



BANGLADESH TECHNICAL EDUCATION BOARD
Agargoan, Dhaka-1207.

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

FOOD TECHNOLOGY

TECHNOLOGY CODE: **669**

3rd SEMESTER

DIPLOMA IN ENGINEERING
PROBIDHAN-2016

FOOD TECHNOLOGY (669)

3rd 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	66931	Catering Management	2	3	3	40	60	25	25	150
2	66932	Food Science and Nutrition	2	3	3	40	60	25	25	150
3	66933	Food Industrial Chemistry	2	3	3	40	60	25	25	150
4	66822	Electronic Engineering Fundamentals	2	3	3	40	60	25	25	150
5	65931	Mathematics -3	3	3	4	60	90	50	0	200
6	65922	Physics -2	3	3	4	60	90	25	25	200
7	65812	Physical Education and Life Skill Development	0	3	1	0	0	25	25	50
Total			14	21	21	280	420	200	150	1050

AIMS:

- To be able to understand the basic concepts of catering management.
- To be able to understand cleaning and housekeeping in catering center.
- To be able to understand Hygiene and sanitation in catering service.
- To be able to understand kitchen planning.
- To be able to understand kitchen equipment and utensil.
- To be able to understand cooking & prepare food.
- To be able to understand menu planning and service.
- To be able to understand cost concept in catering.

SHORT DESCRIPTION:

Basic concept of catering management; cleaning and housekeeping; Hygiene and sanitation in catering service; kitchen planning; kitchen equipment and utensil; menu planning and service system; cooking and cooking methods; prepare food; cost concept of catering; safety and personal management in catering.

DETAIL DESCRIPTION:**Theory:****1. Understand the concept of catering management.**

- 1.1 State the meaning of catering and catering management.
- 1.2 Mention the principle of catering management.
- 1.3 Explain industrial and institutional catering.
- 1.4 Mention the tools of catering management.
- 1.5 Co-ordinate and Co-operation with other departments.

2. Understand the cleaning and housekeeping in catering centers.

- 2.1 Outline the importance of cleaning and washing in catering center.
- 2.2 Explain the water using in utensil washing.
- 2.3 Explain the cleaning process of utensil.
- 2.4 Explain the cleaning process of tools, equipment's and working area.
- 2.5 Explain housekeeping.
- 2.6 Describe 5S method for housekeeping.

3. Understand the hygiene and sanitation in catering.

- 3.1 Define hygiene and sanitation.
- 3.2 Explain the personal hygiene, Kitchen hygiene, Food hygiene.
- 3.3 State the uses of sanitizing agent.
- 3.4 Explain the contamination of food.
- 3.5 Explain the environmental hygiene and sanitation in catering institution.
- 3.6 Describe preparation process of sanitizer.

4. Understand the concept of kitchen planning.

- 4.1 Define the term kitchen and kitchen planning.
- 4.2 Mention the important principle of kitchen planning.
- 4.3 Explain different types of kitchen.
- 4.4 Explain the kitchen layout plan.
- 4.5 Describe the different types of kitchen layout.

5. Understand the aspects of catering equipment and utensil.

- 5.1 Mention catering equipment and utensil.
- 5.2 Mention the classification of catering equipment.
- 5.3 State using of catering equipment and utensil.

- 5.4 Explain care and maintenance of catering equipment.
- 5.5 Describe use and care of knives.
- 5.6 Describe weighing and measuring techniques.

6. Understand the aspects of menu planning.

- 6.1 Define the menu planning.
- 6.2 Mention the different factors to be considered menu planning.
- 6.3 Explain different types of menu.
- 6.4 Mention the parameters for quantity food menu planning.
- 6.5 List the advantages of menu planning.

7. Understand the aspect of service system.

- 7.1 Define service system.
- 7.2 Describe the different type of service systems (such as: table service, self service, specialized service and single point service)
- 7.3 Mention the advantage and disadvantage of table service and self-service.
- 7.4 Describe the mobile catering service system.
- 7.5 Describe laying and relaying table cloth and linen folding.
- 7.6 Describe a table setting system for food service.

