BANGLADESH TECHNICAL EDUCATION BOARD

Agargaon, Dhaka-1207.

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

GRAPHIC DESIGN TECHNOLOGY
TECHNOLOGY CODE: 696

FIRST SEMESTER

DIPLOMA IN ENGINEERING
PROBIDHAN-2016

Graphics Technology   1st Semester

Sl. No	Subject Code	Name of the subject	T	P	C	Marks				Total
						Theory		Practical		
						Cont. assess	Final exam	Cont. assess	Final exam	
1	61011	Engineering Drawing	0	6	2	0	0	50	50	100
2	65811	Social Science	3	0	3	60	90	0	0	150
3	65812	Physical Education & Life Skill Development	0	3	1	0	0	25	25	50
4	65911	Mathematics -1	3	3	4	60	90	50	0	200
5	65913	Chemistry	3	3	4	60	90	25	25	200
6	66612	Computer Laboratory Practices	0	6	2	0	0	50	50	100
7	69611	Basic Graphic Design	2	3	3	40	60	25	25	150
		Total	11	24	19	220	330	225	175	950

ENGINEERING DRAWING (61011)

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:

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 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.

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

SOCIAL SCIENCE (65811)

T	P	C
3	0	3

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. 3Discuss 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 ক্ষমতালাভ 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-আস্তোনভা, প্রি, কতোভভক্তি, "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।

PHYSICAL EDUCATION & LIFE SKILL DEVELOPMENT (65812)

T	P	C
0	3	1

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 Muktasan, Ustrasan.
    3.3 Prana and Pranayama: Nadisuddhi Pranayma, 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 Complet 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

MATHEMATICS-1 (65911)

T	P	C
3	3	4

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) $\dfrac{1}{\sqrt{4.08}}$

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 ± B) = sin A cos B ± cos A sin B.
   ii) cos (A ± B) = cosA cosB ± sinAsinB.

10.3 Deduce formula for tan (A ± B), Cot (A ± B).

10.4 Apply the identities to work out the problems:
   i) Find the value of sin 750, tan 750.

   ii) Show that $\dfrac{\sin75° + \sin15°}{\sin75° - \sin15°} = \sqrt{3}$

   iii) if $\alpha + \beta = \theta$, $\tan\alpha + \tan \beta = b$, $\cot \alpha + \cot \beta = a$,
       Show that (a − b) = ab cot θ .

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, $\sin55° + \cos55° = \sqrt{2} \cos10°$

   ii) Prove that, $\cos80° \cos60° \cos40° \cos20° = \dfrac{1}{16}$

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 5θ in terms of cos θ.

ii) if tan α = 2 tan β, show that, tan (α + β) = $\dfrac{3 \sin 2\alpha}{1 + 3 \cos 2\alpha}$

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

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

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	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

CHEMISTRY (65913)

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.

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 exclusives: 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, led, Ammonium and Zinc salt.)

3.2 Identify unknown basic radical (e.g. led, 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 Boyad.
5. Inorganic Chemistry   - Ali Haider

Computer Laboratory Practices (66612)

T	P	C
0	6	2

OBJECTIVES

SHORT DESCRIPTION

DETAIL DESCRIPTION

1. Operate a personal Computer
   1.1 Start up a Computer
      1.1.1 *Peripherals* are checked and connected with system unit.
      1.1.2 Power cords / adapter are connected properly with computer and power outlets socket.
      1.1.3 Computer is switched on gently.
      1.1.4 PC *desktop / GUI settings* are arranged and customized as per requirement.
   1.2 Operate Computer
      1.2.1 Files and folders are created.
      1.2.2 Files and folders are *manipulated* as per requirement.
      1.2.3 Properties of files and folders are viewed and searched.
      1.2.4 Control panel settings are practiced.
      1.2.5 *Memory devices* are formatted as per requirement.
   1.3 Shutdown computer
      1.3.1 Unsaved file and folders are closed
      1.3.2 Open software is closed and hardware devices are switched off.
      1.3.3 Computer is switched off gently.
      1.3.4 Power at the respective power outlets is switched off.

2. Type text and documents in English and Bangla.
   2.1 Install the Typing Tutor software
      2.1.1 Required *Hardware* and *software* are ready to use.
      2.1.2 Typing tutor software are collected and selected.
      2.1.3 English Typing tutor software is installed.
      2.1.4 Specialized Bangla Typing tutor software is installed.
   2.2 Practice text typing in English and Bangla
      2.2.1 Typing tutor software is started.
      2.2.2 English Home key drilling are practiced systematically
      2.2.3 Intermediate level typing speed(25 cps) are achieved.
      2.2.4 Specialized Bangla Typing tutor / software are installed.
      2.2.5 Bangla Home key typing are practiced systematically.
      2.2.6 Text documents are typed repeatedly for increasing typing speed.
   2.3 Type documents
      2.3.1 *Word processor* is started.
      2.3.2 Text document are typed.
      2.3.3 Intermediate level typing speed (30 cps) in English and (20 cps) in Bangla are achieved.

