



BANGLADESH TECHNICAL EDUCATION BOARD
Agargoan, Dhaka-1207.

4-YEAR DIPLOMA-IN-ENGINEERING PROGRAM
SYLLABUS (PROBIDHAN-2016)

ARCHITECTURE AND INTERIOR DESIGN TECHNOLOGY
TECHNOLOGY CODE: 687

FIRST SEMESTER

DIPLOMA IN ENGINEERING
PROBIDHAN-2016

Architecture and Interior Design 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	65811	Social Science	3	0	3	60	90	0	0	150
2	65812	Physical Education and Life Skills Development	0	3	1	0	0	25	25	50
3	65911	Mathematics-1	3	3	4	60	90	50	0	200
4	65913	Chemistry	3	3	4	60	90	25	25	200
5	68711	Architectural Materials and Product	3	3	4	60	90	25	25	200
6	68712	Architectural Design and Drawing-1	1	9	4	20	30	75	75	200
Total			13	21	20	260	390	200	150	1000

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;
- 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 team.

DETAIL DESCRIPTION:**1. Understand the meaning and scope of civics and interrelations of social science.**

- 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 Define 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 constitution.
- 4.2 Explain the deferent forms of constitution.
- 4.3 Explain the salient feature of Bangladesh constitution.

4.4 Define the fundamental rights of Bangladesh constitution.

4.5 Describe the 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.

5.4 Discuss the role of Bangladesh in 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.

7. Understand the fundamental concepts of economics.

7.1 Define Microeconomics and Macroeconomics.

7.2 Discuss the definition of economics as given by eminent economists.

7.3 Describe the importance of economics for Technical Student.

7.4 Define commodity, utility, value, wealth, consumption, income, savings, wages, value in use, value in exchange and salary.

7.5 Differentiate between value in use and value in exchange.

7.6 Explain wealth with its characteristics.

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

8.1 Discuss production mode and process

8.2 Explain the nature of different factors of production.

8.3 Discuss production function.

8.4 Discuss the law of diminishing returns.

8.5 State the application and limitations of the law of diminishing returns.

8.6 Describe the law of production (increasing constant and diminishing).

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

9.1 Define the term, “demand and supply”.

9.2 Explain the law of demand and supply.

9.3 Draw the demand and supply curve.

9.4 Discuss market equilibrium.

9.5 Define the utility, total and marginal utility

9.6 Illustrate the law of diminishing utility.

9.7 Explain the law of diminishing marginal utility.

10. Understand national income.

10.1 Define national income.

10.2 Explain how to measure national income.

10.3 Discuss GNP, GDP and NNP.

10.4 Discuss economic development and growth.

11. 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.

12. Understand 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 and 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.

Bangladesh: History & Culture

১৩. ইতিহাস

- ১৩.১ ইতিহাসের সংজ্ঞা।
- ১৩.২ বাংলাদেশের আবহাওয়া ও অধিবাসী।
- ১৩.৩ বাংলায় ইংরেজ শাসন ক্ষমতালভ ও প্রতিষ্ঠা।
- ১৩.৪ ব্রিটিশ বিরোধী সশস্ত্র প্রতিরোধ আন্দোলন; সংস্কার আন্দোলন ও জাতীয়তাবাদের বিকাশ এবং বাংলার নবজাগরণ; বঙ্গভঙ্গ ও বঙ্গভঙ্গ উত্তরকালে বাংলার রাজনীতি ও দেশ বিভাগ।
- ১৩.৫. পাকিস্তান আমলে বাংলাদেশ, বঙ্গবন্ধুর নেতৃত্বে বাংলাদেশের মুক্তি সংগ্রাম ও স্বাধীনতালাভ।