8. Understand the aspects of food preparation and cooking.

- 8.1 Define food preparation and cooking.
- 8.2 Mention aims & objective of cooking.
- 8.3 Describe the different methods of cooking.
- 8.4 Explain heat transfer in cooking.
- 8.5 Effects of cooking on the nutritional value of food.

9. Understand preparation of different foods.

- 9.1 Describe the procedure of preparing stock, soup and sauce.
- 9.2 Describe the procedure of preparing salads.
- 9.3 Explain the procedure of preparing meat and poultry dishes.
- 9.4 Describe the procedure of preparing appetizer and dessert.
- 9.5 Describe the cooking procedure of pasta and rice dishes.
- 9.6 Explain the procedure of preparing fish dishes.

10. Understand the aspects of space for service area and storage for catering.

- 10.1 Describe the ideal location of service area for caterings.
- 10.2 Explain the necessity of decoration in service and dining area of catering establishment.
- 10.3 Explain the ideal location and planning of storage space for catering.
- 10.4 Mention the types of stores of goods for catering.
- 10.5 Outline the importance of safety in storage.
- 10.6 Explain the security of stores for catering.

11. Understand cost concepts in catering

- 11.1 Mention the components of costs in catering.
- 11.2 Explain the cost control of food.
- 11.3 Mention the factors responsible for financial losses.
- 11.4 Explain the method of controlling food costs.
- 11.5 Explain the costing of dish, meals and events.
- 11.6 Explain the method of pricing food.

12. Understand the safety and the personal management in catering.

- 12.1 Define safety in catering.
- 12.2 Mention the causes of accidents in catering institute.
- 12.3 Explain the term personal management in catering.
- 12.4 State the development of personnel management.
- 12.5 Outline the importance of training and development of employees in catering.

Practical:

1. Perform equipment and utensil are cleaned (5S method) and stored in designated place.
2. Perform different types of linen folding.
3. Perform different types of food service (such as; a table service).
4. Prepare sanitizer and sanitize workplace.
5. Perform common uses vegetable cutting.
6. Prepare stocks, sauces & soups.
7. Prepare appetizers and dessert.
8. Prepare Salad and salad dressing.
9. Prepare meat and poultry dishes.
10. Perform of simple dishes of continental menu along with appetizer, main dish & desserts.

REFERENCE BOOKS:

1. Catering Management -Mohhini sethu and surjeet malhan.
2. Catering science and technology -Magnus pyke
3. Hotel Management and catering course -Humayun kabir
4. A practical guide to restaurant management -Belal Hossain Joy
5. ক্যাটারিং সাইন্স এন্ড টেকনোলজি - আবু জাফর মোহাম্মদ হোসাইন খান, বাংলাদেশ কারিগরি শিক্ষা বোর্ড
6. Accommodation and cleaning service - David M. Allen, Stantey Thomas Publication.
7. Hotel Housekeeping Training Manual - Sudhir Andrews, Tata Mc Graw Hill Publication.

AIMS

- To be able to understand the basic concepts of food science & nutrition.
- To be able to understand the digestive enzymes and metabolism.
- To be able to perform the experiments of food science & nutrition.
- Prepare students to take advantage of various career opportunities in the field of Food science and Nutrition
- Develop the knowledge, skills and attitudes necessary for the safe preparation and prevention of foods.

SHORT DESCRIPTION

Basic concepts of food science and nutrient, Carbohydrates in nutrition, Proteins & amino acids, Function of lipids, Vitamins and their functions, Functions of minerals and water Nutritive process, inter relationship between nutrients, Regulation of food, Food spoilage, food preservation, balanced diet, Dietetics and diet planning, Nutritional deficiency diseases, Nutrition of expectant and nursing mother.

DETAIL DESCRIPTION**Theory:****1. Understand the basic concepts of Food science and Nutrition.**

- 1.1 Define food science and nutrition.
- 1.2 Mention the classification of food.
- 1.3 Explain the term nutrients.
- 1.4 Discuss the role of food in the maintenance of good health.
- 1.5 Describe the function of food and nutrients.
- 1.6 Explain the Food Guide pyramid.

