

SYLLABUS

1ST SEMESTER

Garments Design and Pattern Making

FIRST SEMESTER

Sl. No	Subject code	Name of the subject	T P C			MARKS				
						Theory		Practical		Total
						Cont. assess.	Final exam.	Cont. assess.	Final exam.	
1	4911	Introduction to Textile Science	3	0	3	30	120	-	-	150
2	1011	Engineering Drawing	0	6	2	-	-	50	50	100
3	6711	Basic Electricity	3	3	4	30	120	25	25	200
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	5712	English-I	2	0	2	20	80	-	-	100
TOTAL			16	17	22	160	640	175	125	1100

AIMS

- To be able to acquire knowledge of clothing.
- To be able to understand ginning, mixing and blending.
- To be able to develop knowledge of weaving, knitting, singeing and dyeing.
- To be able to acquire knowledge of scouring and bleaching.
- To be able to understand garments manufacturing process

SHORT DESCRIPTION

Clothing; Ginning; Mixing; Blending; Batching and emulsion; Yarn manufacturing; Weaving; Knitting; Singeing and desizing; Scouring and bleaching; Dyeing, printing and finishing; Garments manufacturing process; Spreading and cutting of garments; Garments finishing.

DETAIL DESCRIPTION

1 Understand the clothing.

- 1.1 Mention the sequences of cloth processing from fiber to garments.
- 1.2 Name the sources of textile fibers.
- 1.3 Describe different types of woven & knit fabrics.
- 1.4 Discuss the historical development of textile and clothing process.
- 1.5 Describe hand loom products.

2 Understand the ginning.

- 2.1 Define ginning.
- 2.2 Mention the purposes of ginning.
- 2.3 Name the types of ginning.
- 2.4 Describe working principle of different ginning machines.
- 2.5 Describe different types of ginning machines.
- 2.6 Describe the faults of ginning with their remedies.

3 Understand the mixing of spin able fibers.

- 3.1 Define the term of mixing.
- 3.2 Mention the purposes of mixing.
- 3.3 Mention the classification of mixing.
- 3.4 Describe the process of mixing.
- 3.5 Describe the economic process of mixing.

4 Understand the blending of different fibers.

- 4.1 Define blending.
- 4.2 Mention the purpose of blending.
- 4.3 Mention the blending ratio of different fibers.
- 4.4 Mention the classification of blending.
- 4.5 Describe the process of blending.
- 4.6 Describe the economic process of blending.

5 Understand batching and emulsion.

- 5.1 Define batch and batching.
- 5.2 Describe the procedure of batching.
- 5.3 Define emulsion.
- 5.4 Mention the properties of emulsion.
- 5.5 Describe the procedure of emulsion.

6 Understand the yarn manufacturing (spinning).

- 6.1 Mention the purpose of carding (jute and cotton).
- 6.2 List different categories of cotton spinning machinery.
- 6.3 Describe the working principles of each machinery for carding.
- 6.4 Mention the purposes of drawing and doubling.
- 6.5 Describe drawing process in jute spinning.
- 6.6 Describe drawing process in cotton spinning.
- 6.7 Mention the purposes of lap forming.
- 6.8 Mention the purpose of combing.
- 6.9 Mention the purpose of simplex.
- 6.10 Mention the purposes of spinning.

7 Understand the weaving.

- 7.1 Mention the purpose of sizing.
- 7.2 Mention different types of sizing.
- 7.3 Describe the process of sizing.
- 7.4 Differentiate between drafting and denting.
- 7.5 Mention the purposes of drafting .
- 7.6 List different types of drafting and denting.
- 7.7 Describe drafting and denting process.
- 7.8 State basic principles of weaving.
- 7.9 List different types of machinery used in weaving.

8 Understand the knitting.

- 8.1 Define knitting.
- 8.2 Describe different types of knitting machine.
- 8.3 Describe different types of knitted fabrics.
- 8.4 Mention the properties of knitted fabrics.
- 8.5 Discuss the defects of knitted fabrics.

9 Understand the singeing and desizing.

- 9.1 Define singeing.
- 9.2 Mention the purpose of singeing.
- 9.3 List different types of singeing.
- 9.4 Describe the process of singeing.
- 9.5 Mention the purpose of desizing.
- 9.6 List different types of desizing.
- 9.7 Describe the process of desizing.

