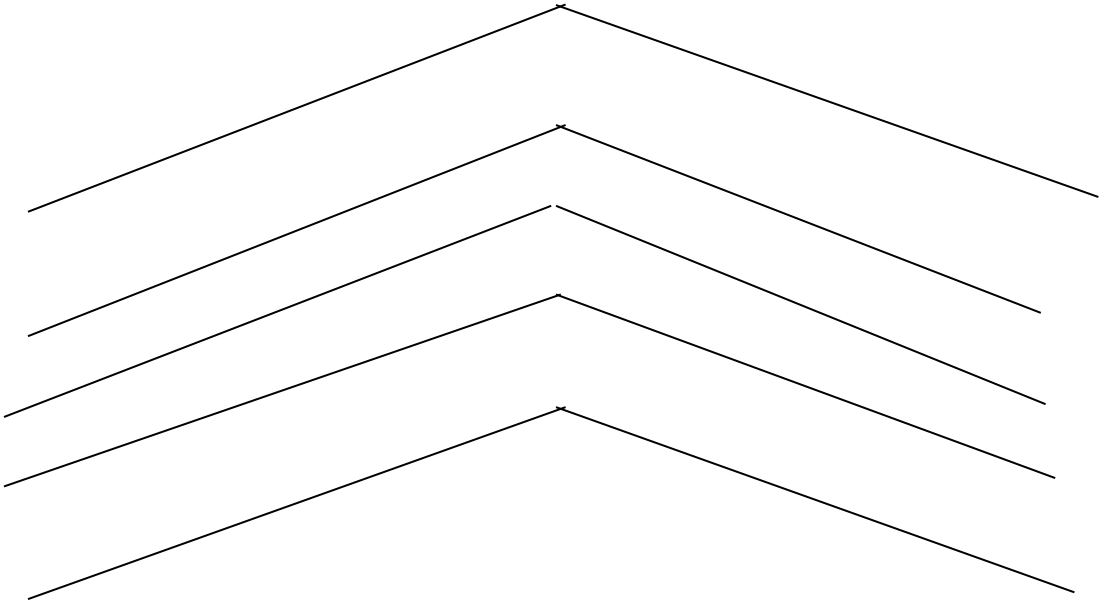
BANGLADESH TECHNICAL EDUCATION BOARD



4- YEAR

DIPLOMA IN TEXTILE ENGINEERING PROGRAM

SYLLABUS

2ND SEMESTER

BANGLADESH TECHNICAL EDUCATION BOARD

BANGLADESH TECHNICAL EDUCATION BOARD

4-YEAR

DIPLOMA IN TEXTILE ENGINEERING PROGRAM

SYLLABUS

2ND SEMESTER

SECOND 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	1921	Textile Raw Materials – II	2	0	2	20	80	-	-	100
2	1922	General Textile Process-II	3	3	4	30	120	25	25	200
3	6711	Basic Electricity	3	3	4	30	120	25	25	200
4	5921	Mathematics – II	3	3	4	30	120	50	-	200
5	5912	Physics – I	3	3	4	30	120	25	25	200
6	5712	English – I	2	0	2	20	80	-	-	100
7	5811	Social Science- I	2	0	2	20	80	-	-	100
		TOTAL	**18**	**12**	**22**	**180**	**720**	**125**	**75**	**1100**

SYLLABUS

SECOND SEMESTER

1921 **TEXTILE RAW MATERIALS-II**

T	P	C
2	0	2

AIMS

1. To develop the knowledge of different chemical fibres.
2. To enable the student a clean idea of viscose rayon fibres.
3. To make understand the basic knowledge of polyester fibres.
4. To develop the basic knowledge of polyamide, acrylic & spandex fibres.

Short Description

Basic idea of different chemical fibres; viscose rayon fibres; polyamide fibres; polyester fibres; acrylic fibres; spandex fibres.

Detail Description

Theory :

1. Understand The Chemical (Synthetic) Fibres.

1.1 Define chemical fibre.
1.2 Mention the classification of man-made fibres.
1.3 List the names of different regenerated fibres.
1.4 List the names of different chemical fibres.

2. Understand the viscose rayon (re-generated) fibre.

2.1 State the term "re-generated fibre".
2.2 Mention the raw materials of viscose rayon fibre.
2.3 Mention the flow-sheet for preparation of viscose rayon fibre.
2.4 Describe the steps for production of viscose rayon fibre.
2.5 Mention the physical properties of viscose rayon fibre.
2.6 Discuss the chemical properties of viscose rayon fibre.
2.7 Mention the end-uses of viscose rayon fibre.

3. Understand the polyamide fibre.

3.1 Define polyamide fibre.
3.2 List the different chemicals required for the production of polyamide fibre.
3.3 Discuss the nomenclature of nylon-6 fibre.
3.4 Mention the raw materials for nylon-6 fibre.
3.5 Mention the flow-chart for preparation of nylon-6 fibre.
3.6 Describe the production of nylon-6 fibre.
3.7 Mention the physical properties of nylon-6 fibre.
3.8 Mention the end-uses of nylon-6 fibre.

