BANGLADESH TECHNICAL EDUCATION BOARD
Agargoan, Dhaka-1207.

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

CIVIL TECHNOLOGY

TECHNOLOGY CODE: **664**

2nd SEMESTER

DIPLOMA IN ENGINEERING
PROBIDHAN-2016

CIVIL TECHNOLOGY (664)

2nd SEMESTER

Sl. No	Subject Code	Name of the subject	T	P	C	Theory		Practical		Total
						Cont. assess	Final exam	Cont. assess	Final exam	
1	66421	Civil Engineering Materials	2	3	3	40	60	25	25	150
2	65722	Communicative English	1	3	2	20	30	50	0	100
3	65921	Mathematics-2	3	3	4	60	90	50	0	200
4	65922	Physics-2	3	3	4	60	90	25	25	200
5	66611	Computer Application	0	6	2	0	0	50	50	100
6	66822	Electronic Engineering Fundamentals	2	3	3	40	60	25	25	150
7	65812	Physical Education and life Skill Development	0	3	1	0	0	25	25	50
		Total	11	24	19	220	330	250	150	950

66421	**CIVIL ENGINEERING MATERIALS**	**T**	**P**	**C**
		2	**3**	**3**

AIMS

- To be able to identify and classify the materials used for construction in civil engineering field.
- To be able to recognize the sources of various civil engineering materials.
- To be able to understand the characteristics of various civil engineering materials.
- To be able to understand the uses of different civil engineering materials.

SHORT DESCRIPTION

Aspects of engineering materials; Engineering uses of Stone; Bricks; Sand; Cement; Timber ; Aluminum as construction materials; Timber & Wood based materials ; Glass and ceramics; Paints and varnishes; Plastic materials ; Alloy & Matel; Insulating materials; Geo-Textile ; Lime and water proofing materials.

DETAIL DESCRIPTION

1   Various aspects of civil engineering materials.

1.1 Define civil engineering materials.
1.2 Mention the classification of civil engineering materials in civil technology

2   Stone

2.1 Define stones.
2.2 Mention geological, physical and chemical classification of stones.
2.3 List the characteristics of good stones for construction.
2.4 Describe the dressing of stones.
2.5 Describe the uses of stone in civil engineering filed.

3   Brick & Hollow block.

3.1   Define bricks
3.2   Mention the raw materials of Bricks and properties of good bricks making earth.
3.3   Explain the Preparation of clay (manual/mechanically): Pug mill and Machine molding.
3.4   Explain the procedures of drying and burning bricks.
3.5   Mention the types of kilns: Bull's Trench Kiln & Hoffman's Kiln.
3.6   Explain the Size of Brick as per BNBC & PWD specification.
3.7   Explain Common testing of Bricks as per BNBC
           Compressive strength, Water absorption, Efflorescence, Dimensional tolerance Test.
3.8   Define Special Bricks: Hollow Block & ceramic brick
3.9   Mention the uses of hollow block and ceramic brick
3.10   State the Advantage and disadvantage of hollow block and ceramic brick

4   **Sand**.

4.1   Classify sand according to their sources.
4.2   Mention the specifications of good sand.
4.3   Describe the purpose of grading of sand.
4.4   Mention the use of various grades of sand.

5   Cement.

5.1   Define cement.
5.2   Mention the Raw materials of cement & functions of various ingredients of cement.
5.3   Explain manufacture process of ordinary Portland cement, Flow diagram for wet and dry process.
5.4   Mention the properties and uses of ordinary Portland cement.
5.5   Explain the testing of cement as per BNBC : Strength of Cement , Fineness by sieving, Consistency, Soundness, Setting times.
5.6   Understand special cement and their uses.
5.7   Explain storage of cement.

6   Tiles

6.1   Define the following tiles: clay tiles, concrete tiles, Plastic tiles, Mosaic tiles, Marble tiles, Glazed tiles. Homogenous tiles
6.2   Explain the uses of different kinds of tiles.

7   Timber & Wood Based Products

7.1   Explain the classification of trees: Exogenous and Endogenous trees and their cross section.
7.2   Explain the various types of timber: Teak, Shilkarai, Mehegoni, Gamari, Teak Chambal, Mango, etc.
7.3   Mention the market forms of converted timber as per PWD.
7.4   Explain seasoning of Timber and method of seasoning.
7.5   Explain plywood; manufacturing plywood (brief description only), uses of plywood.
7.6   Explain the Veneers.
7.7   Define other wood based products, their brief description of manufacturing and uses.
7.8   Laminated board, block board, fiber board, MDF board, melamine board and gypsum board. Applications of boards in false ceiling and wall paneling.

8   Glass and Ceramics.

8.1   Mention the constituents of glass.
8.2   Define the various types of Glass as per use like: Plate glass, weird glass, Tempered glass, colored glass, fiber glass, formed glass, float glass.
8.3   Explain the properties of glass.
8.4   Mention the uses of glass
8.5   Mention the classification of ceramics.
8.6   Explain the properties of ceramics.
8.7   Mention the uses of ceramics in civil engineering field.

9   Paints and varnishes.

9.1   Understand the purpose and uses of paints.
9.2   Explain the different type of paints: Distemper, plastic paint, enamels paint, cement paint, weather coat paint for outside of the building.
9.3   Understand varnishes and polish types properties and their uses
9.4   Explain lacquers their properties and their uses
9.5   Define the method of Application of different types of paints.

10   Plastic

10.1   Define plastic.
10.2   Explain the list the of raw materials for plastic.
10.3   Mention the type of properties of plastic.
10.4   Mention the characteristics of thermoplastic and thermosetting plastic.

