BANGLADESH TECHNICAL EDUCATION BOARD

Agargoan, Dhaka-1207.

4-YEAR DIPLOMA-IN-ENGINEERING PROGRAM

SYLLABUS (PROBIDHAN-2016) **(খসড়া)**

AUTOMOBILE TECHNOLOGY

TECHNOLOGY CODE: 62

FIRST SEMESTER

DIPLOMA IN ENGINEERING
PROBIDHAN-2016

Automobile Technology
1st 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.	66211	Automobile fundamentals	3	3	4	60	90	25	25	200
2.	61011	Engineering Drawing	0	6	2	0	0	50	50	100
3.	65911	Mathematics -1	3	3	4	60	90	50	0	200
4.	65913	Chemistry	3	3	4	60	90	25	25	200
5.	65811	Social Science	3	0	3	60	90	0	0	150
6.	67011	Basic workshop Practice	0	6	2	0	0	50	50	100
7.	65812	Physical Education & Life Skill Development	0	3	1	0	0	25	25	50
		Total	12	24	20	240	360	225	175	1000

AUTOMOBILE FUNDAMENTALS

T	P	C
3	3	4

AIMS

To provide the students with an opportunity to develop fundamental knowledge and basic skills of automobiles with special emphasis on:

- Automotive Industries
- Automobile Components
- Automobile Systems
- Automobile engines
- Use and care of automobile workshop tools and equipment
- Safety practice in automobile workshop

SHORT DESCRIPTION

History and background of automobiles, automotive industries & dealers in Bangladesh, automobile divisions, automobile Specifications; automobile layouts; automobile systems; automobile engines; tools and equipment used in automobile, Different terms related to automobile & Shop and safety practice in automobile workshop.

1 Understand the background & development of automobile

1.1 Describe the history of automobile.
1.2 Mention the world wide remarkable automobile industries & their products.
1.3 Mention the automotive Job market in Bangladesh & abroad.

2 Know the automotive industries & dealers in Bangladesh

2.1 List the automotive industries & dealers in Bangladesh.
2.2 Femiller with the automotive industries & dealers in Bangladesh.
2.3 Mention the brand & Country of origin of two wheelers used in Bangladesh.
2.4 Mention the brand & country of origin of three wheelers used in Bangladesh.
2.5 Mention the brand & country of origin of car, Jeep, pick up & microbus used in Bangladesh.
2.6 Mention the brand & country of origin of commercial vehicles (bus & truck) used in Bangladesh.

3 Understand the division of automobile.

3.1 State the meaning of automobile.
3.2 Classify automotive vehicles.
3.3 Introduce the different types of automobile.

4 Know the layout of automobiles

4.1 Define & draw the front engine front wheel drive vehicle.
4.2 Define & draw the front engine rear wheel drive vehicle.
4.3 Define & draw the rear engine rear wheel drive vehicle.
4.4 Define & draw the four wheel drive vehicle.
4.5 Define & draw the articulated vehicle.

5 Understand the general specification of automobile.

5.1 Define Specification.
5.2 Mention the different factors used in automotive specification.
5.3 Prepare Specification of two-wheeler.
5.4 Prepare Specification of three -wheeler.
5.5 Prepare Specification of car, jeep & microbus.
5.6 Prepare Specification of bus & truck.

6 Understand the chassis & Body.

6.1 Define Chassis & body.
6.2 List the components of chassis.
6.3 Mention the function of components of chassis.
6.4 Name the different types of car body.
6.5 Draw different type of car body.
6.6 Mention the main components of car body.

7 Understand the dimension of automobile.

7.1 Define wheel base.
7.2 Explain the necessity of wheel base.
7.3 Define wheel tread.
7.4 Explain the necessity of wheel tread.
7.5 Define road clearance.
7.6 Explain the necessity of road clearance.
7.7 Define Overhang.
7.8 Explain the necessity of front & rear overhang.
7.9 Show the dimention of a car & bus.