4. Understand the nylon-6.6 fibre.

4.1 State the term of nylon-6.6 fibre.
4.2 Discuss the nomenclature of nylon-6.6 fibre.
4.3 Mention the raw materials for nylon-6.6 fibre.
4.4 Mention the flow-sheet for production of nylon-6.6 fibre.
4.5 Describe the production of nylon-6.6 fibre.
4.6 Mention the physical properties of nylon-6.6 fibre.
4.7 Discuss the chemical properties of nylon-6.6 fibre.
4.8 Mention the end-uses of nylon-6.6 fibre.

5. Understand the polyester fibre.

5.1 State the term ´´ester & polyester``.
5.2 List the chemicals for production of different polyester fibres.
5.3 Mention the flow-chart for production of pet polyester fibre.
5.4 Describe the production of pet polyester fibre.
5.5 Mention the physical properties of polyester fibre.
5.6 Discuss the chemical properties of polyester fibre.
5.7 Discuss the end-uses of polyester fibre.

6. Understand the acrylic fibre.

6.1 State the term ‘‘acrylic” fibre.
6.2 Mention the raw materials of acrylic fibres.
6.3 Mention the flow-chart for production of acrylic fibre.
6.4 Discuss the production of acrylic fibre.
6.5 Mention the physical properties of acrylic fibre.
6.6 Discuss the chemical properties of acrylic fibre.
6.7 Describe the end-uses of acrylic fibre.

7. Understand the ‘‘spandex” fibre.

7.1 Mention the raw materials of ‘‘spandex” fibre.
7.2 Mention the flow-sheet for production of spandex fibre.
7.3 Describe the production of spandex fibre.
7.4 Discuss the physical properties of spandex fibre.
7.5 Mention the chemical properties of spandex fibre.
7.6 Mention the end-uses of spandex fibre.

Reference books

1. Textiles fiber of fabric.- bernard p. Corbman.
2. Man made fibres. - r.w. moncrieff.
3. Textile science. - j. T marsh.
4. Polyester textile. - the textile association.
5. Textile fibre - engr. Md. Mohibul islam.

1922 **GENERAL TEXTILE PROCESSES-II**

T	P	C
3	3	4

AIMS

To provide the students with an opportunity to acquire knowledge, skill & attitude in the area of wet processing & Garments manufacturing.

SHORT DESCRIPTION

Basic idea of Wet processing ; Singeing ; De-sizing ; Scouring ; Bleaching ; Dyeing ; Printing ; Finishing ; Basic idea of garments manufacturing; Pattern making ; Sample ; Marker ; Cutting ; Sewing ; Garment finishing.

DETAIL DESCRIPTION

Theory

1 Understand the basic idea of wet process.

1.0 Define wet process.
1.2 Classify wet process system.
1.3. Mention the flow-chart of wet process for yarn.
1.4 Mention the flow-chart of wet process for cotton cloth.
1.5 Mention the flow-chart of wet process for synthetic cloth.
1.6 Mention the flow-chart of wet process for blended cloth.

2. Understand the basic idea of singeing.

2.1 Define singeing.
2.2 Mention the purposes of singeing.
2.3 Describe the classifications of singeing.

3. Understand the basic idea of De-sizing.

3.1 Define de-sizing.
3.2 Mention the purposes of de-sizing.
3.3 State the classifications of de-sizing methods.

4. Understand the basic idea of scouring.

4.1 Define scouring.
4.2 Mention the purposes of scouring.
4.3 State the methods and machines used for scouring.
4.4 List the ingredients used in scouring.

5. Understand the basic idea of bleaching.

5.1 Define bleaching.
5.2 Mention the purposes of bleaching.
5.3 State the classification of bleaching.
5.4 List the oxidizing and reducing bleaching agents.
5.5 Describe the criteria of selection bleaching agents.

6. Understand the basic idea of dyeing.

6.1 Define colour, dye & dyeing.
6.2 Mention the purposes of dyeing.
6.3 Mention the general classification of dyes & their areas of application.
6.4 Describe general idea of dyeing.

7. Understand the basic idea of printing.

7.1 Define printing.
7.2 Mention the purposes of printing.
7.3 List the methods of printing.
7.4 Name the ingredients of printing paste.
7.5 Describe general idea of printing.

8. Understand the basic idea of Finishing.

8.1 Define textile finishing.
8.2 Mention the purposes of textile finishing.
8.3 Describe classification of finishing treatment.
8.4 General idea of textile finishing.

9. Understand the basic idea to garments manufacture.

9.1 Discuss the history of garment industry in Bangladesh.
9.2 State the flow chart of garment manufacturing process.
9.3 Describe the garments symbols.