2. Understand carbohydrates, proteins and amino acids and their function.

- 2.1 Define carbohydrates, proteins and amino acids.
- 2.2 Classify Carbohydrates, proteins and essential amino acids.
- 2.3 Mention the source of carbohydrates.
- 2.4 Explain the dietary requirement of carbohydrates
- 2.5 Discuss the functions of carbohydrate in human body.
- 2.6 Describe the effect of protein deficiency in human body.
- 2.7 Explain the daily requirement of protein.
- 2.8 Describe the functions of proteins and amino acids in human body

3. Understand Fats and Oils.

- 3.1 Define Fats and Oils.
- 3.2 Mention the classification of Fats and Oils.
- 3.3 Mention the source of fats and oils.
- 3.4 Describe the function of fats and oils in nutrition.
- 3.5 Mention the daily requirements of fats and oils for a normal weight industrial worker.
- 3.6 Explain the effects of composition on fat proteins.
- 3.7 Describe the tests of fats and oils.

4. Understand the vitamins and their functions in nutrition.

- 4.1 Define vitamin A,C,D,E,K and B Complex.
- 4.2 List fats and water soluble vitamins.
- 4.3 Explain the function of vitamins in human body.
- 4.4 Describe the diseases caused due to the deficiency of vitamin A,C,D,E,K and vitamin B complex.
- 4.5 Explain the hypervitaminosis of vitamins A and D.

- 4.6 Explain thiamin, riboflavin and nicotinic acid.
- 4.7 Describe the function of riboflavin and nicotinic acid.

5. Balanced diet, dietetics and diet planning for different age group people

- 5.1 Define balanced diet, dietetics and diet planning.
- 5.2 Explain the importance of balanced diet.
- 5.3 Mention the importance and method of diet planning.
- 5.4 Describe diet during pregnancy and lactating women.
- 5.5 Describe the balanced diet for school going children and young man of normal health.
- 5.6 Explain malnutrition due to defective infants.
- 5.7 Describe nutritional requirements of different age groups..

6. Understand the function of minerals and water in human nutritive process.

- 6.1 List the different minerals which are important in human nutrition.
- 6.2 Explain metabolic water and metabolism.
- 6.3 Describe the function of water in salt balance of human body.
- 6.4 Explain the daily requirements of water in human body.
- 6.5 Describe the function of calcium, sodium, iron, potassium and iodine in human nutrition.
- 6.6 Explain the effect of iron and calcium deficiency in human body.
- 6.7 Mention the diseases due to deficiency of iodine in human body.

7. Understand the nutritional deficiency diseases.

- 7.1 Explain diet in diabetes, tuberculosis and food allergy.
- 7.2 Explain the diet in liver disease and jaundice.
- 7.3 Describe diet in acute in digestion and dysentery.
- 7.4 Explain protein-energy malnutrition (PEM) and causes of PEM.
- 7.5 Explain the sign and symptoms of PEM.
- 7.6 Explain the diseases scurvy and its causes.
- 7.7 Explain the causes of anemia, goiter and beriberi and its effect.

8. Understand inter relationship between nutrients.

- 8.1 Explain protein-energy inter relationship.
- 8.2 Describe the effect of carbohydrates, fats and proteins and calorie restriction on protein content of the body.
- 8.3 Explain vitamin – vitamin inter relationship.
- 8.4 Explain body mass index and calculation of BIM.

9. Understand nutrition of expectant and nursing mother.

- 9.1 Describe physiological adjustments during pregnancy.
- 9.2 Explain the factors affecting the course and outcome of pregnancy.
- 9.3 Explain nutritional requirements during pregnancy.
- 9.4 Explain the effect of malnutrition and socio-economic factors on the nutritional status of pregnant women.

10. Understand heat preservation and processing

- 11.1 Define heat transfer and degrees of preservation.
- 11.2 Mention selecting heat treatments.
- 11.3 Describe heat resistance of Microorganisms
- 11.4 Explain protective effects of food constituents.
- 11.5 Describe different temperature–time combinations.
- 11.6 Explain inoculated pack studies.
- 11.7 Describe heating before or after packaging.