10 Understand scouring and bleaching.

- 10.1 Define scouring.
- 10.2 Mention the purpose of scouring.
- 10.3 List different types of scouring.
- 10.4 Define bleaching.
- 10.5 Mention the purpose of bleaching.
- 10.6 List different types of bleaching.

11 Understand the dyeing, printing & finishing.

- 11.1 Define dyeing.
- 11.2 Mention the purpose of dyeing.
- 11.3 Define printing.
- 11.4 Mention different types of printing.
- 11.5 List different types of printing machines.
- 11.6 Describe different types of mechanical finishing.
- 11.7 Describe different types of chemical finishing.

- 12 Understand the garments manufacturing process.**
- 12.1 Mention the purpose of design/sketch.
 - 12.2 Mention different types of design/sketch.
 - 12.3 Describe the procedure of design/sketch.
 - 12.4 Mention the purpose of production pattern design.
 - 12.5 List different types of production pattern design.
 - 12.6 Describe the procedure production of pattern design.
 - 12.7 Mention the purpose of sample making.
 - 12.8 Identify different types of sample making.
 - 12.9 Describe sample making procedure.
- 13 Understand the spreading and cutting of garments.**
- 13.1 Mention the purpose of spreading.
 - 13.2 Describe spreading procedure.
 - 13.3 Mention the purpose of cutting.
 - 13.4 Describe the purpose of cutting.
 - 13.5 Describe the purpose of sewing.
 - 13.6 Describe the sewing procedure.
- 14 Understand the garments finishing.**
- 14.1 Define garments finishing.
 - 14.2 Describe pressing, folding and packing.
 - 14.3 Mention the purposes of garments finishing.
 - 14.4 Classify the finishing of garments.
 - 14.5 Describe different types of garments finishing.

REFERENCE BOOKS

1. Cotton Spinning, - willian taggart
2. Spun Tarn Technology vol-I, - A venkata
3. Cotton Spinning Hand Book, - R. jagannathan
4. Technology of Tex Processing Vol-I - Dr. V. A. shenai
5. Dyeing and Chemical Technology of Textile Fibre. TK Pattabhiram
6. Bqvbc g`vbyd`vKPvwi - 1, - ‡gvt gwneyj Bmjvg
7. ‡d«weK g`vbyd`vKpvi-1, - ‡gvt Avâyj Lv‡jK
8. ‡U·UvBj ‡Kw gwó^a- 1, - ‡gvt gwReyi ingvb
9. K→w`s ‡UK‡bvjwR-1, - ‡gvt kvnRvnb wd‡ivR

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 Pratham Engineering Drawing — Hemanta Kumar Bhattacharia

OBJECTIVES

- To familiarize the basic electrical quantities & laws and to apply them in solving problems of electrical circuits.
- To acquaint with electro-chemistry, electro-magnetism, electro-magnetic induction and electrostatic.
- To develop skill in electrical wiring.
- To appreciate the safety measures to be taken for electrical wiring.

SHORT DESCRIPTION

Electric current and ohm's law; Conductors and insulators; Basic electrical circuits; Power and energy; Basic electro-chemistry; Electro-magnetism; Electro-magnetic induction; Electrostatics; Wires and cables; Hand tools used in wiring; House wiring; Controlling devices; Protective devices; Earthing.

DETAIL DESCRIPTION

Theory :

ELECTRIC CURRENT

- 1 Understand electricity and its nature.**
 - 1.1 State the meaning of electricity.
 - 1.2 Describe the structure of atom.
 - 1.3 Define current, voltage and resistance.
 - 1.4 State the units of current, voltage and resistance.

CONDUCTOR & INSULATOR

- 2 Understand conductor and insulator.**
 - 2.1 Define conductor and insulator.
 - 2.2 Explain the conductor and insulator according to electron theory .
 - 2.3 List at least 5 conductors and 5 insulators.
 - 2.4 Describe the factors upon which the resistance of a conductor depends.
 - 2.5 State laws of resistance.
 - 2.6 Prove the relation $R = \rho \frac{L}{A}$
 - 2.7 Explain the meaning of resistivity and name the unit of resistivity.
 - 2.8 Solve problems relating to laws of resistance.

OHM'S LAW

- 3 Understand Ohm's Law**
 - 3.1 State Ohm's law.
 - 3.2 Deduce the relation between current, voltage and resistance.
 - 3.3 Solve problems relating to Ohm's law.