10. Understand the basic idea of Pattern making.

10.1 State pattern.
10.2 State the purposes of pattern making.
10.3 Mention the types of pattern.

11. Understand the basic idea of sample.

11.1 Define sample.
11.2 State the objectives of sample.
11.3 Mention the types of sample.
11.4 State the approval, Production and shipment sample.

12. Understand the basic idea of marker.

12.1 Define marker.
12.2 Mention the purposes of marker.
12.3 State the methods of marker making.

13. Understand the basic idea of cutting.

13.1 Define cutting.
13.2 Mention the purposes of cutting.
13.3 State the types of fabric cutting.
13.4 Mention the carefulness of cutting.

14. Understand the basic idea of sewing.

14.1 Define sewing.
14.2 Mention different types of sewing.
14.3 State the lock stitch and chain stitch.

15. Understand the basic idea of garments finishing.

15.1 Define garments finishing.
15.2 Mention the purposes of garments finishing.
15.3 List the steps of garments finishing.

Practical

Wet process

1. Identify wet processing machines.
2. Show the fabric path through jigger machine
3. Sketch the sample dyeing m/c and mention its parts.
4. Sketch the winch dyeing m/c and mention its parts.
5. Sketch the Sample printing m/c and mention its parts.
6. Sketch the Sample washing m/c and mention its parts.
7. Show the Printing table, hand block, screen for printing.

Garments Manufacturing

1. Identify the garments manufacturing machines.
2. Identify the tailoring accessories viz. Scissors, Cloth measuring tape, Shape card, Tailoring chalk, Sewing needle, Sewing thread package etc.
3. Practice a general sewing machine with out yarn.
4. Practice fabric cutting procedure.
5. Practice fabric sewing procedure.
6. Practice general sewing with yarn.

REFERENCE BOOKS

1. Manual of cotton Spinning volume 1& II : Byerley and Buckley.
2. Technology of Tex Processing vol-1: DR. V. A. Shenai
3. General Textile Processing (BTEB) : Engr. Alauddin Khalifa

6711 **BASIC ELECTRICITY**

T	P	C
3	3	4

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 :

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.

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.

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.

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.

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

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 bets 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.

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.
7.6 Explain the force experienced in a current carrying conductor placed in a magnetic field.
7.7 State fleming's left hand rule.
7.8 Explain the work done by a moving conductor in a magnetic field.
7.9 Explain the force between two parallel current carrying conductor.

8 Understand magnetic circuit.

8.6 Define a magnetic circuit.
8.7 Define the terms magnetizing force, magnetomotive force, ampere –turns, reluctance, permeance, permeability, magnetic linkage and leakage.
8.8 Show the relation between magnetomotive force, reluctance and magnetic field intensity or magnetizing force.
8.9 Compare a magnetic circuit with an electrical circuit.

9 Understand electro- magnetic induction.

9.6 Define faraday's laws of electro-magnetic induction.
9.7 Describe the magnitude of dynamically induced emf and statically induced emf
9.8 Solve problems relating to emf generation.
9.9 Define lenz's law and fleming's right hand rule for determining the direction of induced emf and current.
9.10 Define self induced emf and self inductance.
9.11 Explain inductance of a iron cored inductor.
9.12 Define mutual inductance and co-efficient of coupling.

Wires and cables

10 Understand the uses of wires and cables.

10.6 Define electrical wires and cables.
10.7 Distinguish between wires and cables.
10.8 Describe the construction and uses of pvc, vir, trs or cts and flexible wires
10.9 Describe the procedure of measuring the size of wires and cables by wire gauge.
10.10 Describe the current carrying capacity of a wire.

11 Understand the usefulness of joints and splices.

11.6 Define the meaning of joints and splices.
11.7 State the five steps of making a joint.
11.8 Describe the procedure to make a pig tail joint, western union joint, britannia joint, duplex joint, tap joint, simple splice.
11.9 Give example of uses of above mentioned joints.

12 Understand the different methods of house wiring.

12.6 State the meaning of wiring.
12.7 List the types of wiring.
12.8 State the procedure for channel wiring, surface conduit wring and concealed wiring.
12.9 State the types of wiring used in :
a) Residential building.
b) Workshop
c) Cinema hall/auditorium
d) Temporary shed
12.10 List the name of fittings used in different types of electrical wiring.

13 Understand the construction and uses of controlling devices.

13.6 Define controlling device.
13.7 Name the different types of controlling devices.
13.8 Describe the constructional features and uses of tumbler switch, iron clad switch, push button switch and gang switch.

14 Understand the construction and uses of protective devices.

14.6 Define protective devices.
14.7 Name the different types of protective devices.
14.8 Name the different types of fuses used in house wiring.

14.9 Describe the construction and uses of renewable fuse.
14.10 Name the different types of circuit breaker used in house wiring.

