DETAILED SYLLABUS FOR THE POST OF DAIRY FARM INSTRUCTOR - DIRECT RECRUITMENT AND SR FOR SCHEDULED TRIBE ONLY IN KERALA DAIRY DEVELOPMENT (Cat.No: 691/2022, 419/2022)
PHYSICS
Fundamental Forces in Nature **Mark -1**
Units and Measurements - SI Systemof Units, Conversion of one unit to another ,Dimensional Analysis **Mark -1**
Motion along a straight line - Distance and Displacement , Speed and Velocity, Acceleration **Mark -1**
Motion in a Plane - Scalars and Vectors , Projectile Motion , Centripetal Force **Mark -1**
Laws of Motion - First law of Motion and Inertia , Second law of motion and force , Recoil Velocity and Rocket Propulsion , Friction and Banking of Curves **Mark -1**
Work Energy and Power - Work- Energy Theorem , Energy – Kinectic and Potential Energies , Power **Mark -1**
Mechanics of Solids – Stress and Strain **Mark -1**
Mechanics of Fluids – Pascal's law, Bernoulli's Theorem , Surface Tension, Viscosity , Capillarity **Mark -1**
Heat and Thermodynamics – Temperature, Measurement of Temperature, Conduction , Convection and Radiation , Laws of Thermodynamics , Heat engine and Refrigerator. **Mark -1**
Oscillations – Periodic and Non Periodic Motion , Time Period and Frequency of oscillations, Simple Pendulum **Mark -1**
Electric Charge and Fields – Properties of Charge,Coulomb' law and Gauss Theorem. **Mark -1**
Electic Potential and Capacitance – Electric Potential, Capacitance, Parallel Plate Capacitor , Combination of

Capacitors **Mark -1**
Current Electricity – Definition of Current , Drift velocity , Ohm’s law, Resistance , Kirchoff’s Laws **Mark -1**
Magnetic Effects of Current and Magnetism – Motion of a charge in a magnetic field , Force between two Parallel wires, Moving Coil Galvanometer , Earth’ s Magnetism , Magnetic Propertie of materials and its classification **Mark -1**
Electromagnetic Induction – Faraday’s Laws, Self Induction, Mutual Induction , Transformer **Mark -1**
Alternating Current and AC Generator Mark -1
Ray Optics and Wave Optics – Reflection and Refraction , Total Internal Reflection , Interference , Diffraction and Polarisation **Mark -1**
Dual Nature of Matter and Radiation- Photoelectric Effect and deBroglie Waves **Mark -1**
Atomic Nuclei – Mass number, Atomic Number, Mass Defect and Binding Energy, Radio Activity, Nuclear Fission and Fusion **Mark -1**
SemiConductors – Intrinsic and Extrinsic Semi Conductors , Rectifiers, transistors and Digital Gates **Mark -1**
Chemistry
Structure of Atom [Marks – 1] ➢ Discovery of Sub-atomic Particles ➢ Atomic Models ➢ Developments Leading to the Bohr's Model of Atom ➢ Bohr's Model for Hydrogen Atom ➢ Towards Quantum Mechanical Model of the Atom ➢ Quantum Mechanical Model of Atom

Chemical Bonding and Molecular Structure. [Marks – 1]

➢ Kössel-Lewis Approach to Chemical Bonding

➢ Ionic or Electrovalent Bond

➢ Bond Parameters

➢ The Valence Shell Electron Pair Repulsion (VSEPR) Theory

➢ Valence Bond Theory

➢ Hybridisation

➢ Molecular Orbital Theory

➢ Bonding in Some Homonuclear Diatomic Molecules

➢ Hydrogen Bonding

Thermodynamics [Marks – 1]

➢ Thermodynamic Terms

➢ Applications

➢ Measurement of ΔU and ΔH: Calorimetry

➢ Enthalpy Change, ΔH of a Reaction Reaction Enthalpy

➢ Enthalpies for Different Types of Reactions

➢ Spontaneity

➢ Gibbs Energy Change and Equilibrium

Equilibrium [Marks – 2]

➢ Equilibrium in Physical Processes

➢ Equilibrium in Chemical Processes- Dynamic Equilibrium

➢ Law of Chemical Equilibrium and Equilibrium Constant

➢ Homogeneous Equilibria

➢ Heterogeneous Equilibria

➢ Applications of Equilibrium Constants

➢ Relationship between Equilibrium Constant K, Reaction Quotient Q and Gibbs Energy G

➢ Factors Affecting Equilibria

➢ Ionic Equilibrium in Solution

➢ Acids,Bases and Salts

➢ Ionization of Acids and Bases

➢ Buffer Solutions

➢ Solubility Equilibria of Sparingly Soluble Salts

Organic Chemistry-Some Basic Principles and Techniques [Marks – 2]

➢General Introduction

➢Tetravalence of Carbon: Shapes of Organic Compounds

➢Structural Representations of Organic Compounds

➢Classification of Organic Compounds

➢Nomenclature of Organic Compounds

➢Isomerism

➢Methods of Purification of Organic Compounds

➢Qualitative Analysis of Organic Compounds

➢Quantitative Analysts

Solutions. [Marks – 2]