১৪. সংস্কৃতি

- ১৪.১ সংস্কৃতি।
- ১৪.২ সভ্যতার সংজ্ঞা।
- ১৪.৩ সংস্কৃতির প্রকরণ।
- ১৪.৪ ভাষা আন্দোলন উত্তর বাংলার সংস্কৃতি।
- ১৪.৫ স্বাধীনতা উত্তর বাংলাদেশের সংস্কৃতির বিবর্তন।
- ১৪.৬ বাংলাদেশের সংস্কৃতিতে প্রত্নতাত্ত্বিক নিদর্শন ও ক্ষুদ্র নৃতাত্ত্বিক গোষ্ঠীসমূহ।

সহায়ক পুস্তক

১. হক, মোজাম্মেল "পৌরনীতি"- হাসান বুক হাউস।
২. প্রফেসর এমাজউদ্দিন "রাষ্ট্রবিজ্ঞান" আজিজিয়া লাইব্রেরী।
৩. আলী, মাসুম "অর্থনীতি"।
৪. চক্রবর্তী, মনতোষ- "প্রিন্সিপলস অব ইকোনোমিক্স"।
৫. মার্শাল, আলফ্রেড- "প্রিন্সিপলস অব ইকোনোমিক্স"।
৬. রহমান, আনিসুর - "অর্থনীতি"।
৭. রহিম, চৌধুরী, মাহমুদ ও ইসলাম, "বাংলাদেশের ইতিহাস(পরিবর্ধিত ও পরিমার্জিত)"; নওরোজ কিতাবিস্তান, ১৯৯৯।
৮. কে, আলী "বাংলাদেশের ইতিহাস"; আজিজিয়া বুক ডিপো, ২০০১।
৯. সিরাজুল ইসলাম, "বাংলাদেশের ইতিহাস-১৭০৪-১৯৭১"; ১ম, ২য় ও ৩য় খন্ড; বাংলাদেশ এশিয়াটিক সোসাইটি, ২০০০।
১০. কো-আন্তোনভা, প্রি, কতোভস্কি, "ভারত বর্ষের ইতিহাস"; প্রগতি প্রকাশন, ১৯৮৮।
১১. গোপাল হালদার; "সংস্কৃতির রূপান্তর"; মুক্তধারা, ১৯৮৪।
১২. মোতাহের হোসেন চৌধুরী, "সংস্কৃতি কথা"; নওরোজ কিতাবিস্তান, ১৯৯৮।
১৩. গোপাল হালদার, "বাংলা সাহিত্যের রূপরেখা-১ম ও ২য় খন্ড"; মুক্তধারা।

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. Recite national anthem and make assembly**

- 1.1 line and file.
- 1.2 Make assembly.
- 1.3 Recitation of national anthem.
- 1.4 National anthem in music.

2. Conduct warm up.

- 2.1 Conduct 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 Conduct squad drill :
Line, File, Attention, Stand at ease, Stand easy, Left turn, Right turn, About turn, Mark time, Quick march, Right wheel, Left wheel, Open order march & Closed order march.
- 2.3 Conduct 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 Conduct mass physical exercise
Hand raising, Side twisting, Front & back bending, Front curl, Straight arm curl two hand, Hands raising overhead and Push up.

3. Conduct YOGA.

- 3.1 Dhyanasan : Shabasan, Padmasan, Gomukhasan, Sharbangasan, Shashangasan, Shirshasan
- 3.2 Shasthyasan : Halasan, Matshasan, Paban Muktasana, Ustrasana.
- 3.3 Prana and Pranayama: Nadisuddhi Pranayama, cooling pranayamas (sitali pranayama, Sitkari Pranayama, Sadanta pranayama), Ujjayi pranayama,

4. Exercise Muscle developing with equipment.

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

5. Conduct 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, Centering, Standing Asanas, Sitting Asanas, Quick Relaxation Technique).

6. Demonstrate First Aid Skill.

- 6.1 Define First aid.
- 6.2 Know First aider.
- 6.3 Discuss the responsibilities of a First aider.
- 6.4 Identify different types of equipment of First aid.
- 6.5 Practice Muscle Cramp-Ice applications (Remedy).
- 6.7 Practice dislocation-Ice application (Remedy).

