, Sharbangasan, Shirshsan
   2.2   Shasthyasan :
   Halasan, Matshasan, Paban Muktasan, Ustrasan
4. Muscle Developing with equipment
   3.1   Damball :
   Front curl, Hand sidewise stretching, Arms raising overhead.
   3.2   Barball:
   Front press, Leg press, Rowing motion with leverage bar.
   3.3   Rope climbing:
   Straight way climbing, Leg raising climbing.
   3.3   Horizontal bar:
   Chinning the bar front grip, Chinning the bar wide back grip.
   3.4   Jogging Machine:
   Slow, medium, and fast running
   3.5   Rowing Machine:

   4.   Show skill on conversation on day to day life

      4.1   Today's Market price

      4.2   Festivals(religious festivals, National festivals)

      4.3   Celebration of National days

      4.4   Aim of life

      4.5   Visited historical places/sites

5.   Human relation

      5.1   Family relation

      5.2   Relation with neighbor

      5.3   Humanitarian Service

      5.4   Service for handicapped (intelligent, physical, social etc.)

      5.5   Service for orphan / Patient

6.   Vote of appreciation

      6.1   About dress

      6.2   For good work

      6.3   For good result

      6.4   For good news

7.   Telephone conversation

      7.1   Use of telephone

      7.2   Courtesy for using telephone

      7.3   Receiving and sending massages through telephone

      7.4   Presenting the gist

8. Stress Management

Habit to be a man of humor

Positive thinking

Habit to changing thinking

9. Time Management

Determine essential time for a task

Determine delay and unexpected time

Determine time for daily activities

Plan for daily activities

10. Interview Technique

Mental preparation to face an interview

Selection of dress for interview

Introducing himself/herself to the interviewer

Coping interview

11. Team work

Organized a team

Selection of team leader

Distribution to the task to the members

Accepting opinion of team members

Completion of task as a team

12 Social work

Tree plantation

Community service (Sanitation, pure drinking water, social culture etc.)