M.G.V's,Arts,Science and Commerce College, Malegaon Camp. Dist :Nashik 423103

DEPARTMENT OF Chemistry
Diploma in Dairy &Agri
(One Year Diploma Course)

SEMESTER-I

Paper Code	Nomenclature	Duration of Exam	External	Internal	Max Marks	Type	Hours per Semester	Credits
Agri - 101	Basic concepts of Agricultural & Soil Chemistry	3 Hours	60	40	100	General	48	4
Agri - 102	Agriculture & water management	3 Hours	60	40	100	General	48	4
Agri - 103	Soil fertility	3 Hours	60	40	100	General	48	4
Agri - 104	Practical-I	3 Hours	60	40	100	Skill	48	4
Agri - 105	Practical-II	3 Hours	60	40	100	Skill	48	4
Agri - 106	Practical-III	3 Hours	60	40	100	Skill	48	4
Total					**600**			

SEMESTER-II

Paper Code	Nomenclature	Duration of Exam	External	Internal	Max Marks	Type	Hours per Semester	Credits
Dairy - 201	Milk contents & properties	3 Hours	60	40	100	General	48	4
Dairy - 202	Basic concept of Dairy Industry	3 Hours	60	40	100	General	48	4
Dairy - 203	Milk products	3 Hours	60	40	100	General	48	4
Dairy - 204	Practical-I	3 Hours	60	40	100	Skill	48	4
Dairy - 205	Practical-II	3 Hours	60	40	100	Skill	48 48	4 4
Dairy - 206	Practical-III	3 Hours	60	40	100	Skill	48	4
Total					600			
Total (I + II)					1200			

1. Theory exams will be held semester wise.
2. Practical exams will be semester wise.

SEMESTER-I
PAPER-I

Basic concepts ofAgricultural &Soil Chemistry

Subject Code : Agri-101

Time : 3 Hrs.
Total Marks : 100
Minimum Pass Marks : 40

Note : Attempt Five questions in all. Question No. 1 is short answer type. All questions carry equal marks.

Chapter: 1 Introduction to agricultural chemistry. (08 L)

- Role of agricultural chemistry.
- Scope & Importance of agricultural chemistry.
- Relevance ofagricultural chemistry with other sciences.

Chapter: 2 Fundamentals of soil chemistry. (08 L)

- Definition of soil.
- Components of soil- Minerals, organic matter, soil atmosphere, soil water, soil micro-organism.

Chapter:3 Properties of soil. (08 L)

- Physical properties of soil- Soil texture, soil structure, soil colour, soil temperature, soil density, porosity of soil.

Chapter:4 Soil chemical & colloidalProperties. (08 L)

- Introduction, soil clays, organic colloids, cation exchange, anion exchange & adsorption, soil reaction buffering in soils.

Chapter:5 Soil problems. (08 L)

- Formation of acid soil.
- Effects of soil acidity.
- Reclamation of alkali soil.
- Classification of alkali soil- saline soil, saline alkali soil, non-saline alkali soil.
- Calcurous soil.

Chapter:6 Soil testing. (08 L)

- Introduction to soil testing.
- Objectives of soil testing.
- Phases of soil testing- collection of soil analysis in laboratory.

SEMESTER-I
PAPER-II

Agriculture & water management

Subject Code : Agri-102 **Time : 3 Hrs.**
Total Marks : 100
Minimum Pass Marks : 40

Note : Attempt Five questions in all. Question No. 1 is short answer type. All questions carry equal marks.

Chapter: 1 Water resources. (10 L)

- Different sources of water- Atmospheric water, surface water, stored water, ground water.
- Impurities in water, water quality, water related problems in public health.
- Environment & agriculture.

