BANGLADESH TECHNICAL EDUCATION BOARD

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

POWER TECHNOLOGY

TECHNOLOGY CODE: 71

SYLLABUS
(PROBIDHAN-2016)

FIRST SEMESTER

DIPLOMA IN ENGINEERING
PROBIDHAN-2016

Power 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	67111	Power Engineering Fundamentals	3	3	4	60	90	25	25	200
2	61011	Engineering Drawing	0	6	2	0	0	50	50	100
3	65711	Bangla	3	3	4	60	90	50	0	200
4	65712	English	2	0	2	40	60	0	0	100
5	65911	Mathematics-1	3	3	4	60	90	50	0	200
6	65912	Physics-1	3	3	4	60	90	25	25	200
	Total		14	18	20	280	420	200	100	1000

POWER ENGINEERING FUNDAMENTALS **T P C**
3 3 4

OBJECTIVES

To provide the students with an opportunity to develop introductory knowledge of power engineering with special emphasis on:

- Automobiles and automotive shop.
- Steam generator and turbine.
- Fluid and fluid machinery.
- Refrigeration and air Conditioning Equipments.
- Power plants unit.
- Locomotive Engines.
- EFI and VVTI Engines.
- Automation of Vehicles
- Shop safety

Short descriptions

Automobile and its development, Automobile shop. Automobile Construction, Automotive Engines, Hydraulic and Pneumatic machinery, Steam generators. Fluid Machinery, Refrigerator and Air conditioners, cold storage, Power plants, locomotive engines and vehicles automation.

Detail description

1. Understand the concept of an automobile.

1.1 State the meaning of an automobile.
1.2 Describe briefly the history of automobile development
1.3 Mention automobile fields and Industry in Bangladesh.
1.4 Classify automobiles

2. Understand the design and layout of the automobile shop.

2.1 List the common tools and equipments used in an automobile shop
2.2 Mention general specification of different common tools and equipments used in automobile shop.
2.3 Discuss Specification of a motor cycle, three wheeler, auto car and heavy vehicle (bus/truck)

3. Understand the construction on an automobile

3.1 List the major components of an automobile.
3.2 State the function of body frame, Chassis and suspension system.
3.3 State the function of automobile drive line, clutch, transmission drive shaft, differential and rear axle.
3.4 State the function of steering gear & linkage.
3.5 State functions of the brake and the braking system
3.6 State the function of wheels & tyres.

4. Understand the working principle of an automobile engine.

4.1 Define engine
4.2 Explain the CI, SI, EFI, and VVTI Engine working principle.
4.3 Mention the 2 stroke & 4 stroke Engines.

5. Understand the concept of steam generator and turbine.

5.1 Define steam generator, steam engine and steam turbine.
5.2 Classify boiler, steam engine and turbine.
5.3 Mention uses of boiler and steam engine.

6. Understand the concept of fluid and fluid machinery

6.1 Define fluid and fluid Machinery.
6.2 Define pump and water turbine.
6.3 Classify pumps.
6.4 Describe operation and uses of centrifugal, reciprocating, rotary and tubing pump.
6.5 Classify turbine.

6.6 Describe operation of impulse and reaction turbine
6.7 State uses of pelton wheel, Kaplan and Francis turbine.
6.8 Select pump for residential water supply.

7. Understand the application of refrigeration and air conditioning equipment.
7.1 State function of a refrigerator.
7.2 State the function of an air conditioning system.
7.3 Define refrigerants and properties refrigerants.
7.4 State the function of an air cooler.
7.5 State the function of a cold storage
7.6 State the function of a water cooler.

8. Understand the concepts of power plants.
8.1 Mention the function of a power plant
8.2 Classify power plants
8.3 Mention the present and future position of hydro electric power plant in Bangladesh.
8.4 Describe major power plant with capacity in Bangladesh.

9. Understand the concept of hydraulic and pneumatic machinery
9.1 State the meaning of hydraulic and pneumatic machinery.
9.2 Describe the working principle of hydraulic press and its use.
9.3 Explain the working principle of hydraulic auto lift.
9.4 Distinguish pumps, compressors, blowers, fans and super chargers.