7. Exercise Rules and technique of following 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 Define exercise physiology.
- 8.2 State the function of muscles.
- 8.3 Know the concept of work, energy and power.
- 8.4 Express the effect of exercise on heart and circulatory system.
- 8.5 Show the motor components for physical fitness.
- 8.6 Define sports biomechanics.
- 8.7 Define sports psychology.
- 8.8 State the meaning of nutrition, diet and balanced diet.
- 8.9 State the meaning of the terms –test, measurement and evaluation.

9. Show skill on conversation on day to day life of the following:

- 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 Visite to historical places/sites.

10. Understand human relation.

- 10.1 Define family relation.
- 10.2 Know the relation with neighbor.
- 10.3 Identify humanitarian service.
- 10.4 Explain service for handicapped (intelligent, physical, social etc).
- 10.5 Explain service for orphan/patient.

11. Experience vote of appreciation.

- 11.1 About dress.
- 11.2 For good work.
- 11.3 For good result.

11.4 For good news.

12. Practice stress management.

- 12.1 Grow habit to be a man of humor.
- 12.2 Always keep brain cool.
- 12.3 Run with positive thinking.
- 12.4 Explain factors that determine our attitude.
- 12.5 State the benefits of a positive attitude.
- 12.6 Follow steps to building a positive attitude.

13. Practice 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. Play roll to conduct interview technique on:

- 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. Practice team work on:

- 15.1 Organize a team.
- 15.2 Select a team leader.
- 15.3 Distribute the task to the members.
- 15.4 Accept opinion of team members.
- 15.5 Complete the task as a team.

16. Practice social work.

- 16.1 Exercise tree plantation.
- 16.2 Exercise community service.
- 16.3 Rover Scout.
- 16.4 Sanitation.
- 16.5 Pure drinking water.
- 16.6 Social Culture.

REFERENCE BOOK:

- Modern Yoga _ Kany Lal Shah
- Rules of games and sports _ Kazi Abdul Alim
- Yoga _ Sobita Mallick
- Iron Man _ Nilmoni Dass

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:**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 related to permutation:
 - i) Be arranged so that the vowels may never be separated.
 - ii) 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.

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 nCr , nCn , $nC0$

- 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) $nCr = nCn-r$
 ii) $nCr + nCr-1 = n+1Cr$
- 5.6 Solve problems related to the combination.

6 Apply partial fractions to break the numerator and denominator.

- 6.1 Define proper and improper fractions.
- 6.2 Resolve into partial fraction of the following types:
 a) Denominator having a non-repeated linear factor.
 b) Denominator having a repeated linear factor.
 c) Denominator having a quadratic factor.
 d) Denominator having a combination of repeated, non repeated and quadratic factors.

7 Apply the concept of the 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 the 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) $\frac{1}{\sqrt{4.08}}$

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 $\sin 75^\circ$, $\tan 75^\circ$.
 ii) Show that $\frac{\sin 75^\circ + \sin 15^\circ}{\sin 75^\circ - \sin 15^\circ} = \sqrt{3}$
 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 Following types:
 i) Show that, $\sin 55^\circ + \cos 55^\circ = \sqrt{2} \cos 10^\circ$
 ii) 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 following 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 $\cos 3^\circ$, $\cos 6^\circ$, $\cos 9^\circ$, $\cos 18^\circ$, $\cos 36^\circ$ etc.

REFERENCE:

SL No	Author	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

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.

DETAIL DESCRIPTION:**1. Understand Atomic Structure and Chemical Bond.**

- 1.1 Define element, atoms, molecules, Fundamental particle of atom, their mass, charge, location.
- 1.2 Define atomic number, mass number, Isotope, Isotone and Isobar.
- 1.3 Explain electronic configuration based on Hund's Rule, Aufbau's principle, Pauli's exclusion principle.
- 1.4 Define 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. Understand Ionic Equilibrium.

- 2.1 Explain the concept of acid, base, salt and types of salts.
- 2.2 Define pH, pOH, pH scale.
- 2.3 Distinguish between basicity of an acid and acidity of a base.
- 2.4 State normality, molarity, molality, volumetric analysis.
- 2.5 Explain Titration and Indicator.
- 2.6 Describe buffer solution and its mechanism.