8 Understand the feature of automotive engines.

8.1 Classify the automotive engines.
8.2 Explain the principle of operation of external combustion & internal combustion engine.
8.3 Explain the principle of operation of S.I engine.
8.4 Explain the principle of operation of C.I engine
8.5 Identify the two strokes & four stroke engine.
8.6 Identify the stationary parts of automotive engine.
8.7 Identify the moving parts of automotive engine.

9 Understand the different system of automobile.

9.1 Name the different systems of automobile.
9.2 Mention the functions of different systems of automobile.
9.3 List components of different system of automobile.

10 Know the tools & equipment used in automobile workshop.

10.1 Identify the common hand tools used in automobile workshop.
10.2 Identify the special hand tools used in automobile workshop.
10.3 Identify the equipment used in automobile workshop.
10.4 Define special service tool(SST).
10.5 Mention some special service tools(SST).

11 Understand the different terms releted to automotive vehicle.

11.1 Define Engine Capacity.
11.2 Define EFI, VVTI, GDI & Hybride Vehicles.
11.3 Define sensor & Actuator.
11.4 List the common sensors & Actutators used in automobile.
11.5 Define ECU or ECM of automobile.
11.6 Mention the function of ECU or ECM.
11.7 Define rolling resistance, gradient resistance & wind resistance of a moving vehicle.
11.8 Calculate Engine Capacity.

12 Understand the safety practice in automobile workshop.

12.1 Define safety.
12.2 Explain the necessity of safety practice.
12.3 Describe the safety rules for automobile workshop.

Practical:

1. Identify the different type of automobile.
2. Identify the different type of power transmission system.
3. Identify the different Components & automotive body.
4. Identify the different Components & automotive Chassis
5. Measure wheel base, wheel tread, road clearance and overhang of automobile.
6. Identify the different types of automotive engine.
7. Identify the different stationary & moving engine parts.
8. Identify the different systems of automobile.
9. Identify the different components of main systems of automobile.
10. Identify the common hand tools, special hand tools & special service tools (SST) used in automobile workshop.
11. Identify the equipments used in automobile workshop.
12. Identify the sensors & acutators used in modern automobile.

REFERENCE BOOKS

1. Automotive fundametals – Frederic Nash.
2. Automotive mechanics – Martin W.Stockel & Martin T.Stockel
3. Automobiles Engineering – Dr. kripal Singh
4. Automobile Engineering – R.B. Gupta.
5. Automotive Mechanics – W.H. Crouse & Angling
6. The Automobile – Harban Singh Rayet.

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 understand the orthographic and isometric projection.

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; Views and isometric projections.

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 & CONIC SECTIONS

6 Construct geometric figures (regular polygons) & Construct conic sections.

6.1 Draw regular polygons i.e. pentagon, hexagon and octagon having given one side.
6.2 Draw an ellipse by concentric circle method.
6.3 Draw an ellipse by parallelogram method.
6.4 Draw an ellipse by four center method.
6.5 Draw a parabola having given foci and director.
6.6 Draw a parabola from given abscissa and ordinate.

SYMBOLS

7 Adopt standard symbols in drawing.

7.1 Identify symbols used in drawing.
7.2 Draw a legend using symbols of different engineering materials.
7.3 Draw the symbols of different plumbing fittings and fixtures used in drawing.
7.4 Draw the symbols of different electrical fittings and fixtures used in drawing.
7.5 Interpret information from drawing containing standard symbols.

8. Understand the views of engineering drawing.

8.1 Identify different types of views
8.2 Interpret different types of views

9 Apply the Principles of orthographic projection to a straight line.

9.1 Draw the orthographic projection of a straight line under the following conditions : -

a) Line parallel to both planes
b) Line perpendicular in vertical plane and parallel to horizontal plan
c) Line parallel to vertical plane and perpendicular to horizontal plane
d) Line inclined at given angle to horizontal plane and parallel to vertical plane
e) Line inclined at given angle to vertical plane and parallel to horizontal plane