10.5   Identify the uses of plastic as an engineering materials.

10.6   Define laminating plastic.

11   Alloy and Metals

11.1   Define the common types of iron used in industry.

11.2   Mention the uses of wrought iron and cast iron.

11.3   Mention the classification of steel on the basis of carbon content.

11.4   Define the Mild steel, alloy steel and stainless steel.

11.5   Mention the uses of non-ferrous metals and alloys like copper, zinc, tin, lead, brass and bronze.

11.6   Define light metal (aluminum/white metal) as construction material.

11.7   Mention the uses of aluminum as construction materials.

12   Insulating Materials

12.1   Define insulating materials

12.2   Make a list of insulating materials

12.3   State sound and thermal insulation

12.4   Mention the uses of insulation materials

13   Geo-textiles

13.1   Introduction to geo-textiles

13.2   Mention the Uses of geo-textiles

13.3   Describe the Advantage and disadvantage of geo-textiles

14.   Lime:

14.1   Define the lime

14.2   Mention the Uses of lime

14.3   List the Advantage and disadvantage of lime

15   Construction chemicals & Water proofing Matrials

15.1   Define Construction chemicals/Admixture.

15.2   Make a list of contruction chemicals

15.3   Mention the uses of construction chemicals

15.4   Define water proofing Materials.

15.5   Make a list of water proofing materials

15.6   Mention the uses of water proofing materials.

PRACTICAL:
1.   Show skill in identifying various types of stone
    1.1.   Select different type of stone in the laboratory.
    1.2.   Grading of stone as aggregates
2.   Show skill in field test of bricks
    2.1.   Perform field test of bricks
    2.2.   Select 1st class , 2nd class, 3rd class bricks and jhama bricks
3.   Show skill in conducting laboratory test of bricks
    3.1.   Perform:
        (a)   Compression test
        (b)   Absorption test
    3.2.   Determine average weight of a brick.
4.   Show skill in conducting laboratory test of cement
    4.1.   Conduct laboratory tests of cement
        (a)   Make cement paste of Normal Consistency(CPNC)
        (b)   Determine initial setting time
        (c)   Perform final setting time
        (d)   Perform compressive strength test
        (e)   Perform tensile strength test

          (f)   Perform fineness test
    4.2.   Conduct field tests of cement
5.   Show skill in conducting test of sand
    (a)   Bulking of sand
    (b)   F M of sand
    (c)   Specific gravity of sand
6.   Identify mild steel, cast iron, copper, and, aluminum, tin, by physical observation.
7.   Identify Varies types of wood and artificial wood: Veneers , plywood, Laminated board, block board, fiber board and gypsum board.

REFERENCE BOOKS

1   A text book on Engineering Materials   - G. J. Kulkarni
2   Engineering Materials   - Dr. M. A. Aziz
3   Plastic Materials   - J. A Brydson

	T	P	C
65722 **COMMUNICATIVE ENGLISH**	1	3	2

Full Marks: 100 (Practical-50.Theoretical-50)

Introduction

This Course Will Provide A Unique Foundation In The Basic Level For Developing Listening, Speaking, Reading And Writing Skills Into Some Of More Specialized And Advanced Capabilities Of Basic Operation In Communication.

Theory Part

Total Mark:	: 50
Continuous Assessment	: 20
Final Exam	: 30

Objectives:

After The Completion of the Module, Learners Will Be Able To Develop-

    # Creative Writing Ability
    # Transferring Information, Ideas And Knowledge
    #Communicative Competence Effectively In The Workplace Situation.

1.Comprehension For Reading Task (Mark:10)

(Text May Be Taken From Contemporary Journals, Editorial of News Papers Or From Online Resources)

Test Items:

1. MCQ (Guessing Meaning from Context)
2. Rearranging
3. Gap-Filling (With Clues or Without Clues)
4. Answering Questions
5. Summarizing

2. Composition (Mark: 20)

The Following Are The Topic Title Introduced For Writing Task:

1. Introduce Formal/Informal Greeting &Farewell
2. Describe The Idea Of Communication & Presentation Skills
3. Write Paragraph On The Basis Of Comparison and Contrast
4. Narrate Process, Stories And Interpreted Charts, Graphs.
5. Write Letters to the Print and Electronic Media
6. Write Letters of Advice, Complaints, Inquiry, Order and Cancellation
6. Prepare Seven Days Weather Report.
7. Make An Attractive Poster For The People Giving Advice To Protect The Environment.
8. Prepare A Series Of Questions About Personal Information, Place Of Interest, Foods, Hobby And Employment Opportunity.

9. Write Dialogue On The Following Situations
   #   About Exchanging Views With A Person And Introducing One Narrating Daily Activities
   #   Meeting At The Train Station & Asking Question About The Departure And Arrival Of The Train To The Station Manager
   #   Meeting at The Airport And Asking The Flight Schedule
   #   Getting To The Hotel And Asking For A Reservation
   #   Social Language for Telephonic Conversation
   #   Talking About the Weather, Trips & Sight Seeing
   #   Asking Permission and Making Request.
   #   Talking About Office and Office Manner
   #   Talking About Etiquette and Manner

10. Prepare Job Application With A Complete CV For Job Suitable For You.

Practical Part:

Objectives:

1. Communicate The Areas That Learners Encounter In Real Life Situation.

2. Reinforce The Basic Language Skills Of Listening And Speaking.

3. Integrate ICT As Tools In Learning Language.

Course Content

Unit	Lesson	Title
1. Use Of Dictionary	Define Dictionary	1.1 Know How To Use A Dictionary 1.2 Learn At Least 10 Words In A Day With Correct Pronunciation (Follow The Link : Www.Marriunm-Englishdictionary.Com)
2. Basic Vocabulary Practice	Basic Words For Communication By ODGENS	2.1 Use 10 Most Common Formulas (Structure) To Write Correct Sentence. (Follow The Link: Www.Odgensbasicvocabulary.Com Www.Grammarly.Com)
3. Listening Skill Practice	Listen To The Audio Video Presentation On Current Real Life Situation	3.1 Practice Audio Video Conferencing Activities. 3.2. Communicate With The English Speaking People Online (Link: Www.Speaking24.Com)
4. Speaking Skill Practice (Self Interpretation)	Introduce Yourself With The Vocabulary Prescribed By ODGENS	4.1 Browse Vocabulary Related Phrases To Introduce You. (Link : Www.Youtube.Com/ Let Me Introduce Myself)
5. Listening Skill Practice	Listen To The Weather Reports, Sports Commentary In The English TV Channels.	5.1 Prepare Seven Days Weather Report For The Place You Are Staying. 5.2. Make Some Attractive Poster To Protect The Environment.
6. Speaking Skill Practice	Identify Formal And Informal Social Language	6. 1 Practice Conversation Emphasizing On Greetings & Farewell (Link- Www.Esl.Guide@About.Com) 6.2 Take Part In Audio Video Conferencing Activities 6.3 Ask Questions About Personal Information, Place Of Interest, Food, Hobby, Employment Opportunity With Foreign Friends Using Social Media.
7. Writing Skill Practice	Develop Paragraph	7.1 Develop Paragraph On The Basis Of Comparison, Contrast And Analysis. Check Plagiarism Wordiness By The Correction Software (Www.Grammarly.Com) 7.2. Write E-Mail, Send And Reply E-Mail

8. Listening Skill Practice	Watch Short Films, Documentary And Listen To The English Music(With Lyric) To Practice In A Group	8.1 Listen To Hard Talk, Interview 8.2. Prepare A Series Of Questions To Interview A Celebrity 8.3. Down Load Documentary From Www.Youtube.Com/Education
9. Presentation	Define Presentation	9.1 Edutain/Entertain Yourself Preparing A Documentary In A Group With The Activities Done During The Period Of Class Hours In The Lab For Communicative English.

Evaluation:
Students Can Be Evaluated Individually Or In A Group On The Basis Of Performance Done In The Lab. Furthermore, They May Be Given Online Test Using Authenticated Websites Like Www.Britishcoucil.Org/Education/Blog/Podcast/News/Weather,Www.Englishteststore.Com.Www.Ieltsexam.Com

Lab-Facilitator, 30 Students In A Group:

Physical Facility	Size (In Ft)	Area (In Sq Ft)
Class Room Cum Laboratory	$1\ 5 \times 20$	300
Library	15×20	300
Wash Room	4×7	28

Lists Of Equipments And Resources For 30 Learners:

Personal Computers With Accessories	15
Projector Multimedia	01
Printer	01
Scanner	01
Modem	01
Essential Software	01 Set
Internet Connection For Each Computer	Broad Band/Dial Up
Camera (Digital)	01
Video Conferencing Equipments	01 Set
TV Card	01
Satellite Cable Connection	01
Head Phone	15
Related Books And Journals	01
First Aid Box	01

Reference:
Www.Britishcouncil.Org,Www.Marium-Websters.Com,Www.Compellingconversation.Com, Www.Esl.Guide@About.Com, Www.Bbc.Com/News, Www.Speaking24.Com, Www.Itutor.Com, Www.Ieltsexam.Com, Www.Englishteststore.Com, Www.Ginger.Com, Www.Grammarly.Com

(Note: This Course May Be Introduced After Fourth Semester Coz It Needs Some Maturity Of The Students To Adopt With The Course Materials And The Contents. These Themes Are Suggestive Not Prescriptive.)

65921   **MATHEMATICS -2**   **T   P   C**
                                                                     3   3   4

OBJECTIVES

- To enable in solving the simultaneous equations with the help of determinant and matrix.
- To make understand the exponential series.
- To provide ability to apply the knowledge of differential calculus in solving problem like slope, gradient of a curve, velocity, acceleration, rate of flow of liquid etc.
- To enable to apply the process of integration in solving practical problems like calculation of area of a regular figure in two dimensions and volume of regular solids of different shapes.

SHORT DESCRIPTION

Algebra : Determinants, Matrix, Exponential Series.

Trigonometry : Inverse circular functions, Properties of triangle and solution of triangles.

Differential Calculus   : Function and limit of a function, differentiation with the help of limit, differentiation of functions, geometrical interpretation of $\frac{dy}{dx}$, successive differentiation and Leibnitz theorem, partial differentiation.

Integral Calculus   : Fundamental integrals, integration by substitutions, integration by parts, integration by partial fraction, definite integrals.

DETAIL DESCRIPTION

ALGEBRA :

1   **Apply determinants to solve simultaneous equations.**
   1.1   Expand a third order determinant.
   1.2   Define minor and co-factors.
   1.3   State the properties of determinants.
   1.4   Solve the problems of determinants.
   1.5   Apply Cramer's rule to solve the linear equation.
2   **Apply the concept of matrix.**
   2.1   Define matrix, null matrix, unit matrix, square matrix. column matrix, row matrix, inverse matrix, transpose matrix, adjoin matrix, rank of a matrix, singular matrix.
   2.2   Explain equality, addition and multiplication of matrix.
   2.3   Find the rank of a matrix.
   2.4   solve the problems of the following types:
        i)   Solve the given set of linear equations with the help of matrix.
        ii) Find the transpose and adjoin matrix of a given matrix.
3   **Understand exponential series.**
   3.1   Define e.
   3.2   Prove that e is finite and lies between 2 and 3.
   3.3   Prove that $e^x = 1 + \frac{x}{\lfloor 1} + \frac{x^2}{\lfloor 2} + \frac{x^3}{\lfloor 3} + \frac{x^4}{\lfloor 4}$ .... to ∞
   3.4   Solve problems of the followings types :

   i) $1 + \frac{1}{\lfloor 2} + \frac{1}{\lfloor 4} + \frac{1}{\lfloor 6} + \ldots\ldots$ to ∞

   ii) $\frac{1}{\lfloor 2} + \frac{1+2}{\lfloor 3} + \frac{1+2+3}{\lfloor 4} + \frac{1+2+3+4}{\lfloor 5} + \ldots\ldots$ to ∞