10. Understand the concept of locomotive engines.
10.1 Define locomotive.
10.2 Define locomotive engine.
10.3 Describe feature and working principle of locomotive engine.
10.4 Mention locomotive power transmission system

11. Understand the concept of Shop management and safety.
11. 1 Define shop safety.
11.2 State types of safety.
11.3 Necessity of safety.

Practical

1. Identify the general tools, equipment, instruments and Machineries used in the automobile shop.
2. Identify stationery and moving parts of an automobile engine.
4. Demonstrate cylinder head, cylinder block, crank shaft, cam shaft, piston, connecting rod etc.
5. Demonstrate the operation of a 4-stroke petrol engine with the help of a model.
6. Demonstrate the operation of a 2-stroke petrol engine with the help of a model.
7. Demonstrate the operation of a 4- stroke diesel engine with the help of a model
8. Identify major parts of a refrigerators and an air conditioner.
9. Demonstrate the working cycle of a domestic refrigerator.
10. Investigate sinking process of a deep tube well and specify the components.
11. Observe the power plant and its different sections.
12. Identity components of centrifugal, reciprocating, rotary and turbine pumps.
13. Identity Pelton wheel, Kaplan turbine and its components.

Reference books

1.	Automotive Fundamentals	-F. Nash
2.	Vehicle and engine technology	-Heinz Heister
3.	Automotive mechanics	- W H Crouse
4.	Hydraulics and Hydraulic machinery	- R. S. Khurmi
5.	Heat Engine	- K.p Roy
6.	Automobile Engineering	_ Dr. Kripal Singh
7.	Thermal Engineering	_ R. S. Khurmi
8.	Thermal Engineering	_ P.L Ballaney
9.	Pumps and compressors	_ Audals

ENGINEERING DRAWING **T P C**

0 6 2

OBJECTIVES

- To develop the ability to use various drawing instruments and materials.
- To enable in constructing and using various types of scales in drawing.
- To provide the ability to construct various geometrical figures.
- To enable to adopt various symbols used in drawing.
- To understand the orthographic and isometric projection.

SHORT DESCRIPTION

Drawing instruments and their uses; Lettering, numbering and constructing title strip; Adopting alphabet of lines and dimensioning; Constructing scales; Constructing geometrical figures; Constructing conic sections; Adopting symbols; Views and isometric projections.

DETAIL DESCRIPTION

DRAWING INSTRUMENTS AND MATERIALS

1 Practice with drawing instruments and materials for basic drawing technique.

1.1 Identify the different types of drawing instruments.
1.2 Use different types of drafting equipment.
1.3 Use different types of drafting software.
1.4 Identify the standard sizes of drawing board and sheets.
1.5 Draw the border lines in drawing sheets following standard rule.
1.6 Draw horizontal, vertical and inclined lines with the help of set squares and T-square.
1.7 Draw 15 degree, 75 degree, 105 degree and 120 degree angles with the help of set squares.
1.8 Use lettering guide, template, scale pantograph and French curve.

LETTERING NUMBERING AND TITLE STRIP

2 Letter and number freehand and with instruments.

2.1 Identify the necessity of good lettering in engineering drawing.
2.2 Draw freehand single stroke vertical letters from A to Z (upper and lower case) and numbers 0 to 9.
2.3 Draw freehand inclined (65 degree to 75 degree) single stroke letters from A to Z (upper and lower case) and numbers from 0 to 9.
2.4 Draw block letters (Gothic) using 5: 4 and 7: 5 proportions and height.
2.5 Select a suitable size of letters and write a few sentences using all the letters selecting suitable scale.
2.6 Draw title strip with proper placement using suitable size of letters and measurements.

ALPHABET OF LINES AND DIMENSIONING

3 Adopt the alphabet of lines.

3.1 Select different lines in drawing.
3.2 Use center line, hidden line, phantom line, break line, dimension line, extension line, section line and cutting plane line.