10 Apply the principles of orthographic projection of rectangular and circular planes (Lamina)

10.1 Draw the orthographic projection of rectangular lamina Parallel to both planes.

10.2 Draw the orthographic projection of rectangular lamina inclined at given angle to horizontal plane

10.3 Draw the orthographic projection of circular lamina parallel to both planes

11 Apply the principles of orthographic projections of geometric solids

11.1 Draw the orthographic projection of a cube kept at an angle with one of the planes in first angle method

11.2 Draw the orthographic projection of a pyramid kept at an angle with both the planes in 1st angle method

11.3 Draw the orthographic projection of a cone kept at an angle with both the planes in third angle method.

11.4 Draw the orthographic projection of a prism kept at an angle with vertical plane in third angle method.

ISOMETRIC PROJECTION

12 Understand the importance, use and scope of isometric views in engineering.

12.1 Identify isometric views

12.2 Draw the isometric view of rectangular and circular lamina

12.3 Draw the isometric projection of solids such as: cube, cylinder, pyramid, prism and steps from different orthographic views

12.4 Draw the isometric projection of three deterrent engineering parts from orthographic views

REFERENCE BOOKS

1 Geometrical Drawing - I H Morris

2 Prathamic Engineering Drawing - Hemanta Kumar Bhattacharia

3 Civil Engineering Drawing - Guru Charan singh

MATHEMATICS-1

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OBJECTIVES

- To acquaint the students with the basic terminology of Algebra.
- To be able to understand the complex numbers 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 : 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 Understand the concept of AP & GP.

1.1 Define AP and common difference.
1.2 Find last term and sum of n terms, given first term and common difference.
1.3 Define GP and common ratio.
1.4 Find the sum of n terms given first and common ratio.

2 Apply the concept of polynomial in solving the problems.

2.1 Define polynomials and polynomial equation.
2.2 Explain the roots and co-efficient of polynomial equations.
2.3 Find the relation between roots and co-efficient of the polynomial equations.
2.4 Determine the roots and their nature of quadratic polynomial equations.
2.5 Form the equation when the roots of the quadratic polynomial equations are given.
2.6 Find the condition of the common roots of quadratic polynomial equations.
2.7 Solve the problems related to the above.

3 Understand the concept of complex numbers.

3.1 Define complex numbers.
3.2 Perform algebraic operation (addition, subtraction, multiplication, division, square root) with complex number of the form a + ib.
3.3 Find the cube roots of unity.
3.4 Apply the properties of cube root of unity in solving problems.

4 Apply the concept of permutation.

4.1 Explain permutation.
4.2 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.
4.3 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.

5 Apply the concept of Combination.

5.1 Explain combination.
5.2 Find the number of combination of n different things taken r at a time.
5.3 Explain ${}^{n}C_{r}$, ${}^{n}C_{n}$, ${}^{n}C_{0}$
5.4 Find the number of combination of n things taken r at a time in which p particular things
i) Always occur ii) never occur.
5.5 Establish i) ${}^{n}C_{r} = {}^{n}C_{n-r}$
ii) ${}^{n}C_{r} + {}^{n}C_{r-1} = {}^{n+1}C_{r}$
5.6 Solve problems related to combination.

6 Apply partial fraction to break the numerator and denominator.

6.1 Define proper and improper fractions.
6.2 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.

7 Apply the concept of binomial theorem.

7.1 State binomial expression.
7.2 Express the binomial theorem for positive index.
7.3 Find the general term, middle term, equidistant term and term independent of x.
7.4 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 Apply the concept of binomial theorem for negative index.

8.1 Express the binomial theorem for negative and fractional index.
8.2 Solve problems of the following types:
Expand (i) $(1 - nx)^{-\frac{1}{n}}$ (ii) $\frac{1}{\sqrt{4.08}}$

TRIGONOMETRY :

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 $\frac{\sin 75° + \sin 15°}{\sin 75° - \sin 15°} = \sqrt{3}$
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, $\sin 55° + \cos 55° = \sqrt{2}\cos 10°$
ii) prove that, $\cos 80° \cos 60° \cos 40° \cos 20° = \frac{1}{16}$

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.
i) express $\cos 5\theta$ in terms of $\cos\theta$.
ii) 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°, cos 6°, cos 9°, cos 18°, cos 36° etc.