TRIGONOMETRY

4   **Apply the concept of inverse circular function.**
   4.1   Explain the term inverse circular function and principal value of a trigonometrical ratio.
   4.2   Deduce mathematically the fundamental relations of different circular functions.
   4.3   Convert a given inverse circular function in terms of other functions.
   4.4   Prove mathematically

   i) $\tan^{-1} x + \tan^{-1} y = \tan^{-1} \dfrac{x + y}{1 - xy}$.

   ii) $\tan^{-1} x + \tan^{-1} y + \tan^{-1} z = \tan^{-1} \dfrac{x + y + z - xyz}{1 - xy - yz - zx}$

   iii) $\sin^{-1} x + \sin^{-1} y = \sin^{-1}\left(x\sqrt{1 - y^2} + y\sqrt{1 - x^2}\right)$

   iv) $2\tan^{-1} x = \sin^{-1} \dfrac{2x}{1 + x^2} = \cos^{-1} \dfrac{1 - x^2}{1 + x^2} = \tan^{-1} \dfrac{2x}{1 - x^2}$

   4.5   Solve problems of the following types.

   a) $2\tan^{-1}\dfrac{1}{3} + \tan^{-1}\dfrac{1}{4} = \dfrac{\pi}{4}$

   b) $\cos\tan^{-1}\cot\sin^{-1} x = x.$

   c)   Prove that the area of the segment cut from a circle of radius r by a chord at a distance d
               from the centre is given by
               $$K = r^2 \cos^{-1}\dfrac{d}{r} - d\sqrt{r^2 - d^2}$$

5   **Apply the principle of properties of triangles.**
   5.1   Prove the followings identities :

   i) $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C} = 2R$.

   ii) $a^2 = b^2 + c^2 - 2bc\cos A$

   iii) $a = b\cos C - c\cos B$.

   v) $\Delta = \dfrac{1}{2} bc\sin A.$

   5.2   Establish the   followings.

   a) $\tan\dfrac{A}{2} = \sqrt{\dfrac{(s - b)(s - c)}{s(s - a)}}$

   b) $\tan\dfrac{B - C}{2} = \dfrac{b - c}{b + c}\cot\dfrac{A}{2}$

   c) $\Delta = \dfrac{abc}{4R}$

   5.3   Solve the problems of the following types:

   i)   Prove $\cos(B - C) + \cos A = \dfrac{bc}{2R}$

   ii)   An object experiences two forces F_1 and F_2 of magnitude 9 and 13 Newtons with an
               angle 100^0 between their directions. Find the magnitude of the resultant R.

   DIFFERENTIAL CALCULUS

6 **Understand the concept of functions.**
   6.1   Define constant, variable, function, domain, range
   6.2   Solve problems related to functions.
7 **Understand the concept of limits.**
   7.1   Define limit and continuity of a function.
   7.2   Distinguish between $\lim\limits_{x \to a} f(x)$ and f(a).

7.3   Establish (i) $\lim\limits_{x \to 0} \dfrac{\sin x}{x} = 1$

(ii) $\lim\limits_{x \to 0} \dfrac{\tan x}{x} = 1$

8 Understand differential co-efficient and differentiation.
8.1   Define differential co-efficient in the form of
$$\dfrac{dy}{dx} = \lim\limits_{h \to 0} \dfrac{f(x + h) - f(x)}{h}$$

8.2   Find the differential co-efficient of algebraic and trigonometrical functions from first principle.

9 Apply the concept of differentiation.
9.1   State the formulae for differentiation:
  (i)   sum or difference

  (ii)   product

  (iii)   quotient

  (iv)   function of function

  (v)   logarithmic function

9.2   Find the differential co-efficient using the sum or difference formula, product formula and quotient formula.

9.3   Find the differential co-efficient function of function and logarithmic function.

10 Apply the concept of geometrical meaning of $\dfrac{dy}{dx}$
10.1   Interpret $\dfrac{dy}{dx}$ geometrically.

10.2   Explain $\dfrac{dy}{dx}$ under different conditions

10.3   Solve the problems of the type:
A circular plate of metal expands by heat so that its radius increases at the rate of 0.01 cm per second. At what rate is the area increasing when the radius is 700 cm ?

11 Use Leibnitz's theorem to solve the problems of successive differentiation.
11.1   Find 2nd, 3rd and 4th derivatives of a function and hence find   n-th derivatives.
11.2   Express Leibnitz's theorem
11.3   Solve the problems of successive differentiation and Leibnitz's theorem.

12 Understand partial differentiation.
12.1   Define partial derivatives.
12.2   State formula for total differential.
12.3   State formulae for partial differentiation of implicit function and homogenous function.
12.4   State Euler's theorem on homogeneous function.
12.5   Solve the problems of partial derivatives.

INTEGRAL CALCULUS

13 Apply fundamental indefinite integrals in solving problems.
13.1   Explain the concept of integration and constant of integration.
13.2   State fundamental and standard integrals.
13.3   Write down formulae for:
  (i) Integration of algebraic sum.

  (ii) Integration of the product of a constant and a function.

13.4   Integrate by method of substitution, integrate by parts and by partial fractions.
13.5   Solve problems of indefinite integration.