15 Understand the necessity of ear thing.

15.6 Define ear thing
15.7 Explain necessity of ear thing
15.8 Name different types of ear thing

16 Apply the principle of controlling electrical circuit by switch.

16.6 Sketch the wiring diagram of one lamp controlled by one spst switch and describe its uses.
16.7 Sketch the wiring diagram of one lamp controlled by two spdt switch and describe its uses.
16.8 Draw the wiring diagram of one calling bell with a lamp controlled from one point.
16.9 Draw the wiring diagram of a fluorescent tube light circuit.
16.10 Describe the working principle of fluorescent tube light.

17 Understand electricity act/rule of Bangladesh and safety practices.

17.6 State electricity act/rule of Bangladesh to be followed in electrical wiring.
17.7 Describe the importance of electricity act/rule.
17.8 Describe safety procedure against electrical hazards.
17.9 List the performance of safety practices for electrical equipment, machines and accessories.

Practical :

1 Identifies and uses 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 ammeter 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 wring circuit of two lamps controlled from the points separately.

11.1 Sketch a working circuit of two lamps controlled from two point separately.
11.2 Make the wiring circuit using required materials and equipment 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.

Sketch a working diagram of a fluorescent tube light circuit.

Make the connection of a fluorescent tube light circuit using required materials and equipment.

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

5921 **MATHEMATICS – II**

T	P	C
3	3	4

OBJECTIVES

- To enable in solving the simultaneous equations with the help of determinant and matrix.
- To make understand the exponential series.
- To enable to calculate the areas of regular polygons, hexagons, octagon, hydraulic mean depth (HMD) of a channel, area occupied by water of circular culvert. Excavation work.
- To provide the ability to calculate volume of regular solids like pyramid frustum of pyramid, prismoid, wedge and area of curved surfaces.

SHORT DESCRIPTION

Algebra: Determinants, Matrix, Partial Fractions, Exponential Series.

Trigonometry: Inverse circular functions, Properties of triangle and solution of triangles.

Menstruation: Area of rectangles, squares, triangles, quadrilaterals, parallelograms, rhombus, trapezium, circle, sector, segment; Volume of rectangular solids, prism, parallelepiped , pyramids, cones , spheres, frustum of pyramid and cone; Area of curved surface of prism. Cylinder cone, pyramid and frustum of cone.

DETAIL DESCRIPTION

ALGEBRA:

1 Apply determinants to solve simultaneous equations.

1.1 Expand a third order determinant.
1.2 Define minor and co-factors.
1.3 State the properties of determinants.
1.4 Solve the problems of determinants.
1.5 Apply Cramer's rule to solve the linear equation.

2 Apply partial fraction to break the numerator and denominator.

2.1 Define matrix, null matrix, unit matrix, square matrix. column matrix, row matrix, inverse matrix, transpose matrix, adjoin matrix, rank of a matrix, singular matrix.
2.2 Explain equality, addition and multiplication of matrix.
2.3 Find the rank of a matrix.
2.4 solve the problems of the following types:
  i) Solve the given set of linear equations with the help of matrix.
  ii) Find the transpose and adjoin matrix of a given matrix.

3 Solve problems using binomial theorem

3.1 Define proper and improper fractions.
3.2 Resolve in to partial fraction of the followings types :
  a) Denominator having a non-repeated linear factor.
  b) Denominator having a repeated linear factor.
  c) Denominator having a quadratic factors.
  d) Denominator having a combination of repeated, non-repeated and quadratic factors.

4 Understand exponential series.

4.1 Define e.
4.2 Prove that e is finite and lies between 2 and 3.
4.3 Prove that $e^{x} = 1 + \frac{x}{L^1} + \frac{x^2}{L^2} + \frac{x^3}{L^3} + \frac{x^4}{L^4}$ ..... to $\propto$

4.4 Solve problems of the followings types :

i) $1+\frac{1}{L^2}+\frac{1}{L^4}+\frac{1}{L^6}+$ ..... to ∞

ii) $\frac{1}{L^2}+\frac{1+2}{L^3}+\frac{1+2+3}{L^4}+\frac{1+2+3+4}{L^5}+$ ..... to ∞

TRIGONOMETRY

5 Apply the concept of inverse circular function.

5.1 Explain the term inverse circular function and principal value of a trigonometrical ratio.

5.2 Deduce mathematically the fundamental relations of different circular functions.

5.3 Convert a given inverse circular function in terms of other functions.

5.4 Prove mathematically

i) $\tan^{-1} x + \tan^{-1} y = \tan^{-1} \frac{x+y}{1-xy}$.