BASIC ELECTRIC CIRCUITS

- 4 Understand electric circuit.**
 - 4.1 Define electric circuit.

- 4.2 Name the different types of electric circuits.
- 4.3 Define series circuit, parallel circuit and Mixed ckt.
- 4.4 Describe the characteristic of series circuit and parallel circuit.
- 4.5 Calculate the equivalent resistance of series circuit, parallel circuit and Mixed circuit.
- 4.6 Solve problems relating to series circuit parallel circuit. mixed ckt .

POWER AND ENERGY

5 Apply the concept of electrical power and energy.

- 5.1 Define electrical power and energy.
- 5.2 State the unit of electrical power and energy.
- 5.3 Show the relation between electrical power and energy.
- 5.4 List the name of instruments for measuring of electrical power and energy.
- 5.5 Draw the connection diagram of wattmeter and energy meter in an electrical circuit.
- 5.6 Solve problems relating to electrical power and energy Calculation.

6 Understand the principles of Joule's law.

- 6.1 Describe the heating effect of electricity when current flows through a conductor.
- 6.1 Explain Joule's law regarding the development of heat in electrical circuit.
- 6.2 Describe meaning of "J".
- 6.3 Solve problems relating to Joule's law.
- 6.4 Solve problems relating to Joule's law

BASIC ELECTRO-CHEMISTRY

7 Understand the concept of cells.

- 7.1 Describe the meaning of potential difference.
- 7.2 Define the meaning of cell.
- 7.3 Classify the Cell
- 7.4 Define Primary Cell
- 7.5 List the different types of primary Cell
- 7.6 Describe the construction and principle of action of a simple Voltaic cell.
- 7.7 List the defects of a simple Voltaic cell.
- 7.8 Describe the causes of defects of a simple Voltaic cell.
- 7.9 Describe the methods of removing the defects of a simple Voltaic cell.

8. Understand the construction and principle of action of secondary cell.

- 8.1 Define secondary cell.
- 8.2 Describe the construction and principle of action of a lead acid cell.
- 8.3 List the uses of lead acid cell.
- 8.4 List the advantages of secondary cell.
- 8.5 Distinguish between a cell and a battery.
- 8.6 Describe the series and parallel grouping of cells.
- 8.7 Distinguish between Primary & Secondary Cell

9 Understand the concept of capacitors and capacitance.

- 9.1 Define capacitor and capacitance.
- 9.2 Name the unit of capacitance.
- 9.3 Name the different types of capacitor.
- 9.4 Write the uses of capacitor.
- 9.5 Determine the equivalent capacitance of a number of capacitors connected in series.
- 9.6 Determine the equivalent capacitance of a number capacitors connected in parallel.
- 9.7 Explain the energy stored in a capacitor.
- 9.8 Solve problems relating to capacitor connected in series and in parallel.

ELECTRO - MAGNETISM

10 Understand Electro - magnetism.

- 10.1 Describe magnetic field, magnetic lines of force and its properties.
- 10.2 Describe field intensity and magnetic flux density.
- 10.3 Distinguish between absolute permeability and relative permeability.
- 10.4 Describe the concept of magnetic effect of electrical current.
- 10.5 States Maxwell's cork screw rule and Fleming's right hand rule for determining the direction of magnetic field and current.
- 10.6 Explain the force experienced in a current carrying conductor placed in a magnetic field.
- 10.7 State Fleming's left hand rule.
- 10.8 Explain the work done by a moving conductor in a magnetic field.
- 10.9 Explain the force between two parallel current carrying conductor.

11 Understand magnetic circuit.

- 11.1 Define a magnetic circuit.
- 11.2 Define the terms magnetizing force, magnetomotive force, ampere –turns, reluctance, permeance, permeability, magnetic linkage and leakage.
- 11.3 Show the relation between magnetomotive force, reluctance and magnetic field intensity or magnetizing force.
- 11.4 Compare a magnetic circuit with an electrical circuit.

ELECTRO MAGNETIC INDUCTION

12 Understand electro- magnetic induction.

- 12.1 Define Faraday's laws of electro-magnetic induction.
- 12.2 Describe the magnitude of dynamically induced emf and statically induced emf
- 12.3 Solve problems relating to emf generation.
- 12.4 Define Lenz's law and Fleming's right hand rule for determining the direction of induced emf and current.
- 12.5 Define self induced emf and self inductance.
- 12.6 Explain inductance of a iron cored inductor.
- 12.7 Define mutual inductance and co-efficient of coupling.

