# BANGLADESH TECHNICAL EDUCATION BOARD

Agargaon, Dhaka-1207.

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

## COMPUTER TECHNOLOGY

**TECHNOLOGY CODE: 666**

FIRST SEMESTER

# DIPLOMA IN ENGINEERING
# PROBIDHAN-2016

## Computer 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 | 65711 | Bangla | 3 | 3 | 4 | 60 | 90 | 50 | - | 200 |
| 2 | 65712 | English | 2 | 0 | 2 | 40 | 60 | - | - | 100 |
| 3 | 65812 | Physical Education & Life Skill Development | 0 | 3 | 1 | - | - | 25 | 25 | 50 |
| 4 | 65911 | Mathematics-I | 3 | 3 | 4 | 60 | 90 | 50 | - | 200 |
| 5 | 65912 | Physics-I | 3 | 3 | 4 | 60 | 90 | 25 | 25 | 200 |
| 6 | 66611 | Computer Application | 0 | 6 | 2 | - | - | 50 | 50 | 100 |
| 7 | 66712 | Electrical Engineering Fundamentals | 3 | 3 | 4 | 60 | 90 | 25 | 25 | 200 |
| **Total** | | | **14** | **21** | **21** | **280** | **420** | **225** | **125** | **1050** |

**65711** **BANGLA**

| T | P | C |
|---|---|---|
| 3 | 3 | 4 |

**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

**ব্যবহারিকঃ**

**১। নির্ধারিত বক্তৃতা অনুশীলনঃ**

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 - 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 প্রতিযোগীতা (নমুনা)**

সংস্কৃতিই আধুনিক মানুষের ধর্ম
তথ্য প্রযুক্তির অবাধ ব্যবহারই যুব সমাজেরঅবক্ষয়ের মূল কারণ
গতানুগতিক শিক্ষা নয় কর্মমুখি শিক্ষাই অর্থনৈতিক মুক্তির চাবিকাঠি
চালকের অসাবধনতাই সড়ক দুর্ঘটনার প্রধান কারণ
মুক্তিযুদ্ধের চেতনাই অসাম্প্রদায়িক বাংলাদেশ প্রতিষ্ঠার মূলমন্ত্র
প্রযুক্তির বিকাশই প্রকৃতি বিনাশের একমাত্র কারণ

**৫. প্রতিবেদন প্রণয়ন ও উপস্থাপনঃ**

স্থানীয় বিভিন্ন সমস্যা ও অনুসন্ধানী যে কোন বিষয়।

**65712** **ENGLISH** **T P C**
**2 0 2**

## 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. <u>Sentence Analysis:</u>**

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)

| 65812 | PHYSICAL EDUCATION & LIFE SKILL DEVELOPMENT | 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

## 65911 MATHEMATICS-1

| 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) $\frac{1}{\sqrt{4.08}}$

**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 $\sin 750$, $\tan 750$.

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 α, cos α and tan α in terms of $\frac{\alpha}{2}$ and $\frac{\alpha}{3}$

13.2 Solve the problems of the type:
find the value of cos 3°, cos 6°, cos 9°, cos 18°, cos 36° etc.

## REFERENCE:


| SL No | 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 |

| 65912 | PHYSICS-I | T | P | C |
|---|---|---|---|---|
| | | 3 | 3 | 4 |

## OBJECTIVES:

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

## SHORT DESCRIPTION:

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

## DETAIL DESCRIPTION:

## Theory:

**1. Understand Physical World and Measurement.**

1.1. Nature of Physical World.
1.2. Scope and Excitement of Physics.
1.3. Few Terms about Physics.
1.4. Physics and other world of Technological Knowledge.
1.5. Principle of Measurement.
1.6. Fundamental and Derived Quantities and Units.
1.7. Dimensions of Units.
1.8. Errors in Measurement.

**2. Understand scalar and vector quantities.**

2.1. Define vector and scalar quantities with examples.
2.2. Show the various representations of the vector quantities; and representation of a vector by unit vector.
2.3. Find and explain the resultant of two vectors in different directions.
2.4. Resolve a vector into horizontal & vertical component.
2.5. Explain the dot and cross product of two vectors.
2.6. Define laws of triangle of vector.