3. Operate Word Processing Application
   3.1 Create documents:
      3.1.1 Word-processing application are opened.
      3.1.2 *Documents* are created.
      3.1.3 Data are added according to information requirements.
      3.1.4 Document templates Used as required.
      3.1.5 Formatting tools are used when creating the document.
      3.1.6 Documents are saved to directory.

3.2 Customize basic settings to meet page layout conventions:

3.2.1   Adjust page layout to meet information requirements

3.2.2   Open and view different toolbars.

3.2.3   Change *font format* to suit the purpose of the document.

3.2.4   Change alignment and line spacing according to document information requirements.

3.2.5   Modify margins to suit the purpose of the document.

3.2.6   Open and switch between several documents.

3.3 Format documents

3.3.1   Use formatting features and styles as required.

3.3.2   Highlight and copy text from another area in the document or from another active document.

3.3.3   Insert headers and footers to incorporate necessary data.

3.3.4   Save document in another *file format.*

3.3.5   Save and close document to *a storage device.*

3.4 Create tables:

3.4.1   Insert standard table into document.

3.4.2   Change cells to meet information requirements.

3.4.3   Insert and delete columns and rows as necessary.

3.4.4   Use formatting tools according to style requirements.

3.5 Add images:

3.5.1   Insert appropriate *images* into document and customize as necessary.

3.5.2   Position and resize images to meet document formatting needs.

3.6 Print information and Shutdown computer:

3.6.1   Printer is connected with computer and power outlet properly.

3.6.2   Power is switched on at both the power outlet and printer.

3.6.3   Printer is installed and added.

3.6.4   Correct printer settings are selected and document is printed.

3.6.5   Print from the printer spool is viewed or cancelled.

3.6.6   Unsaved data is saved as per requirements.

3.6.7   Open software is closed and computer hardware devices are shut downed.

3.6.8   Power at the respective power outlets is switched off.

4.   Operate Spreadsheet application

4.1 Create spreadsheets

4.1.1   Open spreadsheet application,

4.1.2   Create spreadsheet files and enter numbers, text and symbols into cells according to information requirements.

4.1.3   Enter *simple formulas and functions* using cell referencing where required.

4.1.4   Correct formulas when error messages occur.

4.1.5   Use a range of common tools during spreadsheet development.

4.1.6   Edit columns and rows within the spreadsheet.

4.1.7   Use the auto-fill function to increment data where required.

4.1.8   Save spreadsheet to directory or folder.

4.2 Customize basic settings:

4.2.1   Adjust page layout to meet user requirements or special needs.

4.2.2   Open and view different toolbars.

4.2.3   Change font settings so that they are appropriate for the purpose of the document.

4.2.4   Change *alignment* options and line spacing according to spreadsheet *formatting features.*

4.2.5   *Format* cell to display different styles as required.

4.2.6   Modify margin sizes to suit the purpose of the spreadsheets.

4.2.7   View multiple spreadsheets concurrently.

4.3 Format spreadsheet:

4.3.1   Use formatting features as required.

4.3.2   Copy selected formatting features from another cell in the spreadsheet or from another active spreadsheet.

4.3.3 Use *formatting tools* as required within the spreadsheet.

4.3.4 Align information in a selected cell as required.

4.3.5 Insert headers and footers using formatting features.

4.3.6 Save spreadsheet in another format.

4.3.7 Save and close spreadsheet to *storage device.*

4.4 Incorporate object and chart in spreadsheet:

4.4.1 Import an object into an active spreadsheet.

4.4.2 Manipulate imported *object* by using formatting features.

4.4.3 Create a chart using selected data in the spreadsheet.

4.4.4 Display selected data in a different chart.

4.4.5 Modify chart using formatting features.

4.5 Create worksheets and charts

4.5.1 Worksheets are created as pre-requirement.

4.5.2 Data are entered.

4.5.3 *Functions* are used for calculating and editing logical operation.

4.5.4 *Sheets* are formatted as per requirement.

4.5.5 *Charts* are created.

4.5.6 Charts/ Sheets are previewed.

4.6 Print spreadsheet:

4.6.1 Preview spreadsheet in print preview mode.

4.6.2 Select basic printer options.

4.6.3 Print spreadsheet or selected part of spreadsheet.

4.6.4 Submit the spreadsheet to *appropriate person* for approval or feedback.

5. Operate Presentation Package:

5.1 Create presentations:

5.1.1 Open a presentation package application and create a simple design for a presentation according to organizational requirements.