11. Understand Governmental Regulation of food and nutrition labeling.

- 12.1 Define Federal food, Drug and cosmetics Act.
- 12.2 Explain the additional food laws.
- 12.3 Describe legal categories of food substances.
- 12.4 Explain testing for safety.
- 12.5 Describe food labeling and nutrition labeling.
- 12.6 Describe international food standards and codex alimentations

Practical:

1. Assess the nutritional health of an infant by measuring the height and weight.
2. Calculate the fat percentage of a man.
3. Determine the nutritional status of a group of children.
4. Determine the percentage of fat in a sample of milk.
5. Prepare the balance diet by local ingredients.
6. Determine the presence of aflatoxin in a sample of food.
7. Assess the diseases of Jaundice, beriberi, scurvy, anemia and goiter
8. Calculate the total energy present in supplied quantity of food.
9. Determine the percentage of moisture in a sample of food

REFERENCE BOOKS

1. Principles of nutrition - by Wilson Fisher and Fugug.
2. Nutrition in Developing Countries - by King M.
3. Human Nutrition and Dietetics - by Sir Stanley Dav idson.
4. Pprinciples of nutrition - by Wilson Fisher and Fuqua.
5. Advanced text Book on Food and Nutrition - by Dr.M Swaminathan.
6. Food Science by Norman N. Potter - by Joserph H. Hotchkiss
7. Nutrition and Dietetics - by Shubhanbini, A Joshi
8. Human nutrition & Applied dietetics - by A.K Obidul Huq

৯. পুষ্টি ওখাদ্য ব্যবস্থা ডঃসিদ্দিকা কবির
১০. খাদ্য ও পুষ্টি নারায়ন বসু
১১. বিপাকও পুষ্টি বিজ্ঞান সৈয়দা হামিদা রহমান।

66933

FOOD INDUSTRIAL CHEMISTRY

T P C
2 3 3

AIMS:

- To be able to understand the concept of inorganic and industrial chemistry (organic).
- To be able to develop skills in analyzing chemical compounds (inorganic and organic compounds).
- To be able to identify the properties of various organic compounds.
- To be able to know the preparation & refining of sugar & starch.
- To be able to know the manufacturing process of banaspati & refining of edible oil.

SHORT DESCRIPTION:

Chemical reaction, oxidation, reductions; Classification of organic compounds; Purification of organic compounds; Qualitative and quantitative analysis of organic compounds; Saturated and unsaturated hydrocarbons; Alcohols; Carboxylic acids; Hydroxy acids; Aldehydes and ketons; Formaldehyde; Sugar and Starch Industries; Fats & oils; Aromatic compounds; Chloro-benzene, DDT and nitro benzene.

DETAIL DESCRIPTION

Theory:

1. Understand the feature of chemical reaction, oxidation and reduction.

- 1.1 Define chemical reaction.
- 1.2 Mention the different types of chemical reaction.
- 1.3 State oxidation and reduction.
- 1.4 Explain exothermic and endothermic reaction.
- 1.5 Explain the simultaneous, dissociation, thermal dissociation and ionic reaction.
- 1.6 Describe oxidation and reduction numbers.

2. Understand the feature of organic compounds.

- 2.1 State the meaning of organic compounds.
- 2.2 Explain the classification of organic compounds.
- 2.3 Explain the homologous series of organic compounds.
- 2.4 State alkanes, alkenes and alkynes.
- 2.5 Explain the functional group of organic compounds.
- 2.6 Mention the IUPAC system of nomenclature of organic compounds.

3. Understand the modern concepts of purification of organic compounds.

- 3.1 State the purification methods of organic compounds.
- 3.2 Explain the crystallization methods for purification of organic compounds.
- 3.3 Explain the distillation methods for purification of organic compounds.
- 3.4 Describe the fractional distillation methods for purification of organic compounds.
- 3.5 Explain the steam distillation methods for purification of organic compounds.
- 3.6 Describe solvent extraction methods for purification of organic compounds.
- 3.7 Explain the chromatographic methods for separation of organic compounds.
- 3.8 State the purification value of liquid organic compounds.