WIRES AND CABLES

13 Understand the uses of wires and cables.

- 13.1 Define electrical wires and cables.
- 13.2 Distinguish between wires and cables.
- 13.3 Describe the construction and uses of PVC, VIR, TRS or CTS and flexible wires
- 13.4 Describe the procedure of measuring the size of wires and cables by wire gauge.
- 13.5 Describe the current carrying capacity of a wire.

JOINTS AND SPLICES

14 Understand the usefulness of joints and splices.

- 14.1 Define the meaning of joints and splices.
- 14.2 State the five steps of making a joint.
- 14.3 Describe the procedure to make a pig tail joint, western union joint, Britannia joint, duplex joint, tap joint, simple splice.
- 14.4 Give example of uses of above mentioned joints.

HOUSE WIRING

- 15 Understand the different methods of house wiring.**
- 15.1 State the meaning of wiring.
 - 15.2 List the types of wiring.
 - 15.3 State the procedure for Channel wiring, surface conduit wiring and concealed wiring.
 - 15.4 State the types of wiring used in :
 - a) Residential building.
 - b) Workshop
 - c) Cinema hall/Auditorium
 - d) Temporary shed
 - 15.5 List the name of fittings used in different types of electrical wiring.

CONTROLLING DEVICES

- 16 Understand the construction and uses of controlling devices.**
- 16.1 Define controlling device.
 - 16.2 Name the different types of controlling devices.
 - 16.3 Describe the constructional features and uses of tumbler switch, iron clad switch, push button switch and gang switch.

PROTECTIVE DEVICES

- 17 Understand the construction and uses of protective devices.**
- 17.1 Define protective devices.
 - 17.2 Name the different types of protective devices.
 - 17.3 Name the different types of fuses used in house wiring.
 - 17.4 Describe the construction and uses of renewable fuse.
 - 17.5 Name the different types of circuit breaker used in house wiring.

EARTHING

- 18 Understand the necessity of earthing.**
- 18.1 Define earthing
 - 18.2 Explain necessity of earthing
 - 18.3 Name different types of earthing

WIRING CIRCUITS

- 19 Apply the principle of controlling electrical circuit by switch.**
- 19.1 Sketch the wiring diagram of one lamp controlled by one SPST switch and describe its uses.
 - 19.2 Sketch the wiring diagram of one lamp controlled by two SPDT switch and describe its uses.
 - 19.3 Draw the wiring diagram of one calling bell with a lamp controlled from one point.
 - 19.4 Draw the wiring diagram of a fluorescent tube light circuit.
 - 19.5 Describe the working principle of fluorescent tube light.

ELECTRICITY ACT

- 20 Understand electricity act/rule of Bangladesh and safety practices.**
- 20.1 State electricity act/rule of Bangladesh to be followed in electrical wiring.
 - 20.2 Describe the importance of electricity act/rule.
 - 20.3 Describe safety procedure against electrical hazards.
 - 20.4 List the performance of safety practices for electrical equipment, machines and accessories.

Practical :

- 1 Identify and use electrical measuring instruments.**
- 1.1 Identify Voltmeters, Ammeters, Ohm Meter, Wattmeter, Energy meter and AVO meter.

- 1.2 Select & read the scale of given meters.
- 1.3 Connect correctly voltmeter, ammeter, wattmeter and energy meter to a given circuit.

2 Show skill in verification of Ohm's Law.

- 2.1 Sketch the circuit diagram for the verification of Ohm's Law.
- 2.2 List tools, equipment and material required for the experiment.
- 2.3 Prepare the circuit according to the circuit diagram using proper equipment.

3 Verify the characteristics of series and parallel circuits.

- 3.1 Draw the working circuit diagram.
- 3.2 List tools, equipment and materials required for the experiment.
- 3.3 Prepare the circuit according to the circuit diagram using proper equipment.
- 3.4 Check all connections before the circuit is energized.
- 3.5 Record data and verify that in a series circuit total voltage and resistance is equal to the summation of individual voltage and resistance respectively but total current is equal to the individual current.
- 3.6 Record data and verify that for a parallel circuit supply voltage is equal to the branch voltage, supply current is equal to summation of branch currents and total conductance is equal to the summation of branch conductance.