3. Understand chemical reaction, oxidation and reduction.

- 3.1 Define Chemical reaction and explain the various types of chemical reaction.
- 3.2 Explain the full meaning of a chemical equation.
- 3.3 State the concept of catalyst.
- 3.4 Explain the modern concept of oxidation and reduction.
- 3.5 Describe the simultaneous process of oxidation and reduction.
- 3.6 Explain the oxidation number.

4. Understand Water Treatment.

- 4.1 State the concept of hard and soft water.
- 4.2 Define hardness of water.

- 4.3 Describe the softening method of permutated process and ion exchange resin process.
- 4.4 Mention the advantages and disadvantages of hard water in different industries.
- 4.5 Visit a water treatment plant write a report.

5. Understand Corrosion and Alloy.

- 5.1 Mention the types of corrosion(dry and wet corrosion).
- 5.2 Describe atmospheric corrosion, types of atmospheric corrosion and their mechanism, oxide films factors affecting atmospheric corrosion.
- 5.3 Explain electrochemical corrosion, mechanism of electrochemical corrosion, types of electrochemical corrosion. factors affecting electrochemical corrosion.
- 5.4. Explain protective measures against corrosion: Coating (Galvanic and Zinc, Organic coating agents, Electroplating, metal cladding)
- 5.5 Explain the concept of alloy.

6. Understand the Concept of Organic Chemistry and Introduction to polymers.

- 6.1 Mention types of Chemistry.
- 6.2 Mention the catenation property of carbon.
- 6.3 State organic compounds, its properties and applications.
- 6.4 Explain the classification of organic compound by structure and functional group: Define Homologous series, Alkanes, Alkenes and Alkynes; properties and uses of general formula; Names and structure of first five members hydrocarbons.
- 6.5 Explain polymer, monomer, classification of polymers, polymerization, addition and condensation polymerization.
- 6.6 Define plastics and explain its types and uses.

7. Understand Glass and Ceramic.

- 7.1 Define glass and its constituents; classify glasses, give elementary idea of manufacturing process of glass.
- 7.2 Give introduction to ceramic materials and its constituent.
- 7.3 Describe industrial application of glass and ceramic.
- 7.4 Visit industry and write a report.

8. Understand Soap and Detergent.

- 8.1 Give introduction to Lipid, Fats and oils.
- 8.2 Explain saponification of fats and oils, manufacturing of soap.
- 8.3 Describe synthetic detergent, types of detergents and its manufacturing.
- 8.4 State explosives: TNT, RDX, Dynamite.
- 8.5 Define paint and varnish.
- 8.6 Describe adhesives.

9. Cement, pulp and papers.

- 9.1 Classify cement and mention its uses and manufacturing process.
- 9.2 Describe manufacturing process of pulp and papers.
- 9.3 Conduct industry visit and reporting.

PRACTICAL:

1. Practice the use of laboratory tools and safety measures.

2. Conduct 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. Perform qualitative analysis of known and unknown salts.

3.1 Identify known salt (sample Copper, Iron, Aluminum, lead, Ammonium and Zinc salt.)

3.2 Identify unknown basic radical (e.g. lead, Copper, Iron, Zinc, Aluminum, Ammonium)

3.3 Identify unknown acid radicals (e.g. Chloride, Nitrate, Sulphate, Carbonate)

REFERENCE BOOKS:

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

Objectives:

To provide the students with an opportunity to acquire knowledge and skill,

- To be able to recognize the sources of various architectural materials.
- To be able to identify the characteristics of various architectural materials.
- To be able to understand the uses of different architectural products.

Short Descriptions:

Aspects of architectural materials, use of mud, brick, sand, cement, lime as mortar, timber, insulating materials, glass, paint & varnishes, acoustics materials and steel as architectural materials.