ii) $\tan^{-1} x + \tan^{-1} y + \tan^{-1} z = \tan^{-1} \frac{x+y+z-xyz}{1-xy-yz-zx}$

iii) $\sin^{-1} x + \sin^{-1} y = \sin^{-1}\left(x\sqrt{1-y^2}+y\sqrt{1-x^2}\right)$

iv) $2\tan^{-1} x = \sin^{-1}\frac{2x}{1+x^2} = \cos^{-1}\frac{1-x^2}{1+x^2} = \tan^{-1}\frac{2x}{1-x^2}$

5.5 Solve problems of the following types.

a) $2\tan^{-1}\frac{1}{3}+\tan^{-1}\frac{1}{4}=\frac{\pi}{4}$

b) cos tan $^{-1}$ cot sin $^{-1}$ x = x.

c) Prove that the area of the segment cut from a circle of radius r by a chord at a distance d from the centre is given by $K = r^2 \cos^{-1}\frac{d}{r} - d\sqrt{r^2-d^2}$

6 Apply the principle of properties of triangles.

6.1 Prove the followings identities :

i) $\frac{a}{\sin A}=\frac{b}{\sin B}=\frac{c}{\sin C}=2R$.

ii) $a^2 = b^2 + c^2 - 2bc\cos A$

iii) $a = b\cos C - c\cos B$.

v) $\Delta = \frac{1}{2}bc\sin A$.

6.2 Establish the followings.

a) $\tan\frac{A}{2}=\sqrt{\frac{(s-b)(s-c)}{s(s-a)}}$

b) $\tan\frac{B-C}{2}=\frac{b-c}{b+c}\cot\frac{A}{2}$

c) $\Delta = \frac{abc}{4R}$

6.3 Solve the problems of the following types:

i) Prove $\cos(B-C)+\cos A = \frac{bc}{2R}$

ii) An object experiences two forces F_1 and F_2 of magnitude 9 and 13 Newton's with an angle 100^0 between their directions. Find the magnitude of the resultant R.

7 Apply the concept of area of triangle.

7.1 Find the area of triangle in the form,

i) $A=\frac{\sqrt{3}}{4}a^2$, a = length of a side of equilateral triangle.

ii) $A=\frac{c}{4}\sqrt{4a^2-c^2}$, where a= length of equal sides, c= third side.

iii) $A=\sqrt{s\ (s-a)(s-b)(s-c)}$, where a, b, c = length of the sides of a triangle and 2s is the perimeter of the triangle.

7.2 Use formula in 7.1 to solve problems.

8 Apply the concept of finding areas of quadrilateral & Parallelogram.

8.1 Define quadrilateral & Parallelogram.
8.2 Find the areas of quadrilateral when off sets are given.
8.3 Find the areas of a parallelogram.
8.4 Solve problems using above formulae.

9 Apply the concept of finding areas of rhombus & trapezium.

9.1 Define rhombus & trapezium.
9.2 Find the areas of rhombus when the diagonals are given.
9.3 Find the areas of trapezium in terms of its parallel sides and the perpendicular distance between them.
9.4 Solve problems related to rhombus & trapezium.

10 Apply the concept of finding areas of regular polygon.

10.1 Define a regular polygon.
10.2 Find the area of a regular polygon of n sides, when
i) the length of one side and the radius of inscribed circle are given.
ii) the length of one side and the radius of circumscribed circle are given.
10.3 Find the area of a regular.
a) hexagon
b) octagon
when length of side is given.
10.4 Solve problems of the followings types:
A hexagonal polygon 6 m length of each side has a 20 cm width road surrounded the polygon. Find the area of the road.

11 Understand areas of circle, sector and segment.

11.1 Define circle, circumference, sector and segment.
11.2 Find the circumference and area of a circle when its radius is given.
11.3 Find the area of sector and segment of a circle.
11.4 Solve problems related to the above formulae.

12 Apply the concept of volume of a rectangular solid.

12.1 Define rectangular solid and a cube.
12.2 Find geometrically the volume of a rectangular solid when its length, breadth and height are given.
12.3 Find the volume and diagonal of a cube when side is given.
12.4 Solve problems with the help of 12.2 & 12.3.

13 Apply the concept of the volume of a prism and a parallelepiped.

13.1 Define a prism, parallelepiped and a cylinder.
13.2 Find the volume of prism, parallelepiped and cylinder when base and height are given.
13.3 Solve problems related to 13.2.

14 Apply the concept of the volume of pyramid, cone and sphere.

14.1 Define pyramid, cone and sphere.
14.2 Explain the formula for volume of pyramid, cone and sphere.
14.3 Solve problems related to 14.2.

15 Apply the concept of surface area of prism, cylinder and cone.

15.1 Explain the formulae for areas of curved surfaces of prism cylinder and cone.
15.2 Solve problems related to15.1.

5912 **PHYSICS-I**

T	P	C
3	3	4

OBJECTIVES

- To provide the students a background of basic science i.e. Physics required for understanding technological subjects.
- To develop a working knowledge of common engineering and industrial materials and to enable to determine through experiments the properties of such materials.
- To develop through experiments an understanding of fundamental scientific concept.
- To develop a basic knowledge and concept of physical properties of common engineering and industrial materials.

