



BANGLADESH TECHNICAL EDUCATION BOARD

Agargaon, Dhaka-1207.

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

FOOD TECHNOLOGY

TECHNOLOGY CODE: 669

FIRST SEMESTER

**DIPLOMA IN ENGINEERING
PROBIDHAN-2016**

Food 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	61011	Engineering Drawing	0	6	2	0	0	50	50	100
2	65711	Bangla	3	3	4	60	90	50	0	200
3	65712	English	2	0	2	40	60	0	0	100
4	65911	Mathematics-1	3	3	4	60	90	50	0	200
5	65913	Chemistry	3	3	4	60	90	25	25	200
6	66911	Food Engineering Fundamentals	2	3	3	40	60	25	25	150
7	67011	Basic Workshop Practice	0	6	2	0	0	50	50	100
Total			13	24	21	260	390	250	150	1050

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:**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 Identify 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.

2 Practice 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 proportions.
- 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 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.

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 meter, centimeter and millimeter 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.

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.

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 plane
 - 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.

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 Prathomic Engineering Drawing - Hemanta Kumar Bhattacharia
- 3 Civil Engineering Drawing - Guru Charan singh

উদ্দেশ্য :

১. মাতৃভাষা হিসেবে বাংলা ভাষার প্রকৃতি ও বৈশিষ্ট্য সম্পর্কে ধারণা লাভ। ভাষার ব্যবহারে প্রায়োগিক যোগ্যতা অর্জন।
২. বাংলা সাহিত্য পঠন-পাঠনের মাধ্যমে জাতীয় চেতনা, দেশপ্রেম, মুক্তিযুদ্ধের চেতনা, শুদ্ধাচার, নীতি ও মূল্যবোধের উন্মেষ ঘটানো।

সংক্ষিপ্ত বিবরণী :

মাতৃভাষা ও সৃজনশীলতা : বাংলা ভাষা রীতির বিচিত্রতা, বানান রীতি, পত্র রচনা এবং কবিতা, প্রবন্ধ, নাটক, উপন্যাস ও ছোট গল্প।

বিশদ বিবরণী:**১। বাংলা ভাষার প্রয়োগ:**

ভাষার সংজ্ঞা, বাংলা ভাষা রীতি - সাধু, চলিত, আঞ্চলিক বা উপভাষা (সংজ্ঞা, বৈশিষ্ট্য, পার্থক্য ও উদাহরণ)

২। বাংলা বানান রীতি ও শব্দ প্রয়োগ:

- ২.১। বাংলা একডেমির প্রমিত বানান রীতি, ণ-ত্ব ও ষ-ত্ব বিধি
- ২.২। শব্দ ও শব্দের শ্রেণি বিভাগ (সংজ্ঞা, শব্দের গঠন, উৎস বা উৎপত্তি ও অর্থগত)
- ২.৩। বাক্য প্রকরণ ও গঠন রীতি (সংজ্ঞা, বাক্য গঠন এবং প্রকার)

৩। পত্র রচনা অনুশীলন:

- ৩.১। আবেদন পত্র (চাকুরি, ছুটি),
- ৩.২। চাকুরিতে যোগদান পত্র,
- ৩.৩। মানপত্র,
- ৩.৪। স্মারকলিপি,
- ৩.৫। সংবাদপত্রে প্রকাশের জন্য পত্র

৪। কবিতা চর্চা:

- ৪.১। বঙ্গভাষা -মাইকেল মধুসূদন দত্ত
- ৪.২। সোনার তরী - রবীন্দ্র নাথ ঠাকুর
- ৪.৩। উমর ফারুক -কাজী নজরুল ইসলাম
- ৪.৪। বাংলার মুখ আমি- জীবনানন্দ দাশ
- ৪.৫। আসাদের শার্ট - শামসুর রাহমান
- ৪.৬। স্বাধীনতা শব্দটি কি করে আমাদের হলো? - নির্মলেন্দু গুণ

৫। প্রবন্ধ জানা :