14 Apply the concept of definite integrals.
14.1   Explain definite integration.

14.2   Interpret geometrically the meaning of $\displaystyle\int_{a}^{b} f(x)\, dx$

14.3   Solve problems of the following types:

(i) $\int_0^{\pi/2} \cos^2 x \, dx.$ (ii) $\int_0^1 \frac{(\sin^{-1} x)^2}{\sqrt{-x^2}} dx$

P* =Practical continuous assessment

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	Shri Shantinarayan	Engg.Maths Vol I & II	S.Chand & Comp
04	Dr. B M Ekramul Haque	Higher Mathematics	Akshar Patra Prakashani
05	Md. Abu Yousuf	Differential & Integral Calculus	Mamun Brothers

65922	**PHYSICS-2**	**T**	**P**	**C**
		3	**3**	**4**

OBJECTIVES

- To develop a foundation in scientific principles and processes for the understanding and application of technology.
- To develop an understanding of fundamental scientific concepts through investigation and experimentation.
- To provide a common base for further studies in technology and science.
- To develop the basic knowledge of modern physics.

SHORT DESCRIPTION

Thermometry and Heat Capacity; Expansion of materials (effect of heat); Heat transfer; Humidity; Nature of heat and Thermodynamics; Photometry; Reflection of light; Refraction of light; Electron , photon and Radio activity; Theory of Relativity.

DETAIL DESCRIPTION

THEORY

1. THERMOMETRY AND HEAT CAPACITY

1.1   Define heat and temperature.
1.2   Mention the units of measurement of heat and temperature.
1.3   Distinguish between heat and temperature.
1.4   Identify the range of the Celsius scale determined by the boiling point and melting point of water
1.5   State the construction and graduation of a mercury thermometer.
1.6   Define specific heat capacity, thermal capacity and water equivalent with their units.
1.7   Prove the total heat gained by an object is equal to the sum of the heat lost by all the surrounding objects.
1.8   Explain the principle of calorimetry.
1.9   Define various kinds of specific latent heat.
1.10   Determine the latent heat of fusion of ice and latent heat of vaporization of water.
1.11   Determine the specific heat of a solid by calorimeter.

2. EFFECT OF HEAT ON DIMENSION OF MATERIALS

2.1   Show that different materials change in size at different amounts with the same heat source.
2.2   Explain the meaning of differential expansion in bimetallic strip, thermostats, compensated pendulum etc.
2.3   Explain the methods of overcoming problems caused by the expansion of materials in buildings, machinery, railway lines and bridges.
2.4   Mention the units co-efficient of linear, superficial and cubical expansion of solids.
2.5   Define the co-efficient of linear, superficial and cubical expansion of solids.
2.6   Relation between the co-efficient of linear, superficial and cubical expansion of solids.
2.7   Define real and apparent expansion of liquid.

2.8   Relation between the real and apparent expansion of liquid.

3. HEAT TRANSFER

3.1   Identify the phenomena of heat transferring from hot bodies to cold bodies.
3.2   Explain the methods of heat transfer by conduction, convection and radiation with examples of each type of transfer.
3.3   Define thermal conductivity (K) and Co-efficient of thermal conductivity.
3.4   Find the unit and dimension of Co-efficient of thermal conductivity.
3.5   List the factors which determine the quantity of heat (Q) flowing through a material.
3.6   Show that the quantity of heat flowing through a material can be found from

$$Q = \frac{KA\,(\theta_H - \theta_C)t}{d}$$

3.7   State Stefan-Boltzman Law and wien's law.
3.8   State Newton's law of cooling.
3.9   Explain Green house effect.

4. HUMIDITY

4.1   Define Standard Temperature and Pressure.
4.2   Define Humidity, Absolute Humidity, Relative Humidity and Dewpoint.
4.3   Relation between vapour pressure and air pressure.
4.4   Determine Humidity by wet and dry bulb hygrometer.
4.5   Explain few phenomena related to hygrometry.

5. NATURE OF HEAT AND THERMODYNAMICS

5.1   Describe the caloric theory and kinetic theory of heat.
5.2   Explain the mechanical equivalent of heat.
5.3   State and Explain the first law of thermodynamics .
5.4   Explain Isothermal and adiabatic change.
5.5   Explain Specific heat of a gas, Molar specific heat or molar heat capacity.
5.6   Relate between pressure and volume of a gas in adiabatic Change i, e;PV^γ=const.
5.7   State and Explain Reversible process and irreversible process.
5.8   State & explain 2nd law of thermodynamics
5.9   Entropy: Definition, unit and significant.
5.10 Explain Change of entropy in a reversible and irreversible process.
5.11 Give an example of increase of entropy in irreversible process.

6. PHOTOMETRY

6.1   Define light, medium (transparent, translucent, opaque), luminous & non-luminous bodies, parallel, convergent & divergent of rays.
6.2   Show the travel of light in straight line.
6.3   Define photometry, luminous intensity, luminous flux, brightness and illuminating power.
6.4   Mention relation between luminous intensity & illuminating power.
6.5   Explain inverse square law of light.
6.6   Describe the practical uses of light waves in engineering.

7. REFLECTION OF LIGHT

7.1   Define mirror (plane & spherical), image (real & virtual) and magnification of images.
7.2   Describe the reflection of light.
7.3   State the laws of reflection of light.
7.4   Express the verification of laws of reflection.
7.5   Define pole, principal axis, center of curvature, radius of curvature, principal focus in case of concave & convex mirrors.
7.6   Find the relation between focal length & radius of curvature of a concave & convex mirror.
7.7   Express the general equation of concave and convex mirror.