4. Understand the modern concept of qualitative and quantitative analysis of organic compounds.

- 4.1 Explain the identification of carbon (C) and hydrogen (H) in organic compounds.
- 4.2 Explain the identification of nitrogen (N), halogen (He) by lassaigne's test.
- 4.3 Describe the meaning process of nitrogen in hydrocarbon by Duma's methods.
- 4.4 Explain the meaning process of carbon and hydrogen in organic compounds using carbon and hydrogen measuring equipment.
- 4.5 Explain the fusion method to determine nitrogen and sulphur in organic compounds

5. Understand the feature of saturated & unsaturated hydrocarbon.

- 5.1 Define the meaning of hydrocarbon, saturated hydrocarbon and unsaturated hydrocarbon.
- 5.2 Describe the physical and chemical properties of saturated & unsaturated hydrocarbon.
- 5.3 Explain chemical reaction of alkanes.
- 5.4 Explain the uses of alkanes.
- 5.5 Explain the preparation of acetylene.
- 5.6 List the uses of acetylene, methyl iodide, ethyl iodide and chloroform and Grignard reagent.
- 5.7 Describe the isocyanides test, reduction test and Nessler reagent test for chloroform.

6. Understand the feature of alcohols.

- 6.1 State the meaning of alcohols.
- 6.2 Mention the classification of alcohols.
- 6.3 Mention the structure formula of four alcohols.
- 6.4 Explain the properties of alcohols.
- 6.5 Explain the manufacturing process of ethyl alcohols from starch by fermentation.
- 6.6 Write the uses of alcohols.
- 6.7 Describe the flashing test of ethyl alcohol.

7. Understand the feature of carboxylic acids.

- 7.1 List the derivatives of fatty acid.
- 7.2 Mention the structural formula of three derivatives of fatty acid.
- 7.3 Mention the reason for carboxylic acid being called fatty acid.
- 7.4 Mention the chemical formula of five fatty acids.
- 7.5 Explain the preparation of formic acid & acetic acid.
- 7.6 Describe the properties of formic acid & acetic acid.
- 7.7 Explain the preparation of ethyl acetate.
- 7.8 Write the uses of formic acid, acetic acid & ethyl acetate.

8. Understand the fundamentals of hydroxy acids.

- 8.1 Define the hydroxy acids with examples.
- 8.2 Explain the preparation of lactic acids.
- 8.3 Mention the physical properties of lactic acids.
- 8.4 Mention the uses of lactic acids.
- 8.5 Explain the manufacturing process of citric acids.
- 8.6 Describe the physical properties of citric acids.
- 8.7 Mention the uses of citric acids.

9. Understand the feature of aldehydes and ketons.

- 9.1 State the meaning of aldehydes and ketons.
- 9.2 Mention the structure of functional groups of aldehydes and ketons.
- 9.3 Mention the chemical formula of five aldehydes and ketons.
- 9.4 Describe the properties of aldehydes and ketons.
- 9.5 Mention the uses of aldehydes and ketons.

10. Understand the feature of formaldehyde.

- 10.1 Define formaldehyde
- 10.2 Explain the preparation of formaldehyde.
- 10.3 Mention the physical and chemical properties of formaldehyde.
- 10.4 Mention the important list of formaldehyde.
- 10.5 Mention the uses of formaldehyde.
- 10.6 State the meaning of formalin.
- 10.7 List the uses of formalin.
- 10.8 Identify the formalin of any foods sample.

11. Understand the feature of Sugar and Starch Industries.

- 11.1 Define sugar & invert sugar
- 11.2 Describe the manufacturing process of sugar from sugar cane.
- 11.3 Describe the refining of raw sugar.
- 11.4 Describe the manufacturing process of sugar from sugar beet.
- 11.5 Describe the utilization of byproducts of sugar industry
- 11.5 Explain the production of starch from corn or maize.
- 11.6 Explain the production of glucose and dextrin from starch.
- 11.7 List the uses of glucose.