4 Show skill in measuring the power of an electric circuit.

- 4.1 Sketch the necessary circuit diagram of an electrical circuit w electrical load, ammeter, voltmeter and wattmeter.
- 4.2 Prepare the circuit according to the circuit diagram using ammet voltmeter and wattmeter.
- 4.3 Record the power, measured by the wattmeter and verify t reading with that of calculated from ammeter and voltmeter.
- 4.4 Compare the measured data with that of calculated and rat power.

5 Show skill in measuring the energy consumed in an electrical circuit.

- 5.1 Sketch the necessary diagram of an electric circuit wattmeter, energy meter and electrical load.
- 5.2 Prepare the circuit according to the circuit diagram usir wattmeter and energy meter.
- 5.3 Record the energy measured by the energy meter and verify with that of calculated from wattmeter for a fixed time.

6 Show skill in grouping a number of cell to form a battery.

- 6.1 Sketch the connection diagram of 4 cells (1.5 V each) in series.
- 6.2 List the materials and equipment required for the experiment.
- 6.3 Connect the terminals of the cells according to the diagram.
- 6.4 Determine the terminal voltage of the group and verify it with the calculated result.

7 Make a simple Cell.

- 7.1 List the materials for constructing a simple cell.
- 7.2 Prepare electrolyted by diluting H^2SO_4 with distilled water on proper ratio.
- 7.3 Assemble the cell using required electrolyte and electrodes along with necessary materials.
- 7.4 Measure the emf of the cell.

8 Show skill in making artificial magnets.

- 8.1 Make an artificial magnet by rubbing method (Single touch)
- 8.2 Make an artificial magnet by divided touch method.
- 8.3 Make an artificial magnet by passing electrical current.
- 8.4 Detect the polarity of the produced artificial magnet with the help of a compass needle.

9. Show skill in uses of hand tools, wires and cables.

- 9.1 List the hand tools used in electrical wiring.
- 9.2 Identify the hand tools used in electrical wiring.
- 9.3 Draw neat sketches of hand tools used in electrical wiring.

- 9.4 Identify different types of wires and cables.
 - 9.5 Measure the diameter of the identified wire and cables using standard wire gauge.
- 10. Show skill in making a duplex joint and a T-joint.**
- 10.1 Sketch a duplex joint and a T-joint
 - 10.2 Perform skinning and scraping of two pieces of PVC duplex cal and two pieces of simplex PVC cables.
 - 10.3 Make the joints according to sketches.
 - 10.4 Write a report.
- 11 Show skill in preparing wiring circuit of two lamps controlled from the points separately.**
- 11.1 Sketch a working circuit of two lamps controlled from two points separately.
 - 11.2 Make the wiring circuit using required materials and equipment on a wiring board.
 - 11.3 Test the connection of circuit by providing proper supply.
- 12. Show skill in preparing wiring circuit of one lamp controlled from the points.**
- 12.1 Sketch a working diagram of one lamp controlled by two SPD tumbler switches.
 - 12.2 Complete the wiring circuit using required materials and equipment on wiring board.
 - 12.3 Test the connection of circuit by providing proper supply.
- 13 Show skill in preparing wiring circuit of one bell with two indicating lamp controlled from two points .**
- 13.1 Sketch a working diagram of one bell with two indicating lamps controlled by two push button switch.
 - 13.2 Make the wiring circuit using required materials and equipment in wiring board.
 - 13.3 Test the connection of circuit by providing proper supply.
- 14 Show skill in preparing wiring circuit of a fluorescent tube light.**
- 14.1 Sketch a working diagram of a fluorescent tube light circuit.
 - 14.2 Make the connection of a fluorescent tube light circuit using required materials and equipment.
 - 14.3 Test the connection of the circuit by providing supply.

REFERENCE BOOKS

- 1 A text book of Electrical Technology
— B. L. Theraja
- 2 Basic Electricity
— Charles W Ryan
- 3 Basic Electrical theory and Practice
— E. B. Babler

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

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

Trigonometry: Ratio of associated angles, Compound angles, Transformation formulae, multiple angles and Sub-multiple angles.

DETAIL DESCRIPTION**Algebra:**

- 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) $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$
 - 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.