Reference:

SL No	Athour	Title	Publication
01	S. P Deshpande	Mathematics for Polytechnic Students	Pune Vidyarthi Graha Prakashan
02	H. K. Das	Mathematics for Polytechnic Students(Volume I)	S.Chand Prakashan
03	Ashim Kumar Saha	Higher Mathematics	Akshar patra Prakashani
04	S.U Ahamed & M A Jabbar	Higher Mathematics	Alpha Prakashani

CHEMISTRY

T	P	C
3	3	4

Objectives:

1. **To understand mole concept and volumetric analysis.**
2. **To represent the formation of bonds in molecules.**
3. **Able to select appropriate materials used in construction.**
4. **Apply knowledge to enhance operative life span of engineering material and structure by various protective methods.**

Short Description:

Chemistry is a basic science subject which is essential to all engineering courses. It gives knowledge of engineering material, their properties related application and selection of material for engineering application. It is intended to teach student the quality of water and its treatment as per the requirement and selection of various construction materials and their protection by metallic and organic coatings. The topics covered will provide sufficient fundamental as well as background knowledge for the particular branch.

Section - 01 (physical and Inorganic Chemistry)

1. Atomic Structure and Chemical Bond

1.1 Definition of Element, atoms, molecules, Fundamental particle of atom, their mass, charge, location.
1.2 Definition of atomic number, mass number, Isotope, Isotone and Isobar.
1.3 Electronic configuration based on Hunds Rule, Aufbau's principle, Paulis exclusion principle
1.4 Definition of atomic weight, equivalent weight of an element, molecular weight, mole in terms of number, mass, volume.
1.5 Define symbol, valency and formula.
1.6 Explain Chemical bond, octet rule.
1.7 Explain Formation of various types of chemical bonds: Covalent, Ionic, Co-ordinate bond.
1.8 Explain the bonding along with example CH_4, H_2, O_2, NaCl, $MgCl_2$.
1.9 Explain Quantum number, Orbit and Orbital.

2. Ionic Equilibrium

2.1 Concept of acid, base, salt and types of salts.
2.2 pH, pOH, pH scale.
2.3 Basicity of an acid and acidity of a base.
2.4 Normality, molarity, molality, Volumetric analysis.
2.5 Titration and Indicator.
2.6 Buffer solution and its mechanism.

3. Chemical reaction, oxidation and reduction.

3.1 Define Chemical reaction and explain the various type of chemical reaction.
3.2 Explain the full meaning of a chemical equation.
3.3 Concept of catalyst.
3.4 Modern concept of oxidation and reduction.
3.5 Simultaneous Process of Oxidation and Reduction.
3.6 Explain the oxidation number.

4. Water Treatment

4.1 Concept of hard and soft water
4.2 Hardness of water
4.3 Describe the softening method of permuted process and ion exchange resin process.
4.4 Advantage and Disadvantage of hard water in different industries.
4.5 Water treatment plant visit and reporting .

5. Corrosion and Alloy

5.1 Types of corrosion.(dry and wet corrosion)
5.2 Atmospheric corrosion, Types of atmospheric corrosion and their mechanism, oxide films factors affecting atmospheric corrosion.
5.3 Electrochemical corrosion, Mechanism of electrochemical corrosion .Types of electrochemical corrosion. Factors affecting electrochemical corrosion.
5.4. Protective measures against corrosion: Coating (Galvanic and Zinc, Organic coating coating agents, Electroplating, metal cladding)
5.5 Concept of alloy.

Section -2 (Organic Chemistry)

6. Organic Chemistry and Introduction to polymers:

6.1 Types of Chemistry.
6.2 Catenation property of carbon.
6.3 Organic compounds, its properties and applications.
6.4 Classification of organic compound by structure and functional group: Definne : Homologous series , Alkanes, Alkenes and alkynes; Properties and uses of general formula ; Names and Structure of first five members hydrocarbons .
6.5 Polymer, monomer, classification of polymers, Polymerization, addition and condensation polymerization.
6.6 Plastics: definition, its types and uses.