- ৫.১। অর্ধাঙ্গী -রোকেয়া সাখাওয়াত হোসেন
- ৫.২। বইকেনা - সৈয়দ মুজতবা আলী

৬। একাঙ্কিকা (নাটিকা):

- ৬.১। মানুষ -মুনীর চৌধুরী

৭। উপন্যাস:

- ৭.১। লালসালু - সৈয়দ ওয়ালী উল্লাহ

৮। ছোট গল্প:

- ৮.১। হৈমন্তী - রবীন্দ্র নাথ ঠাকুর
- ৮.২। একুশের গল্প - জহির রায়হান
- ৮.৩। পাতালেহাসপাতালে - হাসান আজিজুল হক

ব্যবহারিক:

১। নির্ধারিত বক্তৃতা অনুশীলন:

বাংলাদেশ ও বাঙালি সংস্কৃতি, বিভিন্ন জাতীয় দিবস (একুশে ফেব্রুয়ারি ও আন্তর্জাতিক মাতৃভাষা দিবস, স্বাধীনতা দিবস, বিজয় দিবস, জাতীয় শোক দিবস, মুজিব নগর দিবস, মহান মে দিবস)

প্রাতিষ্ঠানিক বক্তৃতা- নবাগত শিক্ষক/ছাত্রছাত্রীদের বরণ, গুরুত্বপূর্ণ ব্যক্তিবর্গের আগমন উপলক্ষে বক্তৃতা।

২. উপস্থিত বক্তৃতায় অংশগ্রহণ: বিষয়বস্তু উন্মুক্ত

৩. আবৃত্তি অনুশীলন : ১. মানুষ

- | | |
|-------------------------------------|----------------------|
| ১. মানুষ | - কাজী নজরুল ইসলাম |
| ২. আকাশ নীলা | - জীবনানন্দ দাশ |
| ৩. পল্লী জননী | - জসীম উদ্দীন |
| ৪. ছাড়পত্র | - সুকান্ত ভট্টাচার্য |
| ৫. তোমাকে পাওয়ার জন্য হে স্বাধীনতা | - শামসুর রাহমান |
| ৬. নিষিদ্ধ সম্পাদকীয় | - হেলাল হাফিজ |

৪. বিতর্ক প্রতিযোগিতা (নমুনা)

সংস্কৃতিই আধুনিক মানুষের ধর্ম

তথ্য প্রযুক্তির অবাধ ব্যবহারই যুব সমাজের অবক্ষয়ের মূল কারণ
গতানুগতিক শিক্ষা নয় কর্মমুখি শিক্ষাই অর্থনৈতিক মুক্তির চাবিকাঠি
চালকের অসাবধানতাই সড়ক দুর্ঘটনার প্রধান কারণ
মুক্তিযুদ্ধের চেতনাই অসাম্প্রদায়িক বাংলাদেশ প্রতিষ্ঠার মূলমন্ত্র
প্রযুক্তির বিকাশই প্রকৃতি বিনাশের একমাত্র কারণ

৫. প্রতিবেদন প্রণয়ন ও উপস্থাপন:

স্থানীয় বিভিন্ন সমস্যা ও অনুসন্ধানী যে কোন বিষয়।

OBJECTIVES:

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

- Reading & listening skills with understanding
- The fluency of speech
- Grammatical accuracy with emphasis on spelling, punctuation and pronunciation
- Creative writing for communication in real life situation
- Integrating reading, listening, writing & speaking skills

DETAIL DESCRIPTION:**Reading Skill:****1. Demonstrate the ability to use reading skill.**

- 1.1 Read the mentioned text and take notes covering the main points, facts from passage read.
- 1.2 Recognize how ideas relate to communicative competence.
- 1.3 Use digital dictionaries to discover pronunciation, spelling, meaning and uses.
- 1.4 Identify main points and summarize the text.