12. Understand the feature of Fats & Oils.

- 12.1 List the sources of fats & oils.
- 12.2 Determine the saponification value, iodine value & acid value of fats & oils.
- 12.3 Describe the manufacturing method of Banaspati.
- 12.4 Describe the refining of edible oil.
- 12.5 Describe the extraction of oil by Solvent Extraction process.
- 12.6 Discuss the analysis of fats & oils.

13. Understand the feature of Aromatic compounds.

- 13.1 State the meaning of aromatic compounds.
- 13.2 List the important aromatic compounds.
- 13.3 Explain the preparation of benzene.
- 13.4 Mention the uses of benzene.
- 13.5 Explain the preparation of toluene.
- 13.6 Mention the uses of toluene.
- 13.7 Explain the preparation of 2-4-6 Tri-nitro toluene (TNT).
- 13.8 Mention the physical properties of TNT.
- 13.9 Mention the uses of TNT (Tri-nitro toluene)

14. Understand the feature of chloro-benzene, DDT and nitro benzene.

- 14.1 State the structural formula of chloro benzene and DDT (DDT= Di-chloro di-phenyl tri-chloro ethane)
- 14.2 Describe the preparation of chloro benzene.
- 14.3 Mention the physical and chemical properties of chloro benzene and di-chloro di-phenyl tri-chloro ethane.
- 14.4 Mention the uses of chloro benzene and di-chloro di-phenyl tri-chloro ethane.
- 14.5 Explain the preparation of nitrobenzene.
- 14.6 List the uses of nitrobenzene.

15. Understand the Water treatment

- 15.1 Mention the sources of water.
- 15.2 Describe industrial water treatment.
- 15.3 Explain water purification and water conditioning.

- 15.4 Explain demineralization or deionization.
- 15.5 Describe municipal water conditioning with flow diagram.
- 15.6 Describe sewage and industrial waste water treatment.

Practical:

1. Determine purification of any organic compounds by solvent extraction methods.
2. To measure the nitrogen presence of hydrocarbon by Duma's method.
3. To detect the presence of carbon in organic compounds.
4. Separation the organic compounds by steam distillation method.
5. Identify unknown organic substances following physical characteristics of the supplied unknown organic compounds: a) Color b) Crystalline c) Solubility
6. Determine the saponification value of fats & oils.
7. Measure the melting point of glucose, oxalic acid by capillary tube.
8. Measure the melting point of hydrocarbon (Dalda) by capillary tube.
9. Identify the formalin of any foods sample.
10. Perform the isocyanides test, reduction test and Nessler reagent test for chloroform.
11. Perform the flashing test of ethyl alcohol.
12. Prepare nitrobenzene from benzene.

REFERANCE BOOKS:

1. General chemistry- Md. Rafiqul Islam.
2. Organic chemistry- Md. Nurul Haque Mia.
3. Practical chemistry (degies) - Md. Nurul Haque Mia.
4. Understanding chemistry part- III
5. White wares production – W. RYAN
6. Chemical Process Industries- R. N. Shreve and J. A. Brink, Jr., McGraw-Hill Inc.
7. Industrial Chemistry- B. K. Sharma, Geol Publishing House.
8. Reagel's Hand Book of Industrial Chemistry- J. A. Kent edited, Van Nostrand.
9. Chemical Process Industries- G. T. Austin edited, McGraw-Hill.
10. আধুনিক শিল্প রসায়ন- প্রফেসর মোঃ মহির উদ্দিন।
11. শিল্প রসায়ন- এস. এ. কিউ. এম. হারুন, এবং মু. সায়দুল ইসলাম।
12. শিল্প রসায়ন ও রাসায়নিক প্রযুক্তি- ডাঃ এ এস এম নূরুল হক ভূইয়া।

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 to identify 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 coupled and transformer 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 and Wein-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 n 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 from 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

AIMS

- To enable to calculate the areas of regular polygons, hexagons, octagon, hydraulic mean depth (HMD) of a channel, area occupied by water of circular culvert. Excavation work.
- To provide the ability to calculate volume of regular solids like pyramid frustum of pyramid, prismoid, wedge and area of curved surfaces.
- To enable to use the knowledge of gradient of a straight line in finding speed, acceleration etc.
- To enable to use the knowledge of conic in finding the girder of a railway bridge, cable of a suspension bridge and maximum height of an arch.
- To make understand the basic concept and techniques of composition and resolution of vectors and computing the resultant of vectors.