**3. Understand Motion and equations of motion**

3.1. Define rest and motion
3.2. Classify and explain of motion.
3.3. Define and explain displacement, speed, velocity, acceleration and retardation.
3.4. Deduce the relationship between displacement, velocity, acceleration and retardation from these definitions.
3.5. Show motion of a projectile.
3.6. Equation of motion of a freely moving body thrown obliquely vertically upward or motion of a projectile.
3.7. Define angular velocity and linear velocity with their units.
3.8. Deduce the relation between angular velocity and linear velocity.
3.9. Define centripetal and centrifugal force with examples.
3.10 Prove that centrifugal force = $\frac{mv^2}{r}$
3.11 State and explain the laws of falling bodies and mention the equation of motion of a body when it is projected vertically upwards or downwards.

**4. Understand Newton's laws of motion, force and friction.**

4.1. Define force.
4.2. State Newton's laws of motion.
4.3. Define different units of force and their correlation and also mention the dimension of force.
4.4. Prove P=mf, from Newton's 2nd law of motion.
4.5. Find out the resultant of parallel forces.
4.6. Define inertia and momentum
4.7. State and prove the principles of conservation of momentum.
4.8. Define friction and describe the different kinds of friction.
4.9. Define the co-efficient of static friction.
4.10. Show that the co-efficient of static friction is equal to the tangent of the angle of repose
4.11. State the merits and demerits of friction.

**5. Understand Gravity and gravitation.**

5.1. Define and explain the Kepler's Law.
5.2. Define gravity and gravitation.
5.3. Define and determine the gravitational constant (G) and also mention its units and dimension.
5.4. Define acceleration due to gravity 'g' and also mention its units and dimension.
5.5. Discuss the variation of 'g' at different places.
5.6. Define mass and weight with their units and dimension.
5.7. Distinguish between mass and weight.
5.8. Define and explain gravitational potential and escape velocity

**6. Understand Simple Harmonic Motion (SHM)**

6.1. Define Periodic and simple harmonic motion (SHM).
6.2. State the characteristics of SHM.
6.3. Describe a simple pendulum and a second pendulum.
6.4. Define effective length, amplitude, phase, complete oscillation, period of oscillation, frequency.
6.5. State and explain the laws of simple pendulum.
6.6. Explain the motion of a simple pendulum and determine its time period.

**7. Understand Work, Power and Energy.**

7.1. Define work, power and energy.
7.2. State the units and dimensions of work, power and energy.
7.3. State and prove the principle of the conservation of energy.
7.4. Define potential energy (PE) and kinetic energy (KE).
7.5. Derive the equation of potential and kinetic energy.
7.6. Recognize that the useful work can be found from:

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

**8. Understand Elasticity.**

8.1. Name some of the general and special properties of matter.
8.2. Define Elasticity and Elastic limit.
8.3. Define perfectly elastic body and perfectly rigid body.
8.4. Define stress and strain with their units and dimensions.
8.5. State and explain the Hook's law.
8.6. Describe various kinds of modulus of elasticity.
8.7. Mention the units and dimensions of modulus of elasticity.
8.8. Define and explain Poisson's ratio.

**9. Understand Hydrostatics.**

9.1. Define pressure as force per unit area and state that it is measured in N/m2 or Pascal.
9.2. State characteristics of liquid pressure.
9.3. Establish the pressure at a point in a fluid depend upon the density of the fluid, the depth in the fluid and acceleration due to gravity.
9.4. State surface tension and surface energy, Angle of contact.
9.5. Define capillarity and theory of capillarity.
9.6. Explain viscosity and co-efficient of viscosity.
9.7. Mention the necessity of viscosity.

**10. Understand Wave and sound.**

10.1. Define wave and wave motion.
10.2. Differentiate transverse wave and longitudinal wave.
10.3. Define some terms relating waves.
10.4. Compare progressive wave and stationary waves.
10.5. Mention equation of progressive wave.
10.6. Define sound and production of sound.
10.7. Explain sound is a longitudinal traveling wave.
10.8. Interference of sound: Constructive and Destructive interference.
10.9. Define beats and Mechanism of formation of beats.