8. REFRACTION OF LIGHT

8.1   Define refraction of light Give examples of refraction of light
8.2   State the laws of refraction and Express the verification of laws of refraction
8.3   Define absolute and relative refractive index and Relate absolute and relative refractive index
8.4   Explain the meaning of total internal reflection and critical angle and Relate total internal reflection and critical angle.
8.5   Give examples of total internal reflection.
8.6   Describe refraction of light through a prism.
8.7   Express the deduction of the relation between refractive index, minimum deviation and angle of the prism.
8.8   Define lens and mention the kinds of lens.
8.9   Identify and List uses of lens.
8.10   Express the deduction of the general equation of lens (Concave & convex).

9. ELECTRON, PHOTON AND RADIO-ACTIVITY

9.1   Describe Electrical conductivity of gases.
9.2   Describe Discharge tube.
9.3   Cathode ray : Definition and its properties
9.4   X-ray : Definition, properties & uses
9.5   Discuss Photo electric effect .
9.6   Derive Einstein's photo electric equation
9.7   Define and explain radio-activity.
9.8   Describe radio-active decay law.
9.9   Define half-life and mean-life of radio-active atoms.
9.10   Define nuclear fission and fusion.

10. THEORY OF RELATIVITY

10.1   Define Space, time and Mass.
10.2   Define rest mass.
10.3   Express the theory of relativity.
10.4   Explain special theory of relativity and its fundamental postulate.
10.5   Mention different Kinds of theory of relativity.
10.6   The Relativity of Length - Length contraction.
10.7   The Relativity of Time – Time dilation.
10.8   Deduce Einstein's mass -energy relation

PRACTICAL

1. Compare the operation of common thermometers.
2. Determine the co-efficient of linear expansion of a solid by Pullinger's apparatus.
3. Measure the specific heat capacity of various substances.(Brass, steel).
4. Determine the latent heat of fusion of ice.
5. Determine the water equivalent by calorimeter.
6. Compare the luminous intensity of two different light sources.
7. Verify the laws of reflection.
8. Find out the focal length of a concave mirror.
9. Determine the refractive index of a glass Slab.
10. Determine the angle of Minimum deviation and refractive index of a glass prism by using I-D graph.

REFERENCE BOOKS:
1. Higher Secondary Physics – Second Part   - by Dr. Shahjahan Tapan
2. A Text Book of Heat and Thermodynamics   - by N Subrahmanyam and Brij Lal
3. A Text Book of Optics   - by N Subrahmanyam and Brij Lal
4. Higher Secondary Physics -Second Part   - by Prof. Golam Hossain Pramanik
5. Higher Secondary Physics -Second Part   - by Ishak Nurfungnabi
6. Thermodynamics   - by K K Ramalingam

66611	**COMPUTER APPLICATION**	**T**	**P**	**C**
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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 P*rinter* 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 and
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 per 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

66822	**Electronics Engineering Fundamental**	T	P	C
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OBJECTIVES
- To provide understanding soldering technique and color code.
- To provide understanding and skill on the basic concept of semiconductor and to identify physically a range of semiconductor diodes.
- To develop comprehensive knowledge and skill on special diodes and devices.
- To develop the abilities to construct different rectifier circuits.
- To provide understanding of the basic concept and principle of transistor and toidentify physically a range of transistor.
- To provide understanding and skill on oscillator.
- To provide the understanding skills on Multivibrator.

SHORT DESCRIPTION
Color code and soldering; Semiconductor; P-N junction diode; Special diodes and devices; Power supply; Transistor; Transistor amplifier; Oscillator, Multivibrator.

DETAIL DESCRIPTION
Theory:
1   Soldering and Color Code.
   1.1   Define soldering.
   1.2   List the materials needed in soldering.
   1.3   Mention the properties of a good soldered joint.
   1.4   Multi layered Printed circuit board.
   1.5   Mention the function of resistor, capacitor and inductor in electronic circuits.
   1.6   Describe the procedure of determining the value of Capacitor, & Resistor using numeric and color code.

2   Semiconductor
   2.1   Define Conductor, Semiconductor and Insulator.
   2.2   Describe Semiconductor with atomic structure.
   2.3   Explain the energy band diagram of Conductor, Semiconductor and Insulator.
   2.4   Classify Semiconductor.
   2.5   Describe the formation of P-type & N-Type Semiconductor material.
   2.6   Explain the majority & minority charge carrier of P-type & N-Type Semiconductor.

3   P-N Junction Diode
   3.1   Define PN junction diode
   3.2   Describe the formation of depletion layer in PN junction.
   3.3   Mention the behavior of PN junction under forward and reverse bias.
   3.4   Explain the forward & reverse current voltage (IV) characteristics of PN junction diode.
   3.5   Describe the operation of Zener diode.
   3.6   Describe the application of Zener diode in voltage stabilization.
   3.7   Describe the construction operation and application of (i) varactor diode (ii) LED (iii) LCD (viii) photo diode (ix) Solar cell.
   3.8   Describe the construction operation and application of (i) DIAC (ii) TRIAC and (iii) SCR.

4   DC power supplies.
   4.1   Define (i) dc power supply (ii) Regulated and Unregulated Power Supply.
   4.2   Describe the block diagram of a typical regulated dc power supply.
   4.3   Explain the operation of Half wave, Full wave and Bridge rectifier.
   4.4   Mention ripple factor of Half wave, Full wave and Bridge rectifier.
   4.5   Explain the operation of different types filter circuits with wave shape.
5   Bipolar Junction Transistor (BJT)
   5.1   Define Transistor.
   5.2   Describe the construction PNP and NPN Transistor.