Contexts and Situations- (Seen comprehension : Marks-20)

Unit	Lesson	Title
People Or Institutions Making History (Unit one)	1	Nelson Mandela, from Apartheid Fighter To President
	2	The Unforgettable History
Food Adulteration (Unit Three)	1	Food Adulteration Reaches Height
	2	Eating Habits and Hazards
Human Relationship (Unit Four)	2	Love and Friendship
Environment and Nature (Unit Eight)	1	Water,Water Everywhere
	5	Kuakata: Daughter Of The Sea
Greatest Scientific Achievement (Unit Thirteen)	1	Some Of The Greatest Scientific Achievements Of The Last 50 Years
	2	Science and Technology Against an Age- old Disease
Art and Music (Unit Fourteen)	1	What is Beauty?
	3	Crafts In Our Time
Tours and Travels (Unit Fifteen)	1	Travelling to A village in Bangladesh
	4	The Wonders of Vilayet

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.

Listening Skill:**2. Demonstrate the ability to use listening skill.**

- 2.1 Listen to instructions and follow them.
- 2.2 Take notes from a short talk, story or explanation.
- 2.3 use e-book or reading software to follow the accent and pronunciation of the native speaker.

Speaking Skill:**3. Demonstrate the ability to use speaking skill.**

- 3.1 Ask and answer questions about objects/events/processes.
- 3.2 Ask and answer questions about what they have read, listened and written.
- 3.3 Participate in controlled conversations in various social situations.

Writing Skill:

4. Demonstrate the control of writing skill.

- 4.1 Develop paragraphs from points/outlines
- 4.2 Write guided paragraph about people, places, events and day -to-day life.
- 4.3 Write guided letter and applications.
- 4.4 Describe objects , events, status and process.

Functions:

1. Writing dialogues with teacher, principal, shopkeeper, hotel manager, station master, newcomer, buyers, doctor, friend, colleagues.
2. Writing reports on different events/occasions/accidents.
3. Writing situational personal and official letters
4. Writing job applications with CV/appointment letter/joining letter
5. Writing guided paragraphs with clues

Grammar: Marks-20 (Context & Situations)

(Grammatical items, structures and vocabulary relevant to notions and contexts given bellow will be followed)

1. (a) Uses of Articles.

(b) Uses of Tense (Right forms of verbs with indicators)

(c) Classify verbs (Regular and Irregular verbs, Auxiliary, Principal, finite, non-finite verbs,)

2. Sentence:

(a) Changing Sentences: (Assertive, Interrogative, Optative, Imperative, Exclamatory Simple, Complex and Compound), Comparison of Adjectives/Adverbs

(b) Question making: WH, Yes/No, Tag question

3. Enrich vocabulary: synonyms, Antonyms; suffix and prefix.

4. Voice, Narration

5. Sentence Analysis:

a. Study of part of Speech (Type of verbs-Regular and Irregular verbs, Auxiliary and Principal verb)

b. Study of Phrases and Clauses (noun/adjective/verb/participle/adverbial/prepositional phrases and principal/sub ordinate /co ordinate clauses)

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:
- Denominator having a non-repeated linear factor.
 - Denominator having a repeated linear factor.
 - Denominator having a quadratic factor.
 - 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
- $(0.9998)^2$, correct to six places of decimal.
 - $(1 + \sqrt{2})^5 - (1 - \sqrt{2})^5$

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.
- $\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$.
 - $\cos(A \pm B) = \cos A \cos B \pm \sin A \sin B$.
- 10.3 Deduce formula for $\tan(A \pm B)$, $\cot(A \pm B)$.
- 10.4 Apply the identities to work out the problems:
- Find the value of $\sin 75^\circ$, $\tan 75^\circ$.
 - Show that $\frac{\sin 75^\circ + \sin 15^\circ}{\sin 75^\circ - \sin 15^\circ} = \sqrt{3}$
 - if $\alpha + \beta = \theta$, $\tan \alpha + \tan \beta = b$, $\cot \alpha + \cot \beta = a$,
Show that $(a - b) = ab \cot \theta$.