Chapter: 2Water & irrigation. (10 L)

- Introduction.
- Irrigation water quality – Turbidity, water temperature, BOD, COD, Pathogenic
- Dissolved constituents & their functions
- Major constituents – Ca, Mg, Na, K, Carbonate, bicarbonate, sulphate, chloride & nitrate
- Minor constituents- B, Si, nitrite, sulphide & fluoride

Chapter: 3Water quality standards.(06 L)

- Total soluble salts (TSS), Sodium adsorption ratio (SAR), exchangeable sodium percentage (ESP), residual sodium carbonate salinity classes for irrigation water

Chapter: 4 Method of Appling water (12 L)

- Border strip & check basin irrigation
- Furrow irrigation
- Sprinkler method
- Drip (Trickle) irrigation
- sub irrigation
- special irrigation technique 1) alternate row irrigation 2) Timing for limited irrigation 3)irrigating clay soils 4)irrigation with salty water 5) Surge flow surface irrigation 6)Flexible irrigation – dry land system (IDS)

Chapter: 5 soil & water (10 L)

- Introduction
- Nature of water erosion
- Causes of water erosion of soil
- Classification ofwater erosion
- Factor affecting erosion by water
- water erosion control technique

SEMESTER-I
PAPER-III

Soil fertility

Subject Code : Agri-103 **Time : 3 Hrs.**
Total Marks : 100
Minimum Pass Marks : 40

Note : Attempt Five questions in all. Question No. 1 is short answer type. All questions carry equal marks.

Chapter 01: Soil fertility & plant nutrition (12L)

- Introduction
- Mechanism of nutrients uptake
- Balanced nutrition through fertilization
- Soil nitrogen gains & transformation
- Nitrogen losses from the system
- The nitrogen balance
- Soil phosphorus
- Soil potassium
- Soil calcium
- Soil magnesium
- Soil sulfur
- Soil micronutrients

Chapter 02: fertilizers & optimum yields (12L)

- Introduction
- Modern trends & economics
- Plant composition
- Nutrients supplying capacity of soil
- Determining fertilizer needs
- Fertilizer guarantee
- Material supplying nitrogen
- Material supplying phosphorus
- Material supplying potassium
- Multinutrients fertilizers
- Material supplying other nutrients
- Fertilizers formulations
- Acidity or Basicity of fertilizers
- Method of applying fertilizers
- Fertilizers efficiency
- Getting maximum yields

Chapter 03: Manures (12L)

- Introduction, definition & classification of manures
- Effect of bulky organic Manures on soil farm yard Manure (FYM), factors affecting FYM, method of preparation losses during handling & storage
- Biogas plant, human waste, sewage & sludge, types of sludge, carbon nitrogen ratio, sewage, irrigation & uses

- Green Manuring, types of green manuring, characteristics advantages disadvantages of green Manuring

Chapter 04:Protection of plants (12L)

- Introduction, definition & classification, chemical properties elemental composition, mode of action of synthetic & plant originated compounds, organophosphates , malathion , parathion, carbamates
- Fungicides - definition & classification chemical properties mode of action of S & Cu Fungicides
- Herbicides - definition & classification composition mode of action of selective & non selective Herbicides

SEMESTER-I

PAPER-IV
Practical -I

Time :5 Hrs.

Subject Code :Agri-104 **Total Marks : 100**

Minimum Pass Marks : 40

Note : Attempt two questions in all. All questions carry equal marks.

1. Determination of pH and electrical conductivity of soil I and total soluble salts.
2. Determination of available nitrogen form soil by alkaline permanganate method.
3. Determination of available phosphorous form soil by Olsen colorimetric method
4. Determination of available potassium form soil by turbidimetricanalysis
5. Determination of calcium carbonate in soil by rapid titration method
6. Determination of gypsum requirement of alkaline soils
7. Determination of Soil Organic Carbon
8. Determination of Moisture Content of Soil

SEMESTER-I

PAPER-V
Practical -II

Time : 5 Hrs.

Subject Code : Agri-105 **Total Marks : 100**

Minimum Pass Marks : 40

Note : Attempt two questions in all. All questions carry equal marks.

1. Determination of pH and electrical conductivity of irrigation water sample.
2. Determination of carbonate, bicarbonate and chloride from irrigation water sample.
3. Determination of calcium and magnesium by EDTA (Versenate) method
4. Determination of dissolved oxygen by irrigation water by Winkler's method
5. Determination of total nitrogen from urea.
6. Determination of copper form copper fungicide
7. Determination of r - isomer of BHC by hydrolysis

SEMESTER-I
PAPER-VI
Practical -III

Time : 5 Hrs.