SHORT DESCRIPTION

Units; Vector and Scalar quantities; Motion and Equations of motion; Force and Newton's Laws of motion; Gravity and Gravitation; Simple Harmonic motion; Hydrostatics; Surface tension and viscosity ; Pressure, Sound : wave and sound Concepts and nature of sound, Velocity of sound, Ultrasonic.

DETAIL DESCRIPTION

Theory :

1. UNITS VECTOR AND SCALAR QUANTITIES

Understand vector and scalar quantities.

1.1 List and identify the symbols of fundamental SI Unit and some derived SI Unit.
1.2 Define vector quantities with examples.
1.3 Define scalar quantities with examples.
1.4 Show the various representations of the vector quantities; and representation of a vector by unit vector.
1.5 Distinguish between vector and scalar quantities.
1.6 Find and explain the resultant of two vectors in different directions.
1.7 Resolve a vector into horizontal & vertical component.
1.8 Explain the dot and cross product of two vectors.
1.9 Projection of a vector.
1.10 Define laws of triangle of vector.

2. MOTION AND EQUATIONS OF MOTION

Understand motion and equations of motion.

2.1 Define rest and motion.
2.2 Classify motion.
2.3 Define and explain displacement, speed, velocity, acceleration and retardation.
2.4 Deduce the relationship between displacement, velocity, acceleration and retardation from these definitions.
2.5 Distinguish between (i) speed and velocity (ii) velocity and acceleration.
2.6 Projectile motion.
2.7 Equation of motion of a freely moving body thrown obliquely vertically upward or motion of projectile.

3. Understand circular motion

3.1 Define circular motion.
3.2 Define angular velocity and linear velocity with their units.
3.3 Deduce the relation between angular velocity and linear velocity.
3.4 Define centripetal and centrifugal force with examples.
3.5 Prove centrifugal force = $\frac{mv^2}{r}$
3.6 Define and explain angular momentum, torque and moment of inertia.
3.7 Angular acceleration and relation between torque and angular acceleration.

4. FORCE AND NEWTON'S LAWS OF MOTION

Understand force and Newton's laws of motion

4.1 Define force.
4.2 Define different units of force and their correlation and also mention the dimension of force.
4.3 Define parallel force and a couple.
4.4 Find out the resultant of parallel forces.
4.5 Define inertia and momentum.
4.6 Impulsive force and impulse of a force.
4.7 Relation between impulse of force and momentum.
4.8 State and prove the principals of conservation of momentum.
4.9 State Newton's laws of motion.
4.10 Prove P=mf, from Newton's 2nd law of motion.

5. GRAVITY AND GRAVITATION

Understand gravity and gravitation.

5.1 Define and explain the Kepler's Law.
5.2 Define gravity and gravitation.
5.3 State the laws of gravity and gravitation.
5.4 Define and determine the gravitational constant (G) and also mention its units and dimension.
5.5 Define acceleration due to gravity 'g' and also mention its units and dimension.
5.6 Discuss the variation of 'g' at different places.
5.7 Define mass and weight with their units and dimension.
5.8 Distinguish between mass and weight.
5.9 Define and explain gravitational potential and escape velocity
5.10 State and explain the laws of falling bodies and mention the equation of motion of a body when it is projected vertically upwards or downwards.

6. SIMPLE HARMONIC MOTION (SHM)

Understand simple harmonic motion.

6.1. Define simple harmonic motion (SHM).
6.2. State the characteristics of SHM.
6.3. Describe a simple pendulum and a second pendulum.
6.4. Define effective length, amplitude, phase, complete oscillation, period of oscillation, frequency.
6.5. State and explain the laws of simple pendulum.
6.6. Describe a compound pendulum.
6.7. Discuss the conditions under which a pendulum clock will go slow or fast.
6.8. Potential energy, kinetic energy and average potential and kinetic energy of a particle executing SMH.
6.9. Principle of conservation of mechanical energy.

7. WORK, POWER AND ENERGY

Understand work, power and energy.

7.1 Define work, power and energy.
7.2 State the units and dimensions of work, power and energy.

7.3 State and prove the principle of the conservation of energy.
7.4 Define potential energy (PE) and kinetic energy (KE).
7.5 Derive the equation of potential and kinetic energy.
7.6 Show that the K.E. gained by a falling body is equal to the P.E. Lost by the body.
7.7 Describe transformation of energy and work energy theorem.
7.8 Recognize that the useful work can be found from:

$$\text{Efficiency} = \frac{\text{output work}}{\text{input work}} \times 100.$$

7.9 Describe conservative and non- conservative force.

8. ELASTICITY

Understand the concept of elasticity.