Detail Descriptions:**1. Understand the Building Stone.**

- 1.1 Define Stone.
- 1.2 Describe the different types of Stone.
- 1.3 Explain the Stone ware & porcelain.
- 1.4 Describe the use of Stone.
- 1.5 Define the characteristics of stone.

2. Understand the Geo. Surface or Mud.

- 2.1 Define Geo surface.
- 2.2 Define Mud.
- 2.3 Mention various types of mud.
- 2.4 Understand the clay products.
- 2.5 List the names of clay products.
- 2.6 Describe the manufacturing of clay products.
- 2.7 Understand the terracotta & tiles.
- 2.8 Describe the various types of ceramic tiles.
- 2.9 Understand the properties of clay products.
- 2.10 State the various uses of clay products.

3. Understand the Bricks.

- 3.1 Define Bricks.
- 3.2 Describe the different size of Bricks.
- 3.3 Define the characteristics of ideal Bricks.
- 3.4 Define the classification of Bricks
- 3.5 Describe the properties of Bricks.
- 3.6 Describe the manufacturing of bricks.

4. Understand the wall covering.

- 4.1 Identify different types of wall covering.
- 4.2 Describe the elements of vinyl wall covering.
- 4.3 State the composition of vinyl materials.
- 4.4 Mention the characteristics of commercial wall covering.
- 4.5 Explain the installation process of wall covering.

5. Understand the Sand.

- 5.1 Define Sand.
- 5.2 Describe different types of Sand.

- 5.3 Mention the characteristics of Sand.
- 5.4 Define FM.
- 5.5 Discuss the uses of sand.
- 5.6 Mention the sources of good sand in Bangladesh.

6. Understand the Cement.

- 6.1 Define cement.
- 6.2 Describe different type of cement.
- 6.3 Discuss the properties of cement.
- 6.4 Describe the manufacturing of cement (Haff men & bulls process.)
- 6.5 Define kiln.
- 6.5 Define Portland land cement.
- 6.6 Describe the properties of Portland land cement.
- 6.7 Discuss the various uses of cement.

7. Understand the Timber.

- 7.1 Define Timber.
- 7.2 Define log.
- 7.3 Describe different types of Timber.
- 7.4 State the various uses of timber.
- 7.5 Discuss the seasoning of timber.
- 7.6 Mention the characteristics of timber.
- 7.6 Describe the fault of timber.

8. Understand the basic concept of Lime.

- 8.1 Define lime.
- 8.2 State the source of lime.
- 8.3 Describe the properties of lime.
- 8.4 Mention the uses of lime.

9. Understand the basic concept of glass

- 9.1 Define glass.
- 9.2 Explain varieties of glass.
- 9.3 Describe the treatment of glass.
- 9.4 List various uses of glass.
- 9.5 Mention the special types of glass.

10. Understand the purpose of Distemper, white wash and color wash.

- 10.1 Define white wash and color wash.
- 10.2 Describe the properties of Distemper.
- 10.3 Describe the ingredients of Distemper, white wash and color wash.
- 10.4 Explain the process of applying Distemper, white washing and color.
- 10.5 Define weather coat.
- 10.6 Define enamel paint.
- 10.7 Differentiate between paint and varnish.
- 10.8 Describe different types of paint & varnish with their uses.
- 10.9 Mention the characteristics of ideal paint & varnish.
- 10.10 Describe the ingredients of paint & varnish.

11. Understand the application of Acoustics Materials.

- 11.1 Define the Acoustics or sound absorbent Materials.
- 11.2 Describe the various types of Acoustics materials with their uses.
- 11.3 State the properties of sound, i.e.; sound waves, wave length, Frequency, velocity, resonance, sound levels, loudness, Noise, sound reflection, echo, reverberation, sound absorption etc.
- 11.4 Describe the qualities of good Acoustic materials.

11.5 Mention guidelines for good Acoustic materials.

12. Understand the application of steel.

- 12.1. List the names of commercial steels
- 12.2 Describe different form of steel.
- 12.3 List properties of mild and hard steel.
- 12.4 Mention the uses of various steels.