Subject Code : Agri-106 **Total Marks : 100**

Minimum Pass Marks: 40

- **Two Industrial / laboratory / field visits (2 credits)**
- **Report of Industrial / laboratory / field visits (2 credits)**

SEMESTER-II
PAPER-I

Milk Contents & Properties

Subject Code : Dairy-201 **Time : 3 Hrs.**
Total Marks : 100
Minimum Pass Marks: 40

Note: Attempt Five questions in all. Question No. 1 is short answer type. All questions carry equal marks.

Chapter 1 Composition of milk (08 L)

- Introduction: Definition, Composition of milk-water, fat, lactose, proteins, ash, acidity Composition of milk from different species of mammals
- factors affecting composition of milk-season, feeds and nutrients levels, environmental temperature

Chapter 2 Physicochemical properties of milk (08 L)

- Acidity ,Ph, specific gravity, colour, flavour of milk, food and nutritive value of milk

Chapter 3 Microbiology of milk (08 L)

- Growth of micro-organisms, stages of growth, product of microbial growth, destruction of micro-organisms growth

Chapter 4 Special milk (12 L)

- Sterilized milk- Definition, method of preparation, method of manufacture in details, advantages and disadvantages
- Homogenised milk- Definition, merits and demerits, factor influencing homogenisation, process of manufacture
- Soft curd milk- Definition, characteristics, method of preparation of soft curd milk
- flavoured milk- Definition, types, method of manufacture flow sheet diagram
- Vitaminised / Irradiated milk- Definition, method of manufacture
- Fermented milk- Definition, method of manufacture
- Standardised milk- Definition, method of manufacture

Chapter 5 Milk proteins, Carbohydrates and vitamins (12 L)

- Milk proteins- Importance of proteins found in the milk casein, albumin and globulin
- Carbohydrates- Importance of lactose, classification, properties nutritive value of lactose, use of lactoseVitamins- Importance , definition, properties, nutritive value of vitamins, Vit-A, Vit-B, Vit-B2, Vit-B12, Vit-C and Vit-D

SEMESTER-II
PAPER-II

Basic concept of DairyIndustry

Subject Code : Dairy-202

Time : 3 Hrs.
Total Marks : 100
Minimum Pass Marks: 40

Note: Attempt Five questions in all. Question No. 1 is short answer type. All questions carry equal marks.

Chapter 1 the role of dairy cattle in world food production (08 L)

- Value of milk in human nutrition
- Role of milk and milk products in the human diet
- Role of dairy cattle in the production of animal protein
- History of the dairy industry

Chapter 2 the dairy industry in the United States (08 L)

- History
- Development of the dairy industry
- Production of milk
- Consumption of milk
- Use of the milk supply
- Breeds of dairy cattle

Chapter 3 Bio-protective factors for preservation of raw milk (12 L)

- Introduction
- Use of bio-protective factor for preservation of raw milk
- Effects on physicochemical, microbial and nutritional properties of milk and milk products, present status of preservation of raw milk by chemical preservatives, thermal processing for preservation

Chapter 4 Cleaning and sanitization of dairy equipment (12 L)

- Current trends in cleaning and sanitization of dairy equipment
- Biological detergents, automation ,ultrasonic techniques in cleaning, bio detergents
- Development of sanitization- heat, chemical radiation, mechanism of fouling and soil removal , bio-films, accessing the effectiveness of cleaning and sanitization of dairy products

Chapter 5 Milk Marketing (08 L)

- Method of selling milk
- Development of the milk co-operatives
- Milk pricing system Government regulation of milk marketing

SEMESTER-II
PAPER-III

Milk products

Subject Code : Dairy-203

Time : 3 Hrs.
Total Marks : 100
Minimum Pass Marks: 40

Note: Attempt Five questions in all. Question No. 1 is short answer type. All questions carry equal marks.