8.1 Name some of the general and special properties of matter.
8.2 Define Elasticity and Elastic limit.
8.3 Define perfectly elastic body and perfectly rigid body.
8.4 Define stress and strain with their units and dimensions.
8.5 State and explain the Hook's law.
8.6 Describe various kinds of modulus of elasticity.
8.7 Mention the units and dimensions of modulus of elasticity.
8.8 Define Poisson's ratio and work done in deforming a body or potential energy.
8.9 Elastic behavior of a solid and stress- strain graph.

FRICTION

9. Understand Friction

9.1 Define friction.
9.2 Describe the different kinds of friction.
9.3 Define the laws of static friction.
9.4 Define the co-efficient of static friction.
9.5 Describe the angle of static friction and angle of repose.
9.6 Describe the laws of kinetic friction.
9.7 State the co-efficient and angle of kinetic friction.
9.8 Show that the co-efficient of static friction is equal to the tangent of angle of repose.
9.9 Describe an experiment to determine the co-efficient of static friction.
9.10 State the merits and demerits of friction.

10. HYDROSTATICS

Understand behavior of fluids.

10.1 Define pressure as force per unit area and state that it is measured in N/m^2 or Pa (Pascal).
10.2 State characteristics of liquid pressure.
10.3 Establish that pressure at a point in a fluid is dependent upon the density of the fluid, the depths in the fluid and acceleration due to gravity.
10.4 Surface tension and surface energy, Angle of contact.
10.5 Capillarity and theory of capillarity.
10.6 Viscosity and co-efficient of viscosity.
10.7 Necessity of viscosity.

11. Wave and Sound

11.1 Wave and wave motion.
11.2 Transverse wave and longitudinal wave.
11.3 Some definitions relating waves.
11.4 Progressive wave and stationary waves.
11.5 Equation of progressive wave.
11.6 Sound and production of sound.
11.7 Sound is a longitudinal traveling wave.
11.8 Interference of sound: Constructive and Destructive interference.
11.9 Mathematical analysis of interference of sound.
11.10 Define beats and Mechanism of formation of beats.

12. SOUND

Understand nature and behavior of sound.

12.1 Identify that sound is produced by vibration and travels through a medium as a longitudinal wave.
12.2 Distinguish between the production and behavior of longitudinal and transverse waves.
12.3 Recognize that sound can be produced of different pitches (frequencies) & that the human ear has an audible frequency range covering approximately 20 Hz to 20 KHz.
12.4 State the approximate frequency range for
  a. infrasonic sound
  b. ultrasonic (supersonic) sound.
12.5 Explain how sound is absorbed, reflected & refracted by different types of surface.
12.6 Describe the practical uses of echo sounding devices.
12.7 Define velocity of sound.
12.8 State the velocity of sound at NTP in still air.
12.9 Compare the effects of pressure, temperature & humidity on the velocity of sound in air.
12.10 Doppler effect and Expression for the change of frequency or pitch due to Doppler effect.

PRACTICAL

Observations and Measurements

1. Determine accurate diameter/side of an object using vernier calipers.
2. Measure the area of cross section of a wire by micrometer screw gage.
3. Measure the thickness of a glass plate by speedometer.
4. Verify the law of parallelogram of forces by a force board.
5. Draw L-T^2 graph and determine the value of "g" by using a simple pendulum.
6. Determine the coefficient of static friction.
7. Determine Young's modulus of a steel wire by Searle's apparatus.
8. Determine gravity of a solid heavier than and insoluble in water by hydrostatic balance.
9. Determine specific gravity of a liquid by specific gravity bottle.
10. Determine velocity of sound by resonance air column method.

***

5712 **ENGLISH – I** T P C
2 0 2

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
Three: Learning English	1	Learning a language
	2	Why learn English
	3	How to learn English
Six: Our Environment	1	The environment and the ecosystem
	2	How the environment is polluted
	7	How to manage waste
Seven: Disasters we live with	5	The shake and the quake
Thirteen: 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) Uses of Articles.
(b) Uses of Tense *(Right forms of verbs with indicators)
(c) Classify verbs: (Auxiliary, Principal, 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, principal, shopkeeper, hotel manager, station master, OC, DC, newcomer, buyers, doctor, friend, colleagues etc).

4. Write a guided paragraph with questions.

***

5811 Social science- I

T	P	C
2	0	2

OBJECTIVES

To provide opportunity to acquire knowledge and understanding on:
- importance of civics and its relationship with other social sciences
- the relationship of an individual with other individuals in a society
- social organizations, state and government
- rule of law, public opinion and political parties
- UNO and its roles
- the basic concepts and principles of economics and human endeavor in the economic system.
- the realities of Bangladesh economy and the current problems confronting the country.
- the role of Diploma Engineers in industries.
- occupations and career planning for Diploma Enginers.