3.3 Use different thickness of line to emphasize a part of drawing.
3.4 Select recommended grades of pencils for various types of lines for engineering drawing.

4 Adopt the elements and theory of dimensioning.

4.1 Put dimensions in engineering drawing according to an accepted standard.
4.2 Identify the elements of dimensions from a given dimensioned drawing.
4.3 Apply aligned and unidirectional system of dimensioning.
4.4 Draw size and location of dimension, continuous dimension, staggered dimension and dimensioning in limited space.
4.5 Add necessary dimension to a given drawing with suitable arrows.

CONSTRUCTION OF SCALE

5 Prepare scale for drawing application.

5.1 Calculate representative fraction and interpret a scale reading.
5.2 Use different types of scale to find full size dimension.
5.3 Draw a plain scale to show meters, centimeters and millimeters of a given distance on object.
5.4 Draw a diagonal scale to show three units having given RF.
5.5 Read particular distance on plain and diagonal scale.
5.6 Use scale of chord.
5.7 Draw angle of 49 degree, 78 degree and 95 degree with the help of scale of chord.

GEOMETRICAL CONSTRUCTIONS & CONIC SECTIONS

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

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

SYMBOLS

7 Adopt standard symbols in drawing.

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

8. Understand the views of engineering drawing.

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

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

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

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

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

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

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

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

11 Apply the principles of orthographic projections of geometric solids

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

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

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

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

ISOMETRIC PROJECTION

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

12.1 Identify isometric views

12.2 Draw the isometric view of rectangular and circular lamina

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

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

REFERENCE BOOKS

1 Geometrical Drawing - I H Morris
2 Prathamic Engineering Drawing - Hemanta Kumar Bhattacharia
3 Civil Engineering Drawing - Guru Charan singh

BANGLA	T	P	C
	৩	৩	৪

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 প্রয়োগঃ

ক)বাংলা ভাষা :

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

খ) বাংলা বানান রীতি ও শব্দ প্রয়োগ:

১.বাংলা একডেমির প্রমিত বানান রীতি, ণ-ত্ব ও ষ-ত্ব বিধি
২. শব্দ ও শব্দের শ্রেণি বিভাগ (সংজ্ঞা, শব্দের গঠন, উৎস বা উৎপত্তি ও অর্থগত)
৩.বাক্য প্রকরণ ও গঠন রীতি (সংজ্ঞা, বাক্য গঠন এবং প্রকার)

গ) পত্র রচনা :

আবেদন পত্র (চাকুরি, ছুটি), চাকুরিতে যোগদান পত্র, মানপত্র, স্মারকলিপি, সংবাদপত্রে প্রকাশের জন্য পত্র

২. বাংলা সাহিত্যঃ

ক. কবিতা :

১.বঙ্গভাষা –মাইকেল মধুসূদন দত্ত
২. সোনার তরী – রবীন্দ্র নাথ ঠাকুর
৩. উমর ফারবক –কাজী নজরবল ইসলাম
৪. বাংলার মুখ আমি– জীবনানন্দ দাশ
৫. আসাদের শার্ট – শামসুর রাহমান
৬. স্বাধীনতা শব্দটি কি করে আমাদের হলো? – নির্মলেন্দু গুণ

খ. প্রবন্ধ :

১. অর্ধাঙ্গী –রোকেয়া সাখাওয়াত হোসেন
২.বইকেনা – সৈয়দ মুজতবা আলী

গ. একাঙ্কিকা (নাটিকা):

১.মানুষ –মুনীর চৌধুরী

ঘ. উপন্যাসঃ

১.লালসালু – সৈয়দ ওয়ালী উলৰাহ

ঙ.ছোট গল্পঃ

১. হৈমন্তী – রবীন্দ্র নাথ ঠাকুর
২. একুশের গল্প – জহির রায়হান
৩. পাতালেহাসপাতালে – হাসান আজিজুল হক

ব্যবহারিক

১.নির্ধারিত বক্তৃতা :