Section -3 (Industrial Chemistry)

7. Glass and Ceramic:

7.1 Concept of Glass and its constituents, Classification and uses of different glass, elementary idea of manufacturing process of glass.
7.2 Introduction to ceramic materials, Its constituent.
7.3 Industrial application of glass and ceramic.
7.4 Industry visit and reporting.

8. Soap and Detergent:

8.1 Introduction – A. Lipid B. Fats and oils
8.2 Saponification of fats and oils, Manufacturing of soap.
8.3 Synthetic detergent, types of detergents and its manufacturing.
8.4 Exclusives: TNT, RDX, Dynamite.
8.5 Paint and Varnish
8.6 Adhesives.

9. Cement, pulp and papers:

9.1 Concept of cement and its constituents, Classification and uses of different cement, manufacturing process of cement.
9.2 Manufacturing process of pulp and papers.
9.3 Industry visit and reporting.

Section - 4 (Practical Chemistry)

1. Use of laboratory tools and safety measures

2. Observation and measurement :

2.1 Determine the strength of HCl solution using 0.1N Na_2CO_3
2.2 Determine the strength of NaOH by using 0.1N HCl solution.

3. Qualitative analysis of known and unknown salts :
3.1 Identification of known salt (sample Copper, Iron, Aluminum, led, Ammonium and Zinc salt.)
3.2 Identification of unknown basic radical (e.g. led, Copper, Iron, Zinc, Aluminum, Ammonium)
3.3 Identification of unknown acid radicals (e.g. Chloride, Nitrate, Sulphate, Carbonate)

Source or Reference Book

1. Higher secondary Chemistry (paper 1st and 2nd)
Writer Dr.Gazi Md.Ahsanul Karim. And Md.Robiul Islam
2. Higher secondary Chemistry (Paper 1st and 2nd)
Writer Dr.Soroz kanti Singha Hazari .
3. An Introduction to Metallic corrosion and its prevention
Writer Raj Narayan.
4. Organic Chemistry
Writer Morrisson and Boyad.
5. Inorganic Chemistry
Writer Ali Haider

SOCIAL SCIENCE

T	P	C
3	0	3

OBJECTIVE

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.
- our motherland and its historical background
- good citizenship through practicing our socio- economic culture
- liberation war and its background
- nationalism and life style of the nation

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, Consumption, income wages, salary, value in use and savings; Production – meaning, nature, factors and laws; Demand and Supply; market equilibrium, national income, 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 civics and social science.
   - 1.2 Explain the importance of civics in the personal and social life of an individual.
   - 1.3 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, socialization, Nation, Nationality, citizen and citizenship).
   - 2.2 State the relationship among the individuals in the society.
   - 2.3 Discuss the methods of acquiring citizenship and state the causes of losing citizenship
   - 2.4 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 Define the Constitution.
4.2 Explain the deferent form of Constitution
4.3 Explain state the salient feature of Bangladesh constitution.
4.4 Define the fundamental rights of Bangladesh constitution.
4.5 Meaning of human rights.

5. Understand the role of UNO in maintaining world peace

5.1 Explain the major functions of UNO.
5.2 State the composition and functions of General Assembly.
5.3 Describe the Composition and functions of Security Council.
6.4 Discuss the role of Bangladesh in the UNO.

6. Understand the role of Ethics values and good governance

6.1 Define the values, ethics and good governance.
6.2 Discuss the role of government to establish good governance

Part-2 (Economics)

1. Understand the fundamental concepts of economics.

1.1 Define the Microeconomics and Macroeconomics.
1.2 Discuss the definition of Economics as given by eminent economists.
1.3 Describe the importance of economics for Technical Student.
1.4 Define commodity, utility, value, wealth, consumption, income, savings, wages, value in use, value in exchange and salary.
1.5 Differentiate between value in use and value in exchange.
1.6 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 production function.
2.4 Discuss the law of diminishing returns.
2.5 State the application and limitations of the law of diminishing returns.
2.6 Describe the law of production (increasing constant and diminishing).