5.1.2 Open a blank presentation and add text and graphics.

5.1.3 Apply existing styles within a presentation.

5.1.4 Use presentation template and slides to create a presentation.

5.1.5 Use various *Illustrations* and *effects* in presentation.

5.1.6 Save presentation to correct directory.

5.2 Customize basic settings:

5.2.1 Adjust display to meet user requirements.

5.2.2 Open and view different *toolbars* to view options.

5.2.3 Ensure *font settings* are appropriate for the purpose of the presentation.

5.2.4 View multiple slides at once.

5.3 Format presentation:

5.3.1 Use and incorporate organizational charts, bulleted lists and modify as required.

5.3.2 Add *objects* and manipulate to meet presentation purposes.

5.3.3 Import *objects* and modify for presentation purposes.

5.3.4 Modify slide layout, including text and colors to meet presentation requirements.

5.3.5 Use *formatting tools* as required within the presentation.

5.3.6 Duplicate slides within and/or across a presentation.

5.3.7 Reorder the sequence of slides and/or delete slides for presentation purposes.

5.3.8 Save presentation in another *format.*

5.3.9 Save and close presentation to disk.

5.4 Add slide show effects:

5.4.1 Incorporate preset animation and multimedia effects into presentation as required to enhance the presentation.

5.4.2 Add slide transition effects to presentation to ensure smooth progression though the presentation.

5.4.3 Test presentation for overall impact.

5.4.4 Use onscreen navigation tools to start and stop slide show or move between different slides as required.

5.5 Print presentation and notes:

5.5.1   Select appropriate print format for presentation.

5.5.2   Select preferred slide orientation.

5.5.3   Add notes and slide numbers.

5.5.4   Preview slides and spell check before presentation.

5.5.5   Print the selected slides and submit presentation to appropriate person for feedback.

6. **Access Information using Internet and electronic mail.**

   6.1   Access resources from internet.

   6.1.1   Appropriate internet *browsers* are selected and installed.

   6.1.2   Internet browser is opened and web address / URL is written/selected in /from address bar to access information*.*

   6.1.3   *Search engines* are used to access information.

   6.1.4   Video / Information are Shared/downloaded/uploaded from/to web site/*social media.*

   6.1.5   *Web based resources* are used.

   6.1.6   Netiquette' (or web etiquette) principles are searched and followed.

   6.2 Use and manage Electronic mail

   6.2.1   *Email services* are identified and selected to create a new email address.

   6.2.2   Email account is created.

   6.2.3   Document is prepared, attached and sent to different types of recipient.

   6.2.4   Email is read, forwarded, replied and deleted as per requirement.

   6.2.5   Custom email folders are created and *manipulated.*

   6.2.6 Email message is printed.

BASIC GRAPHIC DESIGN (69611)

T	P	C
2	3	3

AIMS:

- To be able to acquire knowledge and skill in basic graphic design.
- To be able to develop knowledge and skill in basic elements of graphic design.
- To be able to acquire skill and knowledge in Printing Process, color and design technique.

SHORT DESCRIPTION:

History of graphic design; Graphic Design fundamental; Line, Shapes and Space; Proportion; Drawing technique; Texture; Light & color; Typography; Printing Processes.

DETAIL DESCRIPTION:

Theory

1 Understand history of graphic design.

 1.1 Describe history of graphic design.

 1.2 Discuss symbol terms.

 1.3 Explain the calligraphy.

 1.4 Describe rock & cave art.

2 Understand Fundamental of Graphic Design.

 2.1 Define Graphic Design

 2.2 Describe the element of Graphic Design

 2.3 Discuss Innovation on Design

 2.4 Discuss the type harmony.

 2.5 Discuss touch type fingering.

3 Understand Quality of line

 3.1 Define line for graphic Design

 3.2 Describe types of line

 3.3 Explain meaning of different types of line

 3.4 Distinguish thick and thin lines

 3.5 Describe Codes of pencils

 3.6 Explain how line work for Design

4 Understand Shape & Space

 4.1 Define Shape & Space

 4.2 Explain Shapes meaning with relation to symbol

 4.3 Describe various type of shape

 4.4 Discuss various type of space

 4.5 Describe space & Proportion

5 Understand Drawing Technique

 5.1 Define Drawing

 5.2 Discuss grids relation of Graphic Design

 5.3 Describe Type of drawing using Viewer

 5.4 Define Perspectives

6 Understand the Texture

    6.1   Define Texture

    6.2   Describe the types of natural Texture

    6.3   Describe man made Texture

    6.4   Describe Application of Texture

7 Understand Light & Color

    7.1   Define light & color

    7.2   Define source of color

    7.3   Discuss additive & subtractive color

    7.4   Describe color properties.

    7.5   Describe color swatch.

8 Understand Typography

    8.1   Define typography.

    8.2   Describe component of type.

    8.3   Discuss attribute of type.

    8.4   Describe uses of type.

    8.5   Discuss alignment of type.

9 Understand basic Printing.

    9.1   Define Printing.

    9.2   Describe different type of Printing.

    9.3   Describe different type of Image carrier

    9.4   Discuss Printing Materials

    9.5   Distinguish between various printing Processes.

PRACTICAL

1. Draw various type of line using pen & pencil
2. Draw Various types of shapes using line
3. Draw Various freehand drawing using grids
4. Create texture & pattern using pen & pencil
5. Draw Various Type Faces
6. Draw Color Gradient Using Basic color
7. Draw Color Mixing using Circle
8. Draw National flag using appropriate color & Proportion
9. Make a complete Book cover Design,
10. Draw Various Image Carriers.