5.3 State the biasing rules of BJT.
5.4 Explain the mechanism of current flow of PNP and NPN Transistor.
5.5 Draw the three basic transistor configuration circuits (CB, CC, CE).
5.6 Describe the characteristics of transistor in CB, CE, CC configuration.
5.7 Describe current amplification factor α, β and γ.
5.8 Establish the relation among α, β and γ.
5.9 Solve problem related to I_E, I_C, I_B, α, β and γ.

6 Transistor biasing and load line.
6.1 Mention the needs for biasing of transistor
6.2 State the conditions for proper biasing of transistor.
6.3 Describe the methods of drawing load line of transistor.
6.4 Explain the Effect of the location of operating point on the output signal.
6.5 Describe the various methods of transistor biasing.

7 Transistor Amplifier
7.1 Define (i) Amplifier (ii) Amplification and (III) Gain
7.2 Mention the classification of Amplifier.
7.3 Describe the principle of operation of a single stage common emitter (CE) Amplifier.
7.4 Draw DC & AC equivalent circuits of the CE amplifier circuit.
7.5 Explain the operation of RC coupledandtransformer coupled multistage amplifier.
7.6 Describe the operation of Push-Pull amplifier.

8 Field-Effect Transistor(FET).
8.1 Define field effect transistor(FET).
8.2 Mention the types of FET
8.3 Describe the construction and operation Junction Field Effect Transistor (JFET).
8.4 Explain characteristics of JFET .
8.5 Describe the parameters of JFET.
8.6 Establish the relationship among FET parameters.
8.7 Describe the DC biasing of JFET and its load line.
8.8 Describe the Construction and operation of DE and E-Only MOSFET.

9. Sinusoidal Oscillators.
9.1 Define feedback
9.2 Describe different types of feedback with block diagram.
9.3 Calculate the gain of amplifier with feedback (positive and negative).
9.4 Mention the advantages and disadvantages of negative feedback.
9.5 Explain the principle of operation of a oscillatory tank circuit.
9.6 Describe the essentials of feedback LC oscillators.
9.7 Explain the principle of operation of Hartly, Colpitt andWein-bridge oscillators.
9.8 Explain the principle of operation phase shift & crystal oscillators.

10. Multivibrator circuits.
10.1 Define time base circuit.
10.2 Mention the methods of generating time base waveform.
10.3 Explain the generation of saw-tooth wave using charging and discharging of a capacitor.
10.4 Understand the features of multivibrator circuits.
10.5 State what is meant by multivibrator.
10.6 Explain the operation of astable, monostable and bistable mutivibrator circuits with wave shapes.
10.7 Mention the principle of operation of Schmitt trigger circuit.

Practical : (Using Real component and Simulation Software)

1   Show skill in identifying the electronic components.
   1.1   Observe the electronic components board and read the manuals.
   1.2   Identify the different types of resistors with their values, tolerance and wattage.
   1.3   Identify the different types of potentiometers with their values, & wattage.
   1.4   Identify the different types of capacitors with their values, dc working voltages and types.
   1.5   Identify the different types of diodes & rectifiers with the numbers and specifications.
   1.6   Identify the different types of transistors and thyristors with their number and specifications.
   1.7   Identify the different types of LED's, IC's and miniature relays with their number & specification.
   1.8   Identify different types of transformer with their specification.
   1.9   Identify different inductors with their values & current ratings.
   1.10   Study the printed circuit boards.
   1.11   Sketch the symbols of components used in electronic circuits.
   1.12   Describe the basic function of each component.
   1.13   Write a report on above activities.

2   Show skill for determining the values of different resistors and capacitors with the help of color code.
   2.1   Select color code resistors & capacitors of different values.
   2.2   Identify the colors and their numerical numbers.
   2.3   Determine the value of resistors with tolerance.
   2.4   Determine the value of capacitors and dc working voltage.
   2.5   Write a report on above activities.

3   Show skill in performing soldering.
   3.1   Select wires (single strand and multi strand) and cut wires to required length.
   3.2   Select soldering iron, soldering tag and soldering lead.
   3.3   Remove wire insulation to required length.
   3.4   Clean and tin both iron and work piece.
   3.5   Use a tinned iron in order to transfer adequate heat to the joint.
   3.6   Joint two singles& multi stranded wires mechanically and solder.

4   Show skill in soldering & de-soldering of electronic components and wires to the other components and circuit boards.
   4.1   Select electronic components, wires and PCB.
   4.2   Determine the rating of the soldering iron suitable for the work piece.
   4.3   Clean and tin both iron & work piece.
   4.4   Feed new soldering materials to the tinned and heated joint, in order to produce a correctly soldering.
   4.5   Check the quality of soldering.
   4.6   Clean and tin iron and de-solder the joint and components.
   4.7   Use solder suckers and solder braid for de-soldering.
   4.8   Write a report on the Job.

5   Show skill in checking the semi-conductor diode.
   5.1   Collect a range of semi-conductor diodes and manufactures literature.
   5.2   Select the digital multi-meter and set the selector switch to ohm range.
   5.3   Determine the specification of semi-conductor diode.
   5.4   Compare the determined specification with that of manufactures literature.
   5.5   Measure forward & reverse resistances of the diode.
   5.6   Identify p and p side of the diode.
   5.7   Determine the condition of the diode.

6   Show skill in sketching forward and reverse characteristics curves of a semiconductor diode.

6.1   Select meter, power supply, components and materials.
6.2   Complete circuit according to circuit diagram for forward bias.
6.3   Check all connections.
6.4   Measure forward bias and corresponding forward current.
6.5   Record results in tabular form.
6.6   Connect circuit according to circuit diagram of reverse bias.
6.7   Measure reverse bias and corresponding reverse current.
6.8   Record results in tabular form.
6.9   Sketch the curves form data.