**11. Understand Sound and velocity of sound.**

11.1. Identify that sound is produced by vibration and travels through a medium as a longitudinal wave.
11.2. Recognize that sound can be produced of different pitches (frequencies) & that the human ear has an audible frequency range covering approximately 20 Hz to 20 KHz.
11.3. State the approximate frequency range for
11.4. Define Infrasonic sound and Ultrasonic (supersonic) sound.
11.5. Explain how sound is absorbed, reflected & refracted by different types of surface.
11.6. Describe the practical uses of echo sounding devices.
11.7. Define velocity of sound.
11.8. State the velocity of sound at NTP in still air.
11.9. Compare the effects of pressure, temperature & humidity on the velocity of sound in air.

## PRACTICAL:

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

## REFERENCE BOOKS:


1. Higher Secondary Physics - First Part - Dr. Shahjahan Tapan
2. A Text Book of Properties of matter - N Subrahmanyam and Brij Lal
3. A Text Book of Sound - N Subrahmanyam and Brij Lal
4. Higher Secondary Physics- First Part - Prof. Golam Hossain Pramanik
5. Higher Secondary Physics- First Part - Ishak Nurfungnabi

| 66611 | COMPUTER APPLICATION | 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 WPM) 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 WPM) in English and ( 20 WPM) 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 Different Tab 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.

Reference:

It is recommended to follow the Competency standard of Computer Operation NTVQF Level 1.

http://www.btebcbt.gov.bd/utility/searchUser?sector=8&occupation=76&level=&btnSearch=Search

## 66712 ELECTRICAL ENGINEERING FUNDAMENTALS

| T | P | C |
|---|---|---|
| 3 | 3 | 4 |

### OBJECTIVES:

- To familiarize the basic electrical quantities & laws and to apply them in solving problems of electrical circuits.
- To acquaint with electromagnetism, electromagnetic induction.
- To develop skill in electrical wiring.
- To familiarize with DC generator, AC generator, AC motor, DC Motor & Transformers.
- To appreciate the safety measures to be taken for electrical wiring.

### SHORT DESCRIPTION:

Electric current, Voltage & Resistance; Conductors and insulators; Ohm's law; Kirchhoff's Law; Joule's law; Faraday's law; Basic electrical circuits; Power and energy; Electromagnetic induction; House wiring; Controlling devices; Protective devices; Earthling; DC Motor, AC Motor, DC Generator; AC Generator; Transformer & Electricity Act/Rule.

### DETAIL DESCRIPTION:

### Theory:

**1. Understand electricity and its nature.**

1.1 State the meaning of electricity.
1.2 Describe the structure of atom.
1.3 Define current, voltage and resistance.
1.4 State the units of current, voltage and resistance.

**2 . Understand conductor semiconductor & insulator.**

2.1 Define conductor, semiconductor and insulator.
2.2 Explain the conductor, semiconductor and insulator according to electron theory.
2.3 List at least 5 conductors, 5 semiconductor and 5 insulators.
2.4 Describe the factors upon which the resistance of a conductor depends.
2.5 State laws of resistance.
2.6 Prove the relation $R=\rho L/A$
2.7 Explain the meaning of resistivity and name the unit of resistivity.
2.8 Solve problems relating to laws of resistance.

**3 . Understand Ohm's Law.**

3.1 State Ohm's law.
3.2 Deduce the relation between energy current, voltage and resistance.
3.3 Solve problems relating to Ohm's law.

**4. Understand** Kirchhoff's Law**.**

4.1 State Kirchhoff's current law.
4.2 Explain the Kirchhoff's current law.
4.3 Sate Kirchhoff's Voltage law.
4.4 Explain the Kirchhoff's Voltage law.
4.5 Solve problem by Kirchhoff's Law

**5. Understand electric circuit.**

5.1 Define electric circuit.
5.2 Name the different types of electric circuits.
5.3 Define series circuit, parallel circuit and mixed circuit.
5.4 Describe the characteristics of series circuit and parallel circuit.
5.5 Calculate the equivalent resistance of series circuit, parallel circuit.
5.6 Solve problems relating to DC series circuit, parallel circuit and mixed circuit.
5.7 Define inductor, capacitor, inductive reactance & capacitive reactance.
5.8 Write the formula of inductive reactance, capacitive reactance & impedance.
5.9 Draw the AC circuit containing Resistor, Inductor and Capacitor in Series and parallel circuit.
5.10 Problem on AC series & parallel circuit.