3. Understand the concept of demand, supply and utility.

3.1 Define the term, “demand and supply”.
3.2 Explain the law of demand and supply .
3.3 Draw the demand and supply curve.
3.4 Discuss Market equilibrium.
3.5 Define the utility, total and marginal utility
3.6 Illustrate the law of diminishing utility.
3.7 Explain the law of diminishing marginal utility

4. Understand national income.

4.1 Define nation income.
4.2 Explain how to measure national income.
4.3 Discuss GNP, GDP and NNP.
4.4 Discuss economic development and growth

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

5.1 Define rural and urban economics.
5.2 Identify major problems of rural and urban economy.
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 potential uses for sustainable development.

6. 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.
6.4 Explain socio-economic status of a diploma Engineer.

Part-3 ((Bangladesh: History& Culture)

সংক্ষিপ্ত বিবরণী

ইতিহাস

- ইতিহাসের সংজ্ঞা।
- বাংলাদেশের আবহাওয়া ও অধিবাসী।
- বাংলায় ইংরেজ শাসন ক্ষমতালাভ ও প্রতিষ্ঠা।
- ব্রিটিশ বিরোধী সশস্ত্র প্রতিরোধ আন্দোলন; সংস্কার আন্দোলন ও জাতীয়তাবাদেও বিকাশ এবং বাংলার নবজাগরণ; বঙ্গভঙ্গ ও বঙ্গভঙ্গ উত্তরকালে বাংলার রাজনীতি ও দেশ বিভাগ।
- পাকিস্তান আমলে বাংলাদেশ, বঙ্গবন্ধুর নেতৃত্বে বাংলাদেশের মুক্তি সংগ্রাম ও স্বাধীনতালাভ।

(বিবরণী প্রস্তুত প্রক্রীয়াধীন)

সংস্কৃতি

সংস্কৃতি, সভ্যতার সংজ্ঞা, সংস্কৃতির প্রকরণ, ভাষা আন্দোলন উত্তর বাংলার সংস্কৃতি, স্বাধীনতা উত্তর বাংলাদেশের সংস্কৃতির বিবর্তন, বাংলাদেশের সংস্কৃতিতে প্রত্নতার্ত্ত্বিক নিদর্শন ও ক্ষুদ্র নৃতাত্ত্বিক গোষ্ঠীসমূহ।

(বিবরণী প্রস্তুত প্রক্রীয়াধীন)

সহায়ক পুস্তক

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প্রফেসর এমাজউদ্দিন "রাষ্ট্রবিজ্ঞান" আজিজিয়া লাইব্রেরী
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সিরাজুল ইসলাম, "বাংলাদেশের ইতিহাস-১৭০৪-১৯৭১"; ১ম, ২য় ও ৩য় খন্ড; বাংলাদেশ এশিয়াটিক সোসাইটি, ফেব্রুয়ারি ২০০০।
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BASIC WORKSHOP PRACTICE

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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; TIG & MIG welding; Gas & Plasma cutting.

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 Show skill in sawing, chipping, filing, drilling, reaming and grinding.

4.1 Identify the operations of sawing, chipping, filing, drilling, reaming and.
4.2 Perform sawing, chipping, filing, drilling, reaming and grinding operations.
4.3 Make a job involving sawing, chipping, filing, drilling, reaming and grinding operations (Hinge, Angle gage, etc).
4.4 Follow safety procedures during sawing, chipping, filing, drilling, reaming and grinding.

5 Show skill in cutting threads.

5.1 Identify the taps and dies.
5.2 Cut internal and external threads with tap and die.
5.3 Follow safety procedures during working with taps and dies.