- **SHORT DESCRIPTION**

Menstruation : Area of rectangles, squares, triangles, quadrilaterals, parallelograms, rhombus, trapezium, circle, sector, segment; Volume of rectangular solids, prism, parallelepiped, pyramids, cones, spheres, frustum of pyramid and cone; Area of curved surface of prism, Cylinder cone, pyramid and frustum of cone.

Co-ordinate Geometry: Co-ordinates of a point, locus and its equation, straight lines, circles and conic.

Vector: Addition and subtraction, dot and cross product.

DETAIL DESCRIPTION

MENSURATION:

1 Apply the concept of area of triangle.

1.1 Find the area of triangle in the form,

i) $A = \frac{\sqrt{3}}{4} a^2$, a = length of a side of equilateral triangle.

ii) $A = \frac{c}{4} \sqrt{4a^2 - c^2}$, where a = length of equal sides, c = third side.

iii) $A = \sqrt{s(s-a)(s-b)(s-c)}$, where a, b, c = length of the sides of a triangle and 2s is the perimeter of the triangle.

1.2 Use formula in 1.1 to solve problems.

2 Apply the concept of finding areas of quadrilateral & Parallelogram & finding areas of rhombus & trapezium.

2.1 Define quadrilateral & Parallelogram.

2.2 Find the areas of quadrilateral when off sets are given.

2.3 Find the areas of a parallelogram.

2.4 Solve problems using above formulae.

2.5 Define rhombus & trapezium.

2.6 Find the areas of rhombus when the diagonals are given.

2.7 Find the areas of trapezium in terms of its parallel sides and the perpendicular distance between them.

2.8 Solve problems related to rhombus & trapezium.

3 Apply the concept of finding areas of regular polygon.

3.1 Define a regular polygon.

3.2 Find the area of a regular polygon of n sides, when

i) The length of one side and the radius of inscribed circle are given.

ii) The length of one side and the radius of circumscribed circle are given.

3.3 Find the area of a regular.

a) Hexagon

b) Octagon when length of side is given.

3.4 Solve problems of the followings types:

A hexagonal polygon 6 m length of each side has a 20 cm width road surrounded the polygon. Find the area of the road.

4 Understand areas of circle, sector and segment.

- 4.1 Define circle, circumference, sector and segment.
- 4.2 Find the circumference and area of a circle when its radius is given.
- 4.3 Find the area of sector and segment of a circle.
- 4.4 Solve problems related to the above formulae.

5 Apply the concept of volume of a rectangular solid.

- 5.1 Define rectangular solid and a cube.
- 5.2 Find geometrically the volume of a rectangular solid when its length, breadth and height are given.
- 5.3 Find the volume and diagonal of a cube when side is given.
- 5.4 Solve problems with the help of 6.2 & 6.3.

6 Apply the concept of surface area, volume of a prism, parallelepiped and cylinder.

- 6.1 Define a prism, parallelepiped and a cylinder.
- 6.2 Explain the formulae for areas of curved surfaces of prism, parallelepiped and cylinder.
- 6.3 Explain the formulae for volume of prism, parallelepiped and cylinder when base and height are given.
- 6.4 Solve problems related to 7.2, 7.3.

7 Apply the concept of the surface area, volume of pyramid, cone and sphere.

- 7.1 Define pyramid, cone and sphere.
- 7.2 Explain the formula for areas of curved surfaces of pyramid, cone and sphere.
- 7.3 Explain the formula for volumes of pyramid, cone and sphere.
- 7.4 Solve problems related to 8.2, 8.3.