11 Apply sum and product formula of trigonometrical ratios.

- 11.1 Express sum or difference of two sines and cosines as a product and vice-versa
- 11.2 Solve problems of the Following types:
- Show that, $\sin 55^\circ + \cos 55^\circ = \sqrt{2} \cos 10^\circ$
 - Prove that, $\cos 80^\circ \cos 60^\circ \cos 40^\circ \cos 20^\circ = \frac{1}{16}$

12 Apply the concept of ratios of multiple angles.

- 12.1 State the identities for $\sin 2A$, $\cos 2A$ and $\tan 2A$.
- 12.2 Deduce formula for $\sin 3A$, $\cos 3A$ and $\tan 3A$.
- 12.3 Solve the problems of the following types.
- express $\cos 5\theta$ in terms of $\cos \theta$.
 - if $\tan \alpha = 2 \tan \beta$, show that, $\tan(\alpha + \beta) = \frac{3 \sin 2\alpha}{1 + 3 \cos 2\alpha}$

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

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

13.2 Solve the problems of the type:

find the value of $\cos 3^\circ$, $\cos 6^\circ$, $\cos 9^\circ$, $\cos 18^\circ$, $\cos 36^\circ$ etc.

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 Hunds Rule, Aufbau's principle, Paulis 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 permuted 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 - Morrisson and Boyd.
5. Inorganic Chemistry - Ali Haider

OBJECTIVES:

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

- To make understand Basic concept of food engineering.
- To develop the Basic knowledge of unit operation & unit process.
- To be able to draw the schematic representation of the different food plant equipments.
- To be able to identify food engineering field.
- To be able to understand the unit, dimension, conversion factor and heat transfer in food sector.
- To be able to understand hand tools.
- To be able to understand pipe and pipe fittings.
- To be able to understand mixture and solution.
- To be able to understand food safety, Hazard.

SHORT DESCRIPTIONS:

Food engineering; Composition of food; Unit operation and unit process; Food processing industries; Process symbol, Units and dimension; Conversion factor; Heat transfer; Hand tools; Pipe; Pipe fittings; Food safety; PPE, OSH, Accident, Hazard; Mixture; Solution.

DETAILED DESCRIPTION:**Theory:**

- 1. Understand the general concept of food engineering.**
 - 1.1 Define Food Engineering and Food Technology.
 - 1.2 Responsibility of food engineer.
 - 1.3 Explain the role of food engineers for the development in the country
 - 1.4 State food process industry.
 - 1.5 Make a list of important food process industries in Bangladesh.

- 2. Classification and composition of foods.**
 - 2.1 Define food.
 - 2.2 State the composition of foods.
 - 2.3 Define plant foods and animal foods.
 - 2.4 State classification of plant foods.
 - 2.5 State classification of animal foods.

- 3. Understand the concept of unit operations and unit processes.**
 - 3.1 Define unit operation and unit process.
 - 3.2 Make a list of important unit operations related to the food processing industries.
 - 3.3 Explain the following unit operations;
 - i) Crystallization
 - ii) Pasteurization
 - iii) Filtration
 - iv) Sterilization
 - v) Mixing
 - vi) Size reduction
 - vii) Emulsification
 - viii) Extraction
 - ix) Distillation

x) Homogenization

3.4 Explain the following unit processes;

i) Alkylation

ii) Hydrogenation

iii) Oxidation

iv) Dehydration

v) Nitration

vi) Hydration

vii) Halogenation

viii) Polymerization

4. Understand the process symbols applied to food process industries.

4.1 Define process symbol.

4.2 Explain the process symbols with diagram applied to food process industries.

4.3 Identify instrumental symbol with diagram applied to food process industries.

4.4 Identify the electrical symbols with diagram applied to food process industries.

4.5 Mention the significance of process symbols applied to food process industries.

5. Understand the schematic representation of food plant units and equipment.

5.1 Make a list of important food plants and equipments.

5.2 Draw the schematic representation of following;

i) Spray drier

ii) Rotary drier

iii) Tunnel drier

iv) Liquid extraction unit

v) Open pan evaporator

vi) Multiple effect evaporator

vii) Centrifugal pump

viii) Pneumatic conveyor

ix) Screw conveyor

x) Belt conveyor

xi) Bucket elevators

xii) Shell and tube heat exchangers.