6 Show skill in making sheet metal jobs.

6.1 Select appropriate sheet metal.
6.2 Select tools and equipment for sheet metal works.
6.3 Layout the sheet for jobs.(Development Drawing)
6.4 Make seam joint.
6.5 Rectangular tray, Dust pan, Funnel etc.

7 Show skill in Arc Welding:

7.1 Identify the Arc welding machine.
7.2 Select tools and equipment for Arc welding.
7.3 Prepare a work piece for an Arc welding joint.
7.4 Select Proper current and voltage for Arc welding.
7.5 Select appropriate electrode.
7.6 Practice uniform and straight weld bead.
7.7 Make Arc welding joints 1F, 2F (Lap, butt, tee, corner, etc.)
7.8 Follow safe working procedures during Arc welding.

8 Show skill in Gas Welding:

8.1 Identify the Gas welding cylinders.
8.2 Select tools and equipment for Gas welding.
8.3 Prepare a work piece for a Gas welding joint.
8.4 Select appropriate a filler rod and flux.
8.5 Select appropriate flame for Gas welding.
8.6 Practice uniform and straight weld bead.
8.7 Make Gas welding joints 1F, 2F (Lap, butt, tee, corner, etc.)
8.8 Follow safe working procedures during Gas welding.

9 Show skill in Gas and Plasma cutting

9.1 Identify the Gas cutting torch and Plasma cutting machine.
9.2 Select tools and equipment for Gas cutting and Plasma cutting machine.
9.3 Select appropriate flame and high pressure oxygen flow for gas cutting.
9.4 Select appropriate current, voltage and high presser air flow for plasma cutting.
9.5 Metal cutting by gas and plasma cutting machine.
9.6 Follow safe working procedures during Gas and plasma cutting machine.

10 Show Skill in TIG Welding:

10.1 Identify the TIG welding machine.
10.2 Select tools and equipment for TIG welding.
10.3 Prepare a work piece for a TIG joint.
10.4 Select Proper current and voltage for TIG welding.
10.5 Select appropriate electrode and holder / electrode casing.
10.6 Practice uniform and straight weld bead.
10.7 Make TIG welding joints 1F (butt.)
10.8 Follow safe working procedures during TIG welding.

11 Show Skill in MIG Welding:

11.1 Identify the MIG welding machine.
11.2 Select tools and equipment for MIG welding.
11.3 Prepare a work piece for a MIG joint.
11.4 Select Proper current and voltage for MIG welding.
11.5 Select appropriate electrode and pressure roller.
11.6 Practice uniform and straight weld bead
11.7 Make MIG welding joints 1F (butt.)
11.8 Follow safe working procedures during MIG 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
6	Manufacturing Technology Lab Manual	—	T Jeyapoovan • S Sundaram

PHYSICAL EDUCATION AND LIFE SKILL DEVELOPMENT

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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

Warm up; Yoga; Muscle developing with equipment; Meditation, First aid; sports science, Games & sports; Life skill development.

DETAIL DESCRIPTION

1. National Anthem and Assembly

1.1 Line and File.
1.2 Make assembly.
1.3 Recitation of national anthem.
1.4 National anthem in music.

2. WARM UP

2.1 General Warm-up :

Spot running (Slow, Medium & Fast), Neck rotation, Hand rotation, Side twisting, Toe touching, Hip rotation, Ankle twisting, Sit up and Upper body bending (Front & Back).

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 warm up :

Legs raising one by one, Leg raising in slanting position, Knee bending and nose touching, Heels raising, Toes touching (standing and laying position), Hand stretch breathing (Tadasana, Horizontal, Vertical).

2.4 Mass Physical Exercise

Hand raising, Side twisting, Front & back bending, Front curl, Straight arm curl two hand, Hands raising overhead and Push up.