➢ Types of Solutions

➢ Expressing Concentration of Solutions

➢ Solubility

➢ Vapour Pressure of Liquid Solutions

➢ Ideal and Non-ideal Solutions

➢ Colligative Properties and Determination of Molar Mass

➢ Abnormal Molar Masses

Chemical Kinetics. [Marks – 2]

➢ Rate of a Chemical Reaction

➢ Factors Influencing Rate of a Reaction

➢ Integrated Rate Equations

➢ Temperature Dependence of the Rate of a Reaction

➢ Collision Theory of Chemical Reactions

Alcohols And Phenols [Marks -3]

➢ Classifications

➢ Nomenclature

➢ Structures of functional Groups

➢ Alcohols and Phenols

➢ Some Commercially Important Alcohols

Aldehydes, Ketones and Carboxylic Acids. [Marks – 2]

➢ Nomenclature and Structure of Carbonyl Group

➢ Preparation of Aldehydes and Ketones

➢ Physical Properties

➢ Chemical Reactions

➢ Uses of Aldehydes and Ketones

➢ Nomenclature and Structure of Carboxyl Group

➢ Methods of Preparation of Carboxylic Acids

➢ Physical Properties

➢ Chemical Reactions

➢ Uses of Carboxylic Acids

Biomolecules [Marks – 4]

➢ Carbohydrates

➢ Proteins

➢ Enzymes

➢ Vitamin

➢ Nucleic Acids

➢ Hormones

BOTANY		
Reproduction Total (2 marks)	1. Sexual reproduction in flowering plants	Flower structure; Pollination–types, agencies and examples; Out - breeding devices; Double fertilization; Special modes– apomixes, parthenocarpy, Polyembryony.
Biotechnology and Its Applications Total (2 marks)	2. Principles and process of Biotechnology	Tools of Recombinant DNA Technology ;- Restriction Enzymes, Cloning Vectors, Amplification of Gene of Interest using PCR
	3. Application of Biotechnology in health and agriculture	APPLICATIONS IN AGRICULTURE; - Bt Cotton: Pest Resistant Plants / RNA interference (RNAi). Human insulin, Gene therapy; Genetically modified organisms; Transgenic Animals
Ecology and environment Total (1mark)	4. Organisms and Population	Ecological adaptations; Population interactions–mutualism, competition, predation, parasitism; Population attributes–growth, birth rate and death rate.
	5. Ecosystems	Components : productivity and decomposition; Energy flow; Pyramids of number, biomass and energy
Diversity in Living World Total (1mark)	6. Biological classification	Five kingdom classification; Lichens; Viruses, Viroids & Prions.
	7. Plant Kingdom	Salient features and classification of plants into major groups- Algae, Bryophytes, Pteridophytes (Heterospory & Seed habit), Gymnosperm and Angiosperm.
Structural Organisation in Plants Total (1 Mark)	8. Morphology of Flowering Plants	Different parts of flowering plants: Root, leaf venation & phyllotaxy, inflorescence- Cymose and Racemose, Aestivation, Placentation , Seed
	9. Anatomy of Flowering Plants	The Tissue System :- The Vascular Tissue system ;Radial, Conjoint, Open , Closed vascular bundles

Cell Structure and Function Total (1Mark)	10. Cell theory and cell as the basic unit of life	Cell organelles–Endomembrane system- Endoplasmic reticulum, Golgi bodies, Lysosomes, Vacuoles; Mitochondria, Ribosomes, Plastids
	11. Cell division	Cell cycle, mitosis, meiosis (main events)
Plant Physiology Total (2 marks)	12. Photosynthesis	Cyclic and Non -Cyclic photo phosphorylation; Photorespiration; C3 and C4 pathways
	13. Respiration	Cellular respiration – Glycolysis, fermentation (anaerobic), TCA cycle Respiratory quotient.
	14. Plant growth and development	Growth regulators–Auxin, Gibberellin, Cytokinin, Ethylene, ABA
ZOOLOGY		
Reproduction Total (1 marks)	1. Human Reproduction	Male and female reproductive systems; Gametogenesis- spermatogenesis & oogenesis Fertilisation, embryo development up to blastocyst formation, implantation; Hormones of placenta; Parturition, Lactation
	2. Reproductive health	Sexually transmitted diseases (STD); Birth control- Methods, Contraception and Medical Termination of Pregnancy (MTP); Amniocentesis; Infertility and assisted reproductive technologies – IVF(ZIFT, GIFT), AI, ICSI, Surrogacy
Genetics and Evolution Total (2 marks)	3. Heredity and variation	Mendelian Inheritance; Deviations from Mendelism– Incomplete dominance, Co-dominance, Multiple alleles and Inheritance of blood groups; Polygenic inheritance , Pleiotropy ; Sex determination– In humans, birds, honey bee; Chromosomal disorders in humans;