7   Show skill in sketching waves of half wave rectifier circuit.
7.1   Select meter, component, oscilloscope and materials.
7.2   Complete circuit of a half wave rectifier according to circuit diagram.
7.3   Check the circuit before operation.
7.4   Measure the input and output voltage and observe wave shapes in the oscilloscope.
7.5   Sketch the output voltage wave shape.

8   Show skill in sketching waves of full wave center tapped rectifier circuit.
8.1   Select meter, component, oscilloscope and materials.
8.2   Complete a full wave rectifier circuit according to circuit diagram.
8.3   Check the circuit supply & polarity of supply.
8.4   Measure the input & output voltages and observe wave shapes in the oscilloscope.
8.5   Sketch the output voltage wave shape.
8.6   Compare the result with half-wave rectifier circuit.

9   Show skill in constructing full wave bridge rectifier.
9.1   Select meter, component, oscilloscope and materials.
9.2   Build the circuit according to the circuit diagram.
9.3   Check the circuit.
9.4   Measure the input and output voltage.
9.5   Observe wave shape.
9.6   Compare the result with other rectifiers.

10   Show skill in identifying the terminals of bipolar junction transistor.
10.1   Select pnp & npn bipolar junction transistors.
10.2   Take AVO meter and manufacture's literature of transistor.
10.3   Identify transistor legs.
10.4   Measure base-emitter, base-collector, forward and reverse resistance.
10.5   Determine the specifications with help of manufacturer's literatures.
10.6   Identify pnp & npn transistor.

11   Show skill in determining input and output characteristics of a transistor in common emitter connection.
11.1   Select component, AVO meters, circuit board and required materials.
11.2   Construct the circuit.
11.3   Adjust the biasing voltage to appropriate point.
11.4   Record input and output voltage and current.
11.5   Plot the curve with recorded data.

12   Show skill in measuring operating points (VCE and IC) for Transistor circuit.
12.1   Select a fixed bias transistor circuit materials.
12.2   Select required equipment.
12.3   Prepare the circuit.
12.4   Check the connections
12.5 Adjust the circuit**.**

13.   Demonstrate the operation of a Hartly, Colpitt and R-C oscillator.
13.1   Draw the circuit diagram.
13.2   Select tools, equipment and materials.

13.3   Connect the circuit diagram.
13.4   Check and energize the circuit.
13.5   Observe the output for different frequencies

14.   Study the operation of a transistor astable, monostable& bi-stable multivibrator circuit. Select an experiment circuit.
14.1   Select the required tools and materials.
14.1   Build up the circuit as per diagram.
14.1   Switch on the power supply.
14.1   Switch on the trigger signal.
14.1   Observe the wave shapes at each collector & base of the transistor

REFERENCE BOOKS :

1. A Text Book of Applied Electronics   - R.S. SEDHA
2. Principles of Electronics   - V. K. Mehta

65812   PHYSICAL EDUCATION AND LIFE SKILL DEVELOPMENT   T   P   C
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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.   National Anthem and Assembly
   1.1   Line and File.
   1.2   Make assembly.
   1.3   Recitation of national anthem.
   1.4   National anthem in music.

2.   Warm up
   2.1   **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   **Squad Drill :**
            Line, File, Attention, Stand at easy, Stand easy, Left turn, Right turn, About turn, Mark time, Quick march, Right wheel, Left wheel, Open order march & Closed order march.
   2.3   **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   Mass Physical Exercise
            Hand raising, Side twisting, Front & back bending, Front curl, Straight arm curl two hand, Hands raising overhead and Push up.

3.   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 Pramayama, sadanta pranayama), Ujjayi pranayama,

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

5   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, Centring, Standing Asanas, Sitting Asanas, Quick Relaxation Technique).

6.   **First Aid**
6.1   Define First Aid.
6.2   What do you mean by First Aider.
6.3   Discuss the responsibilities of a First Aider.
6.4   Different types of equipment of First Aid.
6.5   Muscle Cramp-Ice application (Remedy).
6.7   Dislocation-Ice application (Remedy).

7.   **Rules and Technique of 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   Definition of Exercise physiology.
8.2   Function of muscles.
8.3   Concept of work, energy and power.
8.4   Effect of exercise on heart and circulatory system.
8.5   Motor components for physical fitness.
8.6   Definition of sports Biomechanics.
8.7   Definition of sports psychology.
8.8   Meaning of nutrition, Diet and Balanced diet.
8.9   Meaning of the terms –Test, measurement and Evaluation.

9.   **Show skill on conversation on day to day life**
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   Visited historical places/sites.

10.   **Human relation**
10.1   Family relation.
10.2   Relation with nighbour.
10.3   Humanitarian Service.
10.4   Service for handicapped (intelligent, physical, social etc).
10.5   Service for orphan / Patient.

11   **Vote of appreciation**
11.1   About dress .
11.2   For good work.
11.3   For good result.
11.4   For good news.

12.   **Stress Management**
12.1   Habit to be a man of humor.
12.2   Always brain should be cool.
12.3   Positive thinking.
12.4   Factors that determine our attitude.
12.5   The benefits of a positive attitude.
12.6   Steps to building a positive attitude.

13   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   Interview Technique
   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   Team work
   15.1   Organized a team.
   15.2   Selection of team leader.
   15.3   Distribution the task to the members.
   15.4   Accepting opinion of team members.
   15.5   Completion of task as a team.

16   Social work
   16.1   Tree plantation.
   16.2   Community service.
        16.2.1 Rover Scout.
        16.2.2 Sanitation.
        16.2.3 Pure drinking water.
        16.2.4 Social Culture.

Reference Book

Modern Yoga _Kany Lal Shah
Rules of games and sports_ Kazi Abdul Alim
Yoga _ Sobita Mallick
Iron Man_ Nilmoni Dass