3. YOGA

3.1 Dhyanasan : Shabasan, Padmasan, Gomukhasan, Sharbangasan, shashangasan Shirshasan
3.2 Shasthyasan : Halasan, Matshasan, Paban Muktasan, Ustrasan.
3.3 Prana and Pranayama: Nadisuddhi Pranayma, cooling pranayamas (sitali pranayama, Sitkari Pramayama, sadanta pranayama), Ujjayi pranayama,

4. Muscle Developing with equipment

4.1 Damball : Front curl, Hand sidewise stretching, Arms raising overhead.
4.2 Barball : Front press, Leg press, Rowing motion with leverage bar.
4.3 Rope climbing : Straight way climbing, Leg raising climbing.
4.4 Horizontal bar : Chinning the bar with front grip, Chinning the bar with wide back grip.
4.5 Jogging Machine : Slow, Medium, and Fast running.
4.6 A. B king pro (Rowing Machine): Sit up.
4.7 Sit up bench: Sit up.

5 **MEDITATION**

5.1 Define meditation.
5.2 Classification of Meditation.
5.3 Nadanusandhana (A-Kara chanting, U-Kara chanting, M-Kara chanting, AUM-kara chanting.
5.4 OM-Meditation.
5.5 Cyclic Meditation (Starting Prayer, Instant Relaxation Technique, Centring, Standing Asanas, Sitting Asanas, Quick Relaxation Technique).

6. **FIRST AID**

6.1 Define First Aid.
6.2 What do you mean by First Aider.
6.3 Discuss the responsibilities of a First Aider.
6.4 Different types of equipment of First Aid.
6.5 Muscle Cramp-Ice application (Remedy).
6.7 Dislocation-Ice application (Remedy).

7. RULES AND TECHNIQUE OF GAMES AND SPORTS

7.1 Kabadi.
7.2 Football.
7.3 Cricket.
7.4 Badminton.
7.5 Athletics.
7.6 Swimming.

8. SPORTS SCIENCE

8.1 Definition of Exercise physiology.
8.2 Function of muscles.
8.3 Concept of work, energy and power.
8.4 Effect of exercise on heart and circulatory system.
8.5 Motor components for physical fitness.
8.6 Definition of sports Biomechanics.
8.7 Definition of sports psychology.
8.8 Meaning of nutrition, Diet and Balanced diet.
8.9 Meaning of the terms –Test, measurement and Evaluation.

9. SHOW SKILL ON CONVERSATION ON DAY TO DAY LIFE

9.1 Today's Market price.
9.2 Festivals (religious festivals, National festivals).
9.3 Celebration of National days.
9.4 Aim in life.
9.5 Visited historical places/sites.

10. HUMAN RELATION

10.1 Family relation.
10.2 Relation with nighbour.
10.3 Humanitarian Service.
10.4 Service for handicapped (intelligent, physical, social etc).
10.5 Service for orphan / Patient.

11 VOTE OF APPRECIATION

11.1 About dress.
11.2 For good work.
11.3 For good result.
11.4 For good news.

12. STRESS MANAGEMENT

12.1 Habit to be a man of humor.
12.2 Always brain should be cool.
12.3 Positive thinking.

12.4 Factors that determine our attitude.
12.5 The benefits of a positive attitude.
12.6 Steps to building a positive attitude.

13 TIME MANAGEMENT

13.1 Determine essential time for a task.
13.2 Determine delay and unexpected time.
13.3 Determine time for daily activities.
13.4 Plan for daily activities.

14 INTERVIEW TECHNIQUE

14.1 Mental preparation to face an interview.
14.2 Selection of dress for interview.
14.3 Introducing himself/herself to the interviewer.
14.4 Coping interview.

15 TEAM WORK

15.1 Organized a team.
15.2 Selection of team leader.
15.3 Distribution the task to the members.
15.4 Accepting opinion of team members.
15.5 Completion of task as a team.

16 SOCIAL WORK

16.1 Tree plantation.
16.2 Community service.
16.2.1 Rover Scout.
16.2.2 Sanitation.
16.2.3 Pure drinking water.
16.2.4 Social Culture.

Reference Book

Modern Yoga _ Kany Lal Shah

Rules of games and sports _ Kazi Abdul Alim

Yoga _ Sobita Mallick

Iron Man _ Nilmoni Dass