SHORT DESCRIPTION
Civics and Social Sciences; Individual and Society; Nation and Nationality; Citizenship; state and government; Law; Constitution; Government and its organs; public Opinion; Political Party; UNO and its organs;
Scope and importance of Economics; Basic concepts of Economics- Utility, Wealth, consunmption, income wages and salary and savings; Production – meaning, nature, factors and laws; Demand and Supply; Current economic problems of Bangladesh; Role of Diploma Engineers in the economic development of Bangladesh; Occupations and career planning; Engineering teem.

Part-1 (Civics)

1. Understand the meaning and scope of civics and inter relations of social sciences.

1.1. Define social science.
1.2. State the meaning and scope of civics.
1.3. Explain the importance of civics in the personal and social life of an individual.
1.4. Describe the relationship of all social science (civics, Economics, political science, sociology, ethics)

2. Understand the relationship of the individual with the society, Nationality and nation, Rights and duties of a citizen.

2.1 Define the concept (individual, society, Nation, Nationality, citizen and citizenship).
2.2 State the relationship among the individuals in the society.
2.3 Differentiate between nation and nationality.
2.4 Describe the elements of nationality
2.5 Describe the criteria of Bangladesh nationalism.
2.6 Diferentiate between a citizen and an alien.
2.7 Discuss the methods of acquiring citizenship and state the causes of losing citizenship
2.8 Describe the rights of a citizen and state the need for developing good citizenship.

3. Appreciate the relationship between the state and government, law and organs of government.

3.1 Meaning the state, government and law
3.2 Discuss the elements of state.
3.3 Discuss the classification of the forms of government
3.4 Distinguish between cabinet form of Government and presidential form of government.
3.5 Describe the main organs of Government (legislature, Executive and judiciary)
3.6 Discuss the sources of law

4. Understand and the classification of constitution
4.1 Explain the deferent form of Constitution
4.2 Explain the merits and demerits of different forms of constitution and state the salient feature of Bangladesh constitution

5. Understand the importance of the formation of public opinion and the role of political parties in the affairs of state and government.

5.1 Define the public Opinion and political party.
5.2 Explain the importance of public opinion in the modern democratic society.
5.3 Discuss the role of different media in forming public opinion.
5.4 Discuss the importance of political parties in democracy.

6. Understand the role of UNO in maintaining world peace

6.1 Explain the major functions of UNO.
6.2 State the composition and functions of General Assembly.
6.3 Describe the Composition and functions of security council.
6.4 Discuss the role of Bangladesh in the UNO.

Part-2 (Economics)

1. Understand the importance of the study fundamental concepts of economics.

    1.1 Discuss the definition of Economics as given by eminent economists.
    1.2 Describe the scope and importance of economics of Technical Student.
    1.3 Define commodity, utility, value, wealth, consumption, income, savings wages and salary.
    1.4 Differentiate between value in use and value in exchange.
    1.5 Explain wealth with its characteristics.

2. Understand the production process and the concept of the law of diminishing returns in the production process.

    2.1 Discuss production mode and process
    2.2 Explain the nature of different factors of production.
    2.3 Discuss the law of diminishing returns.
    2.4 State the application and limitations of the law of diminishing returns.
    2.5 Describe the law of production (increasing constant and diminishing).

3. Appreciate the importance of the concept of elasticity of demand.

    3.1 Illustrate the law of diminishing utility.
    3.2 Define the marginal utility explain the law of dimishing marginal utility.
    3.3 define the term, “demand”
    3.4 Describe elasticity of demand and factors which determine the elasticity of demand
    3.5 Describe elasticity of supply with the help a supply curve.

4. Understand national income and population control.

    4.1 Explain national income.
    4.2 Discuss GDP and GNP.
    4.3 Discuss growth rates.
    4.4 Explain features of Bangladesh population.
    4.5 State measures to be undertaken to arrest high growth rate of population.

5. Understand the current issues and the avilability and use of natural resource in the economic development of Bangladesh

    5.1 Identify major problems of rural and urban economy.
    5.2 Explain income distribution in alleviating poverty in equality and discrimination.
    5.3 Explain the migration of rural population to urban areas.
    5.4 List of the Natural resource of Bangladesh and classify them according to sources of availability.
    5.5 Explain the importance of the mine, forest and water resources and protential uses for sustainable development.

6. Understand the role of a Diploma Engineer in the Development of Bangladesh Economy.

    6.1 Explain the concept of the term, “Engineering team”
    6.2 Identify the functions of Engineers, Diploma Engineers, craftsmen forming the engineering team.
    6.3 Discuss the role of a Diploma Engineer in the overall economic development of Bangladesh.

7. Appreciate the career prospects for Diploma Engineers in different production/service engineering organizations.

    7.1 Explain the employment opportunities for diploma engineers in different sectors and sub Sectors of economy
    7.2 Explain socio-economic status of a diploma Engineer.
    7.3 Explain prospects of diploma Engineers in self-employment.

***