**6. Apply the concept of electrical power and energy.**

6.1 Define electrical power and energy.

6.2 State the unit of electrical power and energy.

6.3 Show the relation between electrical power and energy.

6.4 Name the instruments for measuring electrical power and energy.

6.5 Draw the connection diagram of wattmeter and energy meter in an electrical circuit.

6.6 Solve problems relating to electrical power and energy calculation.

**7. Understand the principles of Joule's law.**

7.1 Explain Joule's law regarding the development of heat in electrical circuit.

7.2 Describe meaning of "J".

7.3 Solve problems relating to Joule's law.

**8. Understand the Faraday's laws of Electromagnetic Inductions**

8.1 Define Electromagnetic Inductions.

8.2 Explain Faraday's laws of Electromagnetic Induction.

8.3 Solve problems on Electromagnetic Induction.

**9. Understand the uses of wires and cables.**

9.1 Define electrical wires and cables.

9.2 Distinguish between wires and cables.

9.3 Describe the procedure of measuring the size of wires and cables by wire gauge.

**10. Understand the different methods of house wiring.**

10.1 State the meaning of wiring.

10.2 List the types of wiring.

10.3 State the types of wiring used in:

a) Residential building.

b) Workshop

c) Cinema hall/Auditorium

d) Temporary shed

10.4 List the name of fittings used in different types of electrical wiring.

**11. Understand the controlling and protective devices & use of those.**

11.1 Define controlling device.

11.2 Name the different types of controlling device.

11.3 Define protective device.

11.4 Name the different types of protective device.

11.5 Name the different types of fuses used in house wiring.

11.6 Name the different types of circuit breaker used in house wiring.

**12. Understand the necessity of earthing.**

12.1 Define earthing.

12.2 Explain necessity of earthing.

12.3 Name different types of earthing.

**13. Understand the principle of operation of transformer.**

13.1 Define transformer.

13.2 Explain the working principle of transformer.

13.3 Write the equation relating to voltage, current & turns of primary & secondary winding of transformer.

13.4 Name the different losses of transformer.

13.5 Define transformation ratio (voltage, current and turns).

13.6 Solve problems on transformation ratio.

**14. Understand the principle of DC generator.**

14.1 Define DC generator.
14.2 Classify DC generator.
14.3 Explain the constructional features of DC generator.
14.4 Explain the working principle of DC generator.
14.5 Name the different losses of DC generator.

**15. Understand the principle of AC generator.**

15.1 Define AC generator.
15.2 Explain the constructional features of AC generator.
15.3 Explain the working principle of AC generator.
15.4 Name the different losses of AC generator.

**16. Understand the principle of DC motor.**

16.1 Define DC motor.
16.2 Classify DC motor.
16.3 Name the different parts of DC motor.
16.4 Explain the working principle of DC motor.
16.5 Name the different losses of DC motor.
16.6 List the uses of different types of DC motor.

**17. Understand the principle of Induction motor.**

17.1 Define Induction motor.
17.2 Classify Induction motor.
17.3 Describe the principles of operation of capacitor motor.
17.4 List the uses of induction motor.

**18. Understand act/rule of Bangladesh and safety practices.**

18.1 Sate electricity act/rule of Bangladesh to be followed in electrical wiring.
18.2 Describe the importance of electricity act/rule.
18.3 Describe safety procedure against electricity hazard.
18.4 List the performance of safety practices for electrical equipment, machines and accessories.

## PRACTICAL:

**1. Identify and use electrical measuring instruments.**

1.1 Identify voltmeters, ammeters, clip-on meter, frequency meter, wattmeter, energy meter and AVO meter.
1.2 Select & read the scale of given meters.
1.3 Connect correctly voltmeter, ammeter, wattmeter and energy meter to a given circuit.

**2. Show skill in verification of Ohm's Law.**

2.1 Sketch the circuit diagram for the verification of Ohm's Law.
2.2 List tools, equipment and materials required for the experiment.
2.3 Prepare the circuit according to the circuit diagram using proper equipment.
2.4 Check all connections before the circuit is energized.
2.5 Verify the law by collecting relevant data.

**3. Show skill in verification of Kirchhoff's Law.**

3.1 Sketch the circuit diagram for the verification of Kirchhoff's Law.
3.2 List tools, equipment and materials required for the experiment.
3.3 Prepare the circuit according to the circuit diagram using proper equipment.
3.4 Check all connections before the circuit is energized.
3.5 Verify the laws by collecting relevant data.