6. Understand units and dimensions.

6.1 Define units and dimensions.

6.2 State the objectives of units and dimensions.

6.3 Units of measurement and dimensions.

6.4 Describe systems of units.

6.5 Explain the dimensional equation.

7. Understand the conversion factor, mass and energy balance.

7.1 Define conversion factor.

7.2 State the objectives of a conversion factor.

7.3 Solve the problems of conversion factors from one unit to another unit (such as mass, volume, pressure, force and energy).

7.4 Define mass and energy balance.

7.5 Application of mass and energy balance in food engineering operations.

7.6 Solve the problems of mass and energy balance.

8. Understand Heat & Heat transfer.

8.1 Define heat and temperature.

8.2 Describe scales of temperature.

- 8.3 Define heat transfer.
- 8.4 State the classification of heat transfer.
- 8.5 Mechanisms of heat transfer.
- 8.6 Explain steady state and unsteady state heat transfer.
- 8.7 Explain thermal processing of foods.
- 8.8 Solve the problems of Heat, Temperature and Heat Transfer.

9. Understand the application of common hand tools used in the food process industries.

- 9.1 Define cutting, striking, holding and measuring tools.
- 9.2 List the cutting, striking, holding and measuring tools commonly used in food process industries.
- 9.3 Mention the function of cutting, striking, holding and measuring tools commonly used in food process industries with diagram.

10. Understand the features of pipes and pipe fittings.

- 10.1 Define pipe and pipe fittings.
- 10.2 List commonly used pipe fittings.
- 10.3 Explain the uses of important pipe fittings.
- 10.4 Design a pipe structure using different types of pipe fittings.
- 10.5 List commonly used pipe fittings symbol with diagram.

11. Understand the basic concept of safety and hazard in the food industry.

- 11.1 Define safety.
- 11.2 Explain safety symbol and color code.
- 11.3 Explain personal protective equipment (PPE), Occupational safety and health (OSH).
- 11.4 Explain the safety procedure and practice in modern food industry.
- 11.5 Explain first aid and first aid box.
- 11.6 Explain accident and hazard.

12. Understand solutions and mixtures

- 12.1 Define solution and mixtures.
- 12.2 Explain solubility.
- 12.3 Describe concentration of solution and mixtures.
- 12.4 Calculations related to solution and mixture.

PRACTICAL:

1. Show skill in drawing the process symbols and diagrams.
2. Show skill in drawing the schematic representation of the following food plants;
 - 2.1 Spray drier
 - 2.2 Rotary drier
 - 2.3 Tunnel drier
 - 2.4 Multiple effect evaporator
 - 2.5 Shell and tube heat exchangers
 - 2.6 Filter press.
3. Practice in solving Stoichiometric dimensions and conversion of units.
4. Practice in solving conversion of temperature from one scale to another.
5. Practice in solving Conversion of pressure from one form of unit to another (such as dyne/cm² to PSI, Nm², cm Hg, ft of water and vice versa).
6. Show skill in physical identification and practical demonstration of the use of hand tools.
7. Show skill in identifying the different pipe fittings and write their uses with diagram.
8. Show skill in making a piping structure by cutting threads and connecting pipe fittings.
9. Practice solving concentration of solution (such as mass%; mole%; molality; normality.)

REFERENCE BOOKS:

1. Fundamentals of food process engineering. By Romeo T. Toledo.
2. Introduction to Food Engineering By R.P. Singh & D.R. Heldman
3. Unit operation in food processing. By R.L. Earle with M.D. Earle
(www.nzifst.org.nz/unitoperation/index)
4. Food Science. By N.N Potter.
5. Unit Operations. By K.M. Sahay and K.K Singh.
6. An Introduction to Chemical Engineering By C.E Little John.
7. Basic Stoichiometry By BTEB.
8. Introduction to Food Engineering By R.P. Singh & D.R. Heldman

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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 workpiece 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 workpiece 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 workpiece 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 workpiece 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 |