LOGARITHMS

- 3 Apply the concept of logarithms.**
 - 3.1 Define logarithm.
 - 3.2 Prove the following laws of logarithm.
 - a) $\text{Log}_a (m \times n) = \text{Log}_a m + \text{Log}_a n$
 - b) $\text{Log}_a \left(\frac{m}{n} \right) = \text{Log}_a m - \text{Log}_a n$

c) $\text{Log}_a (m)^n = n \text{Log}_a m$

d) $\text{Log}_b a \times \text{Log}_a b = 1$

e) $\text{Log}_a 1 = 0$

3.3 Solve problems using 3.2.

3.4 State the difference between Napierian 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 men 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 ${}^n C_r$, ${}^n C_n$, ${}^n C_0$

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) ${}^n C_r = {}^n C_{n-r}$

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
- $(0.9998)^2$, correct to six places of decimal .
 - $(1 + \sqrt{2})^5 - (1 - \sqrt{2})^5$
- 8.4 Express the binomial theorem for negative and fractional index.
- 8.5 Solve problems of the following types:

Expand i) $(1-nx)^{-\frac{1}{n}}$ 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.
- $\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$.
 - $\cos(A \pm B) = \cos A \cos B \pm \sin A \sin B$.
- 10.3 Deduce formula for $\tan(A \pm B)$, $\cot(A \pm B)$.
- 10.4 Apply the identities to work out the problems:
- find the value of $\sin 75^\circ$, $\tan 75^\circ$.
 - show that $\frac{\sin 75^\circ + \sin 15^\circ}{\sin 75^\circ - \sin 15^\circ} = \sqrt{3}$
 - 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:
- show that, $\sin 55^\circ + \cos 55^\circ = \sqrt{2} \cos 10^\circ$
 - prove that, $\cos 80^\circ \cos 60^\circ \cos 40^\circ \cos 20^\circ = \frac{1}{16}$

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.
- express $\cos 5\theta$ in terms of $\cos \theta$.
 - if $\tan \alpha = 2 \tan \beta$, show that, $\tan(\alpha + \beta) = \frac{3 \sin 2\alpha}{1 + 3 \cos 2\alpha}$

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

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

13.2 Solve the problems of the type :
find the value of $\cos 3^\circ$, $\cos 6^\circ$, $\cos 9^\circ$, $\cos 18^\circ$, $\cos 36^\circ$, 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, CATALYST & 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 Boyle's law & Charles 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, Charles 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 Pauli'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-valent bonds, co-ordinate bond, Sigma bond, Pi 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 Permutit 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 alkyne's.
 - 18.3 Explain common 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.

DžĪk

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Objectives:

After the completion of the course, learners will be able to develop-

- Listening with understanding
- The fluency of speech
- Reading with understanding
- Grammatical accuracy with emphasis on spelling & punctuation
- Creative writing
- Transferring information
- Communicating effectively

CONTENTS**Seen comprehension**

Unit	Lesson	Title
<i>Three:</i> Learning English	1	Learning a language
	2	Why learn English
	3	How to learn English
<i>Six:</i> Our Environment	1	The environment and the ecosystem
	2	How the environment is polluted
	7	How to manage waste
<i>Seven:</i> Disasters we live with	5	The shake and the quake
<i>Thirteen:</i> We and our rights	2	Women have rights too.

N.B: The Unit mentioned refers to the Text Book (1st Paper) English for Today for class 11 – 12 by National Curriculum & Text Book Board, Dhaka.

GRAMMAR

1. (a) Use of Articles.
(b) Use of Tense *(Right forms of verbs with indicators)
(c) Classify verbs: (Auxiliary, Principle, transitive, intransitive, finite, non-finite, causative, quasi-passive)
(d) Uses of voice.
2. **Sentence:**
(a) Sentence structure: (Assertive, Interrogative, Optative, Imperative, Exclamatory, Simple, Complex and Compound)
(b) Question making: WH, Yes/No, Tag question
3. **Enrich vocabulary:** synonyms, Antonyms
4. Change Parts of speech and uses of suffix and prefix.

Communication

1. **Style of letters:** (full blocked, blocked, semi- blocked)
2. **Parts of writing official letters:** Techniques of writing (Heading, reference, date, inside, address, topic, greetings, complementary closing, signature, supplements.)
3. **Write dialogues:** (with teacher, principle, shopkeeper, hotel manager, station master, OC, DC, new corner, buyers, doctor, friend, colleges etc).
4. Write a guided paragraph with questions.