		Down's syndrome, Turner's and Klinefelter's syndromes.
	4.Molecular Basis of Inheritance	Structure of DNA and RNA; DNA packaging; DNA replication; Central dogma; Transcription, Genetic code, Translation; Gene expression and Regulation– Lac Operon and Human Genome Project; DNA finger printing.
	5Evolution	Origin of life; Biological evolution and evidences for biological evolution (Paleontological, comparative anatomy); Hardy- Weinberg's principle; Adaptive Radiation; Human evolution.
Biology and Human Welfare Total (1 mark)	6.Health and Disease	Pathogens; parasites causing human diseases (Malaria, Filariasis, Ascariasis, Typhoid, Pneumonia, Common cold, Amoebiasis, Ring worm); Basic concepts of immunology–Vaccines; Cancer, HIV and AIDs..
	7.Microbes in human welfare	In household food processing, industrial production, As bio control agents and Bio fertilizers.
Ecology and environment Plants Total (1 mark)	8. Biodiversity and its conservation	Biodiversity conservation; Hotspots, endangered organisms, extinction, Red Data Book, biosphere reserves, National parks and sanctuaries
Diversity in Living World Total (1 marks)	9.What is living	Taxonomical hierarchy; Binomial nomenclature; Tools for study of Taxonomy– Museums, Zoos, Herbaria, Botanical gardens
	10.Animal kingdom	Salient features and classification of animals- non chordate up to phyla level and chordate up to classes level (salient features and examples).
Cell Structure and Function Total (1 mark)	11. Chemical constituents of living cells(Bio molecules)	Enzymes–types, properties, enzyme action

Human Physiology Total (3 marks)	12.Breathing and Respiration	Mechanism of breathing and its regulation in humans– Exchange of gases, transport of gases and regulation of respiration, Respiratory volumes; Disorders related to respiration-Asthma, Emphysema, Occupational respiratory disorders
	13. Body fluids and circulation	Composition of blood, blood groups, coagulation of blood; Human circulatory system– Structure of human heart Cardiac cycle, cardiac output, ECG; Disorders of circulatory system-Hypertension, Coronary artery disease, Angina pectoris, Heart failure
	14. Excretory products and their elimination	Modes of excretion – Ammonotelism, Ureotelism, Uricotelism; Human excretory system–structure and fuction; Regulation of kidney function– Renin-angiotensin, Atrial Natriuretic Factor, ADH ;Disorders-Uraemia, Renal failure, Renal calculi, Nephritis; Dialysis and artificial kidney
	15. Locomotion and Movement	Skeletal muscle – contractile proteins and muscle contraction Joints; Disorders of muscular and skeletal system- Myasthenia gravis, Tetany, Muscular dystrophy, Arthritis, Osteoporosis, Gout.
	16. Neural control and coordination	Neuron and nerves; Nervous system in humans– central nervous system, peripheral nervous system and visceral nervous system; Generation and conduction of nerve impulse
	17. Chemical coordination and regulation	Human endocrine system Hypothalamus, Pituitary, Pineal, Thyroid, Parathyroid, Adrenal, Pancreas, Gonads; Common disorders e.g. Dwarfism, Acromegaly, Cretinism, goiter, exopthalmicgoiter, diabetes, Addison’s disease

MATHEMATICS

SL NO	TOPIC	NO OF QUESTIONS	MARK
1	SETS :Union,intersection,complement and difference of sets	4	4
2	Permutations and combinations Permutations of n different objects taken r at a time Combinations of n different objects taken r at a time	1 1	1 1
3	Differentiability and continuity Derivative of function Tangents and normals Increasing and Decreasing Function	1 1 1	1 1 1
4	Probability Probability of independent events	1	1
3	Binomial theorem General and middle terms of the expansion($a+b)^{n}$,	2	2
4	Sequences and Series n th term ,Sum of n terms of a GP,number of terms of GP	3	3
5	Relations and Functions Inverse of the function,Composition of function	2	2
6	Matrices and Determinents Adjoint and Inverse of the matrix,Transpose of a matrix	3	3

BASIC DAIRY SCIENCE		
Module No.	**Description**	**Distribution of Marks**
1	Dairy Development and Co-operative system- Overview of the dairy industry in India, History of Dairy development in India and Kerala, Operation Flood, NDDB, MILMA,	**2**
2	Milk Production- Classification and characteristics of dairy animal breeds, Clean milk production, Dairy farming practices, and management, Feed formulation and rationing for dairy animals, Fodder, Cattle diseases	**5**
3	Milk Processing and Preservation- Raw milk quality assessment and grading, Pricing, Market milk, Principles of milk processing, Pasteurization and sterilization techniques, Homogenization and standardization of milk, Milk preservation methods - refrigeration, and fermentation,	**5**
4	Dairy Products Technology- Fat-rich products, Fermented milk products, Ice cream and frozen desserts, Traditional dairy products, Cereal-based milk products, Dried milk products, Cheese.	**4**
5	Quality Control and Safety in Dairy Industry- Physico-chemical properties of milk, Quality control of raw milk and dairy products, Food safety standards and regulations in the dairy industry, Hygiene and sanitation practices in milk processing plants	**4**

NOTE: - It may be noted that apart from the topics detailed above, questions from other topics prescribed for the educational qualification of the post may also appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper

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