Chapter 1 Present status of traditional dairy products (08 L)

- Globalisation of traditional dairy products, plants and policies of the government and developmental agencies

Chapter 2 Frozen Milk Products (20 L)

- Cream : definition , classification, compositions food and nutritive value, physico -chemical properties, manufacture and uses
- Butter : definition, classification, composition, food and nutritive value, physico -chemical properties, manufacture and uses of butter selection of milk/cream, preheating of milk, separation of milk, neutralization of cream ,pasteurization of cream, cooking and ageing, repending of cream, salting of butter, washing of butter, packaging and storage, use of butter
- Cheese : definition, classification, food and nutritive value, properties, manufacture and uses of cheese
- Ice-cream : definition, classification, composition food and nutritive value, manufacturing, packing, hardening and storage, uses of ice-cream

Chapter 3 Advance Products (10 L)

- New products based on fruits, vegetables and cereals,
- Application of membrane, technology, microwave heating for industrial production of traditional dairy products
- Industrial production of ghee, flavour and texture stimulation

Chapter 4 Dried milk products (10 L)

Introduction, butter milk powder, cream, powder, infact milk powder, Shrikhand powder, whay powder, Ice-cream mix powder, cheese powder

SEMESTER-II

PAPER-IV
Practical -I

Time: 5 Hrs.

Subject Code: Agri-204 **Total Marks : 100**

Minimum Pass Marks: 40

Note: Attempt two questions in all. All questions carry equal marks.

1. Study of platform tests
    a. Sediment test
    b. Alcohol test
    c. Clot on boiling test
    d. Organoleptic test and temperature.
2. Determination of specific gravity of milk from different sources by using.
    a. Specific gravity bottle and
    b. Lactometer.
3. Determination of fat Content in Samples of Cow and Buffalo Milk by Gerber Method
4. Determination of pH, acidity, total solids and lactose of cow and buffalo milk.
5. Determination of caesin in milk by Pyne's formal titration method and calculate the percentage of proteins in milk.
6. Determination of saponification value of ghee or butter
7. Determination of iodin value of Ghee by Wij's method
8. Detection of Starch in Channa

SEMESTER-II

PAPER-V

Practical -II

Time: 5 Hrs.

Subject Code: Dairy-205 **Total Marks : 100**

Minimum Pass Marks: 40

Note: Attempt two questions in all. All questions carry equal marks.

1. Determination of total calcium in milk
2. Determination of phosphorous in milk
3. Estimation of acidity and refractive index of cream, butter and ghee.
4. Determination of preservatives in milk, basic acid and formaldehyde.
5. Detection of adultrants in milk, water, separated milk or extraction of fat in milk samples
6. Determination of chloride content of the milk
7. Detection and Quantification of Starch in Milk
8. Quantitative Determination of Cane Sugar in Milk

SEMESTER-II
PAPER-VI
Practical -III

Time : 5 Hrs.

Subject Code :Dairy-206 **Total Marks : 100**

Minimum Pass Marks: 40

- **Two Industrial / laboratory / field visits (2 credits)**
- **Report of Industrial / laboratory / field visits (2 credits)**

Pattern of Question for theory

For theory courses, end semester question papers will be set to test the conceptual knowledge and understanding of the basic and advanced concepts of the subject. Eachtheory course question paper will be of **60 marks** and the pattern of question paper shall be:

Question 1 (15 Marks)	5 compulsory sub-questions, each of 3 marks; precisely answerable in 2-5 sentences (such as define, short problem, draw the structure / neat labelled diagram, short reasons, characteristics, applications, etc.)
Question 2 and Question 3 (30 Marks)	6 out of 10 – descriptive answer type questions of 5 marks each; answerable in sufficient length with graph or diagram or flow sheet if necessary
Question 4 (15 Marks)	3 out of 5– numerical problem type question; spectral analysis, For descriptive course critical notes, decryption of technique, how you will apply your knowledge to solve particular problem, etc. types of question.

Pattern of Question for Practical

Each practical course question paper will be of **60 marks** and candidate has to attempt two practicals from given questions.