13. Understand the various kinds of miscellaneous materials.

- 13.1 Mention different types of gypsum board.
- 13.2 Describe the uses of gypsum board.
- 13.3 State the installation system of gypsum board.
- 13.4 Describe the uses of aluminum.
- 13.5 Discuss the properties of aluminum.
- 13.6 Mention the advantage & disadvantage of using aluminum.
- 13.7 Describe the uses of aluminum composite panel.

14. Understand the fundamental aspects of fire & waterproofing materials.

- 14.1 Mention the term of fire resisting & waterproofing materials.
- 14.2 Explain the uses of asbestos as fireproofing materials.
- 14.3 List the characteristics of refractory materials.
- 14.4 Explain the uses of rubber as waterproofing materials.

PRACTICAL:

1. Show skill in identifying various types of stone.

- 1.1 Select different types of stone in the laboratory.
- 1.2 Sketch different types of stone on the basis of formation.

2. Practice field test of brick.

- 2.1 Perform field test of bricks.
- 2.2 Select 1st class, 2nd class, 3rd class & jhama bricks.

3. Conduct laboratory test of bricks.

- 3.1 Determine average weight of bricks.
- 3.2 Perform absorption test of brick.
- 3.3 Perform compression test of brick.

4. Conduct laboratory test of cement.

- 4.1 Perform fineness test.
- 4.2 Perform setting time test.
- 4.3 Perform compressive strength test.
- 4.4 Perform tensile strength test.
- 4.5 Make cement paste of normal consistency.

5. Conduct sand test.

- 5.1 Bulking of sand.
- 5.2 F.M. of sand.
- 5.3 Specify gravity of sand.

Reference Books:

1. Modern Geotechnical Engineering - Written By Alam Singh,
2. Engineering Materials - R K Rajput,
3. Engineering Materials - Surendra Singh,
4. Building Constructional Materials - M Pratap Rao.
5. Engineering Materials - M A Aziz.

Objectives

- To develop the ability to use various drawing instruments and equipments.
- To enable the design and drawing media
- To enable the elements of drawing
- To enable in constructing and using various types of scales in the 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 skills of drawing orthographic views.

Short Description

Architectural Design and Drawing Equipment; Design and Drawing Media; Element of Design; concept of view; reproduction; Lettering, numbering and constructing the title strip; Adopting alphabet of lines and dimensioning; Constructing scales; Constructing geometrical figures; Constructing conic sections; Adopting symbols; Freehand sketching (with shades and shadows);

Detail Description

Theory:

1. Understand Architectural Design and Drawing Equipment

- 1.1 Identify the basic equipment and tools necessary for architectural drafting.
- 1.2 Describe the proper usage of drafting tools.
- 1.3 Distinguish the two basic pencil types, as well as understand the usage of different lead thickness and grades.
- 1.4 Identify the function of technical pens.
- 1.5 Differentiate between eraser types, and erasing techniques.
- 1.6 Describe the types and usage of various drafting instruments, including: compass, Dividers, parallel bars, triangles, architectural templates, irregular, curves, protractors curves, protractors, triangular scale etc.
- 1.7 Distinguish different types of scale (comparison between FPS and SI unit)

2. Understand Design and Drawing Media

- 2.1 Identify factors, which influence the selection of drawing media.
- 2.2 List different types of paper used in Architectural drawing such as art paper, plain paper, offset paper, tracing paper, butter paper, mount board, ivory paper etc.
- 2.3 List different size of sheet used in Architectural Drawing.
- 2.4 List different types of color media (color pencil, crayon, pastel, water color, oil paint)
- 2.5 List different types of print media (PVC, sticker, pana flex).

3. Understand the Element of Design

- 3.1 Define Design
- 3.2 Define Drawing
- 3.3 Distinguish between Design and Drawing
- 3.4 Define the elements of design.
- 3.5 Discuss the necessity of elements of design.
- 3.6 List the different types of elements of design.
- 3.7 Describe different types of dotted lines and their uses.