CO-ORDINATE GEOMETRY

8 Apply the concept of co-ordinates to find lengths and areas.

- 8.1 Explain the co-ordinates of a point.
- 8.2 State different types of co-ordinates of a point.
- 8.3 Find the distance between two points (x_1, y_1) and (x_2, y_2) .
- 8.4 Find the co-ordinates of a point which divides the straight line joining two points in certain ratio.
- 8.5 Find the area of a triangle whose vertices are given.
- 8.6 Solve problems related to co-ordinates of points and distance formula.

9 Apply the concept of locus & the equation of straight lines in calculating various Parameter.

- 9.1 Define locus of a point.
- 9.2 Find the locus of a point.
- 9.3 Solve problems for finding locus of a point under certain conditions.
- 9.4 Describe the Equation $x=a$ and $y=b$ and slope of a straight line.
- 9.5 Find the slope of a straight line passing through two point (x_1, y_1) and (x_2, y_2) .
- 9.6 Find the equation of straight lines:
 - (i) Point slope form.
 - (ii) Slope Intercept form.
 - (iii) Two points form.
 - (iv) Intercept form.
 - (v) Perpendicular form.
- 9.7 Find the point of intersection of two given straight lines.
- 9.8 Find the angle between two given straight lines.
- 9.9 Find the condition of parallelism and perpendicularity of two given straight lines.
- 9.10 Find the distances of a point from a line.

10 Apply the equations of circle, tangent and normal in solving problems.

- 10.1 Define circle, center and radius.
 10.2 Find the equation of a circle in the form:
 (i) $x^2 + y^2 = a^2$
 (ii) $(x - h)^2 + (y - k)^2 = a^2$
 (iii) $x^2 + y^2 + 2gx + 2fy + c = 0$
 10.3 Find the equation of a circle described on the line joining (x_1, y_1) and (x_2, y_2) .
 10.4 Define tangent and normal.
 10.5 Find the condition that a straight line may touch a circle.
 10.6 Find the equations of tangent and normal to a circle at any point.
 10.7 Solve the problems related to equations of circle, tangent and normal.

11 Understand conic or conic sections.

- 11.1 Define conic, focus, Directorx and Eccentricity.
 11.2 Find the equations of parabola, ellipse and hyperbola.
 11.3 Solve problems related to parabola, ellipse and hyperbola.

VECTOR :**12 Apply the theorems of vector algebra.**

- 12.1 Define scalar and vector.
 12.2 Explain null vector, free vector, like vector, equal vector, collinear vector, unit vector, position vector, addition and subtraction of vectors, linear combination, direction cosines and direction ratios, dependent and independent vectors, scalar fields and vector field.
 12.3 Prove the laws of vector algebra.
 12.4 Resolve a vector in space along three mutually perpendicular directions
 12.5 Solve problems involving addition and subtraction of vectors.

13 Apply the concept of dot product and cross product of vectors.

- 13.1 Define dot product and cross product of vectors.
 13.2 Interpret dot product and cross product of vector geometrically.
 13.3 Deduce the condition of parallelism and perpendicularity of two vectors.
 13.4 Prove the distributive law of dot product and cross product of vector.
 13.5 Explain the scalar triple product and vector triple product.
 13.6 Solve problems involving dot product and cross product.

Reference

SL No	Athour	Title	Publication
01	G. V. Kumbhojkar	Companion to basic Maths	Phadke Prakashan
02	Murary R Spigel	Vector & Tensor Analysis	Schaum's Outline Series
03	Md. Abu Yousuf	Vector & Tensor Analysis	Mamun Brothers
04	Rahman & Bhattacharjee	Co-ordinate Geometry & Vector Analysis	H.L. Bhattacharjee
05	Md. Nurul Islam	Higher Mathematics	Akkhar Patra Prakashani

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; $PV^\gamma = \text{const.}$
- 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 coefficient 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 |

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 Muktasana, Ustrasana.
- 3.3 Prana and Pranayama: Nadisuddhi Pranayama, 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 neighbour.
- 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