**4. Verify the characteristics of series and parallel circuits.**

4.1 Draw the working circuit diagram.

4.2 List tools, equipment and materials required for the experiment.

4.3 Prepare the circuit according to the circuit diagram using proper equipment.

4.4 Check all connections before the circuit is energized.

4.5 Record data and verify that in a series circuit total voltage and resistance is equal to the summation of individual voltage and resistance respectively but total current is equal to the individual current.

4.6 Record data and verify that for a parallel circuit supply voltage is equal to the branch voltage, supply current is equal to summation of branch currents.

**5. Show skill in measuring the power of an electric circuit.**

5.1 Sketch the necessary circuit diagram of an electrical circuit with electrical load, ammeter, voltmeter and wattmeter.

5.2 Prepare the circuit according to the circuit diagram using ammeter, voltmeter and wattmeter.

5.3 Record the power, measured by the wattmeter and verify the reading with that of calculated from ammeter and voltmeter.

5.4 Compare the measured data with that of calculated and rated power.

**6. Show skill in measuring the energy consumed in an electrical circuit.**

6.1 Sketch the necessary diagram of an electric circuit wattmeter, energy meter and electrical load.

6.2 Prepare the circuit according to the circuit diagram using wattmeter and energy meter.

6.3 Record the energy measured by the energy meter and verify with that of calculated from wattmeter for a fixed time.

**7. Show skill in using of hand tools, wires and cables.**

7.1 List the hand tools used in electrical wiring.

7.2 Identify the hand tools used in electrical wiring.

7.3 Draw neat sketches of hand tools used in electrical wiring.

7.4 Identify different types of wires and cables.

7.5 Measure the diameter of the identified wire and cables using standard wire gauge.

**8. Show skill in preparing wiring circuit of two lamps controlled from two points separately.**

8.1 Sketch a working circuit of two lamps controlled from two points separately.

8.2 Make the wiring circuit using required materials and equipment on a wiring board.

8.3 Test the connection of circuit by providing proper supply.

**9. Show skill in preparing wiring circuit of one lamp controlled from two points.**

9.1 Sketch a working diagram of one lamp controlled by two SPD tumbler Switches.

9.2 Complete the wiring circuit using required materials and equipment on wiring board.

9.3 Test the connection of circuit by providing proper supply.

**10. Show skill in preparing wiring circuit of one bell with two indicating lamp controlled from two points.**

10.1 Sketch a working diagram of one bell with two indicating lamps controlled by two push button switch.

13.2 Make the wiring circuit using required materials and equipment on wiring board.

13.3 Test the connection of circuit by providing proper supply.

**11. Show skill in preparing wiring circuit of a fluorescent tube light.**

11.1 Sketch a working diagram of a fluorescent tube light circuit.

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

11.3 Test the connection of the circuit by providing supply.

**12. Find the transformation ratio of a transformer.**

12.1 Develop a circuit to perform the experiment.

12.2 Select required equipment and materials.

12.3 Connect the components according to the circuit diagram.

12.4 Check the connections.

12.5 Record the primary (EP) and secondary (ES) voltages.

12.6 Calculate the transformation ratio using the relation

$$\frac{E_S}{E_P} = \frac{N_S}{N_P} = K$$

12.7 Note down the observations.

**13. Disassemble and re-assemble the parts of a DC generator/ DC motor.**

13.1 Select the necessary tools required for disassembling and re-assembling the parts of DC generator/ DC motor.

13.2 Identify at least ten main parts of the generator/motor.

13.3 Sketch at least ten main parts of the generator/motor.

13.4 Re-assemble the parts of the generator/motor.

13.5 Connect the generator/motor to the proper power source.

13.6 Start the generator/motor.

**14. Start a 1-phase capacitor type motor/ceiling fan with regulator.**

14.1 Select the equipment and tools required for the experiment.

14.2 Sketch a working diagram.

14.3 Identify the two sets of coils.

14.4 Connect the capacitor with the proper set of coil.

14.5 Connect power supply to the fan motor.

14.6 Test the rotation of the motor in opposite direction by changing the capacitor connection.

14.7 Note down the observations.

## REFERENCE BOOKS:


1 A Text Book of Electrical Technology - B. L. Theraja

2 Basic Electricity - Charles W Ryan

3 Basic Electrical Theory and Practice - E. B. Babler

4 Electrical Machine - Siskind