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 শিৰক/ছাত্রছাত্রীদের বরণ, গুরৰত্বপূর্ণ ব্যক্তিবর্গের আগমন উপলৰে বক্তৃতা।

২. উপস্থিত বক্তৃতা :

বিষয়বস্তু উন্মুক্ত

৩.আবৃত্তি :

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

৪. বিতর্ক (নমুনা)

সংস্কৃতিই আধুনিক মানুষের ধর্ম
তথ্য প্রযুক্তির অবাধ ব্যবহারই যুব সমাজেরঅবৰয়ের মূল কারণ
গতানুগতিক শিৰা নয় কর্মমুখি শিৰাই 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 উপস্থাপন:

স্থানীয় বিভিন্ন সমস্যা ও অনুসন্ধানী যে কোন বিষয়।

ENGLISH Subject Code :…….	T	P	C
	2	0	2

Full Marks: 100

Continuous Assessment : 40 Marks

Theory (Final Exam) : 60 Marks

Objectives:

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

- Reading, Listening with understanding
- The fluency of speech
- Grammatical accuracy with emphasis on spelling & punctuation
- Creative writing

CONTENT

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 Habit 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.

Grammar (Marks-20)

1. (a) Uses of Articles.
(b) Uses of Tense *(Right forms of verbs with indicators)
(c) Classify verbs: (Regular and Irregular verbs, Auxiliary, Principal, finite, non-finite verbs,)
2. Sentence:
(a) Changing Sentences: (Assertive, Interrogative, Optative, Imperative, Exclamatory Simple, Complex and Compound) ,Comparison Of Adjectives/Adverbs

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

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

4. Voice , Narration

5. Sentence Analysis :

Study of part of Speech,(Type of verbs-Regular and Irregular verbs , Auxiliary and Principal verb)
Study Of Phrases and Clauses (Noun/ Adjective/ verb/ participle /adverbial/ prepositional phrases and Principal /Sub ordinate //co ordinate clauses)

Free Writing (Marks -20)

1. Write dialogues: (with teacher, principal, shopkeeper, hotel manager, station master, newcomer, buyers, doctor, friend, colleagues etc).
2. Report writing on different events/ occasions/ accidents.
3.. Writing situational personal and official letters.
4. Writing job application with CV /Appointment letter / joining letter
5. Write a guided paragraph with questions.

সিলেবাস

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

A**LGEBRA :**

1 Understand the concept of AP & GP.

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

2 Apply the concept of polynomial in solving the problems.

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

3 Understand the concept of complex numbers.

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

4 Apply the concept of permutation.

4.1 Explain permutation.
4.2 Find the number of permutation of n things taken r at a time when,
i) things are all different.
ii) things are not all different.
4.3 Solve problems of the related to permutation :
i) be arranged so that the vowels may never be separated. From 10 man and 6 women a committee of 7 is to be formed. In how many ways can this be done so as to include at least two women in the committee.

5 Apply the concept of Combination.

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

ii) ${}^{n}C_{r} + {}^{n}C_{r-1} = {}^{n+1}C_{r}$

5.6 Solve problems related to combination.

6 Apply partial fraction to break the numerator and denominator.

6.1 Define proper and improper fractions.

6.2 Resolve in to partial fraction of the followings types :

a) Denominator having a non-repeated linear factor.
b) Denominator having a repeated linear factor.
c) Denominator having a quadratic factors.
d) Denominator having a combination of repeated, non-repeated and quadratic factors.

7 Apply the concept of binomial theorem.

7.1 State binomial expression.
7.2 Express the binomial theorem for positive index.
7.3 Find the general term, middle term, equidistant term and term independent of x.
7.4 Use binomial theorem to find the value of
i) $(0.9998)^2$, correct to six places of decimal.
ii) $(1 + \sqrt{2})^5 - (1 - \sqrt{2})^5$

8 Apply the concept of binomial theorem for negative index.

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

TRIGONOMETRY :

9 Apply the concept of associated angles.

9.1 Define associated angles.
9.2 Find the sign of trigonometrical function in different quadrants.
9.3 Calculate trigonometrical ratios of associated angle.
9.4 Solve the problems using above.