4. Understand the concept of view

- 4.1 Define view.
- 4.2 State the necessity of views.
- 4.3 List the different types of view.
- 4.4 Describe the technique of isometric and oblique drawing.
- 4.5 Describe the technique of axonometric drawing.

- 4.6 Define Perspective drawing.
- 4.7 Distinguish between 1st angle and 3rd angle method of orthographic view.

5. Understand the reproduction

- 5.1 State the types of reproduction and their uses.
- 5.2 Discuss the necessity and importance of reproduction in Architectural profession.
- 5.3 Discuss the necessity and importance of photography in Architectural profession.
- 5.4 Explain the photo taking technique for architectural purpose.
- 5.5 Describe the advantages and importance of engineering photocopy production versus
- 5.6 Blue print machines.
- 5.7 Identify the uses of plotter.

Practical:

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 drawing equipment.
- 1.3 Identify the standard sizes of drawing board and sheets.
- 1.4 Draw the border lines in drawing sheets following standard rule.
- 1.5 Draw horizontal, vertical and inclined lines with the help of set squares and parallel ruler/bar.
- 1.6 Draw 15 degree, 75 degree, 105 degree and 120 degree angles with the help of set squares and parallel ruler/bar.
- 1.7 Use lettering guide, template, scale and French curve.

2 Practice letter and number by freehand and instruments.

- 2.1 Identify the necessity of good lettering in Architectural 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 the 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.

3 Practice of lines.

- 3.1 Select different lines in the 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 Practice the elements and theory of dimensioning.

- 4.1 Put dimensions in engineering drawing according to accepted standards.
- 4.2 Identify the elements of dimensions from a given dimension 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 heads.

5 Prepare scale for drawing application.

- 5.1 Calculate representative fraction (RF) 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 to object.
- 5.4 Draw a diagonal scale to show three units having given RF.
- 5.5 Use scale of chord.
- 5.6 Draw angles of 49 degree, 78 degree and 95 degree with the help of scale of chord (Adjustable set square).

6 Construct geometric figures (lines, triangles & squares).

- 6.1 Divide a given straight line into any number of equal parts in different method.
- 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.

8 Construct conic sections.

- 8.1 Draw an ellipse by the 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 focus and the directory.
- 8.5 Draw a parabola from given abscissa and ordinate.

9 Adopt standard symbols in the drawing.

- 9.1 Identify symbols used in Architectural 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.

10 Sketch freehand with shades and shadows.

- 10.1 Use different materials and methods of shading and shadowing freehand sketches
- 10.2 Produce freehand sketches of the following with shade and shadow technique:

a. Book	f. Open box
b. Brick	g. Electric lamps
c. Step	h. Hut
d. Cylinder	i. Tree
e. Car	j. Single storied building

11 TWO DIMENSIONAL (ORTHOGRAPHIC) PROJECTION

- 11.1 Draw the view of different simple object in 1st angle method.
- 11.2 Draw the view of different simple object in 3rd angle method.
- 11.3 Draw the view of different complex object having circular & hidden portion in 1st angle method.
- 11.4 Draw the view of different complex object having circular & hidden portion in 3rd angle Method.
- 11.5 Draw the object from the given view in 3rd angle method
- 11.6 Draw the complex object having hidden portion form the given view in 3rd angle method with dimensioning

12 THREE DIMENSIONAL PROJECTION

- 12.1 Draw an isometric view of a simple object.
- 12.2 Draw an isometric view of a circular object.
- 12.3 Draw an oblique view of a simple object.
- 12.4 Draw an oblique view of a circular object.
- 12.5 Draw an axonometric view of a simple object.
- 12.6 Draw an axonometric view of a circular object.

REFERENCE BOOKS

- 1 Geometrical Drawing - I H Morris

- 2** Prathamic Engineering Drawing
- 3** Rendering with pen and ink
- 4** Architectural Rendering

- Hemanta Kumar Bhattacharia
- Robert W.Gill.
- Albert O.Halse