10 Apply the principle of trigonometrical ratios of compound angles.

10.1 Define compound angles.
10.2 Establish the following relation geometrically for acute angles.
i) $\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$.
ii) $\cos(A \pm B) = \cos A \cos B \pm \sin A \sin B$.
10.3 Deduce formula for $\tan(A \pm B)$, $\cot(A \pm B)$.
10.4 Apply the identities to work out the problems:
i) find the value of $\sin 75^0$, $\tan 75^0$.
ii) show that $\frac{\sin 75° + \sin 15°}{\sin 75° - \sin 15°} = \sqrt{3}$
iii) if $\alpha + \beta = \theta$, $\tan\alpha + \tan\beta = b$, $\cot\alpha + \cot\beta = a$,
show that $(a - b) = ab \cot\theta$.

11 Apply sum and product formula of trigonometrical ratios.

11.1 Express sum or difference of two sines and cosines as a product and vice-versa
11.2 Solve problems of the followings types:
i) show that, $\sin 55° + \cos 55° = \sqrt{2}\cos 10°$
ii) prove that, $\cos 80° \cos 60° \cos 40° \cos 20° = \frac{1}{16}$

12 Apply the concept of ratios of multiple angles.

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

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

13.1 Find mathematically the identities for sin 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	Athour	Title	Publication
01	S. P Deshpande	Mathematics for Polytechnic Students	Pune Vidyarthi Graha Prakashan
02	H. K. Das	Mathematics for Polytechnic Students(Volume I)	S.Chand Prakashan
03	Ashim Kumar Saha	Higher Mathematics	Akshar patra Prakashani
04	S.U Ahamed & M A Jabbar	Higher Mathematics	Alpha Prakashani

(Pro-2016)	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 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. 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. 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. 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 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. 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 angle of repose
4.11 State the merits and demerits of friction.

5. 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. 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 Motion of simple pendulum and it's time period.

7. 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. 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. HYDROSTATICS

9.1 Define pressure as force per unit area and state that it is measured in N/m^2 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 Surface tension and surface energy, Angle of contact.
9.5 Capillarity and theory of capillarity.
9.6 Viscosity and co-efficient of viscosity.
9.8 Necessity of viscosity.

10. WAVE AND SOUND

10.1 Wave and wave motion.
10.2 Transverse wave and longitudinal wave.
10.3 Some definitions relating waves.
10.4 Progressive wave and stationary waves.
10.5 Equation of progressive wave.
10.6 Sound and production of sound.
10.7 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. 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
a. infrasonic sound, b. Ultrasonic (supersonic) sound.
11.4 Explain how sound is absorbed, reflected & refracted by different types of surface.
11.5 Describe the practical uses of echo sounding devices.
11.6 Define velocity of sound.
11.7 State the velocity of sound at NTP in still air.
11.8 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 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 - by Dr. Shahjahan Tapan
2. A Text Book of Properties of of matter -By N Subrahmanyam and Brij Lal
3. A Text Book of Sound -By N Subrahmanyam and Brij Lal
4. Higher Secondary Physics- First Part -by Prof. Golam Hossain Pramanik
5. Higher Secondary Physics- First Part -by Ishak Nurfungnabi

DIPLOMA IN ENGINEERING
PROBIDHAN-2016

POWER TECHNOLOGY (671)

2nd 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	67121	Workshop Safety & Management	2	6	4	40	60	50	50	200
2	66711	Basic electricity	3	3	4	60	90	25	25	200
3	65922	Physics -2	3	3	4	60	90	25	25	200
4	65722	Communicative English	1	3	2	20	30	50	0	100
5	65921	Mathematics -2	3	3	4	60	90	50	0	200
6	65812	Physical Education & life skill development	0	3	1	0	0	25	25	50
Total			**12**	**21**	**19**	**240**	**360**	**225**	**125**	**950**