DETAILED SYLLABUS

Field Officer in Kerala Forest Development Corporation

(Cat. No. 449/2024,450/2024,784/2024,785/2024,786/2024,787/2024)

I. General Knowledge	10
II. General English	10
III. Physics	14
IV. Chemistry	14
V. Botany	14
VI. Zoology	14
VII. Mathematics	14
VIII. Regional Language (Malayalam/Tamil/Kannada)	10

PART - I (10 Marks)

General Knowledge

Facts about India

Geography of India – Physical features – Climate – Soils – Rivers – Famous sites – etc.
Demography – Economic and social development – Poverty alleviation – Economy and planning – etc.
History of India – Period from 1857 to 1947 – National movement

Five Year Plans

Facts about Kerala

Geographical Facts – Physical features – Climate – Soils – Rivers – Famous sites – Economic and Social deve – Historical importance - etc.

Renaissance in Kerala

Important Events/Movements/Leaders

Brahmananda Swami Sivayogi, Chattampi Swami, Sree Narayana Guru, Vagbhatananda, Thycaud Ayya, Ayya Vaikundar, Poikayil Yohannan (Kumara Guru), Ayyankali, Pandit Karuppan, Mannathu Padmanabhan,V. T. Bhattathirippad, Dr. Palpu, Kumaranasan, Vakkom Moulavi, Blessed Kuriakose Elias Chavara, Etc.

Current Affairs

Important world, national and regional events related to the political and scientific fields, sports, cinema and literature etc.

II. GENERAL ENGLISH (10 Marks)

i. English Grammar (5 Marks)

1. Types of Sentences and Interchange of Sentences.
2. Different Parts of Speech.
3. Agreement of Subject and Verb.
4. Articles - Definite and Indefinite Articles.
5. Uses of Primary and Modal Auxiliary Verbs
6. Question Tags
7. Infinitive and Gerunds
8. Tenses
9. Tenses in Conditional Sentences
10. Prepositions
11. The Use of Correlatives
12. Direct and Indirect Speech
13. Active and Passive voice
14. Correction of Sentences
15. Degrees of Comparison

ii Vocabulary (5 Marks)

1.Singular & Plural, Change of Gender, Collective Nouns
2.Word formation from other words and use of prefix or suffix
3.Compound words
4.Synonyms
5.Antonyms
6.Phrasal Verbs
7.Foreign Words and Phrases
8.One Word Substitutes
9.Words often confused
10.Spelling Test
11. Idioms and their Meanings
12. Expansion and meaning of Common Abbreviations

PART – III Physics (14 Marks)

Module 1. Properties of Matter (4 marks)

Elasticity-Modulus of elasticity, the three elastic modulii, Surface tension-shapes of drops, concept of excess of pressure, capillary rise, variation of surface tension with temperature, Fluid Dynamics- Streamline and turbulent flow, equation of continuity, Bernoulli's theorem and its applications, Viscosity-coefficient of viscosity, Stoke's formula, variation of viscosity with temperature.

Module 2. Thermal Physics (3 marks)

Thermal conductivity, coefficient of thermal conductivity, Weidman-Franz law, Radiation of heat, Stefan's law, Zeroth Law and First law of Thermodynamics, differential form of first law, different thermodynamic processes, specific heat capacities, Carnot's heat engine, entropy.

Module 3. Optics (3 marks)

Interference of light- The principle of superposition, coherent sources, Double slit interference, interference in thin films, Newton's Rings, Diffraction-Fresnel diffraction, Half-period zones, Fraunhofer diffraction-diffraction at a single slit, diffraction grating, LASER-Basic principle, He-Ne laser, optical fibre-step, index fibre, graded index fibre , numerical aperture.

Module 4. Modern Physics (4 marks)

Black body radiation curve, photoelectric effect, Compton effect, Bohr model- hydrogen atom, wave nature of particles, uncertainty principle, wave function, Vector atom model-quantum numbers associated with vector atom model, L-S and J-J couplings, Zeeman effect, Anomalous Zeeman effect, Paschen-Back effect, Stark effect, Solids-Amorphous and Crystalline Materials, Unit Cell, Types of Lattices, Miller Indices, Nucleus-Constituents of nucleus and their intrinsic properties, binding energy, Nuclear fission and nuclear fusion processes.

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PART – IV Chemistry (14 Marks)

Module 1. Inorganic chemistry (5 marks)

Atomic structure- Bohr's atom model, Hydrogen spectrum, Heisenberg's uncertainty principle, de Broglie hypothesis, Quantum numbers. periodicity- atomic radius, ionisation energy, electron affinity, electronegativity, classification of elements into s, p, d, f blocks.

Preparation, properties and uses of hydrogen and hydrides. Hardness of water- Types, causes and consequences.

Chemical bonding- Ionic, covalent, coordinate and metallic bonds, hydrogen bonding.

Theories of acids and bases, effects of solvents on ionic strength, levelling effect. Solubility product, common ion effect and their applications.

Theory of titration- acid-base, redox, precipitation and complexometric titrations. Indicators, Gravimetric analysis.

Metallurgy- Various steps involved in metallurgical processes.

Sources, effects and consequences of air, water, soil, noise, thermal and radioactive pollution.

Module 2. Organic chemistry (4 marks)

Nomenclature, basic concepts of reaction mechanism- addition, substitution and elimination reactions. Preparation and properties of alkanes, alkenes, alkynes, aromatic hydrocarbons, cycloalkanes, alcohols, phenols, ethers, epoxides, aldehydes, ketones, carboxylic acids, amines and nitro compounds.

Petroleum- Refining of crude oil, knocking, octane number, cetane number, cracking.

Polymers-Classification, Thermoplastics and thermosetting plastics, Rubber.

Module3. Physical chemistry (5 marks)

Gaseous state- Gas laws, Kinetic gas equation, Ideal and real gases.

Thermodynamics- first, second and third laws of thermodynamics. Enthalpies of formation, combustion, neutralisation, solution and hydration, heat capacities.
Chemical kinetics±integrated rate laws and half-lives of zero, first, second and third order reactions. Arrhenius equation, chain reactions. Theories of catalysis, industrial application of catalysis. Photochemistry- Laws of photochemistry, Quantum yield.
Physical and chemical adsorption, applications of adsorption.
Chemical and ionic equilibria- Factors affecting equilibrium, Le-Chatelier's principle and its applications. Hydrolysis of salts and its effects. pH and pOH, Buffer action.
Electrochemistry- Conductance, Kohlrausch's law and its applications, transport number, Types of electrodes, primary and secondary cells, Fuel cells.
Basic principle and applications of UV-Vis, IR, NMR and ESR spectroscopy, mass spectrometry.

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PART – V Zoology (14 Marks)

Module 1 (4 marks)

Balanced diet, PEM, vitamins, minerals and their deficiencies.

Blood - composition and functions, blood groups, blood clotting, anticoagulants.

Heart- conducting system and pace maker, heartbeat, pulse and blood pressure, cardio vascular diseases -arteriosclerosis, myocardial infarction, electrocardiogram, angiogram, angioplasty.

Structure of haemoglobin, transport of oxygen, oxyhaemoglobin curve, Bohr effect, transport of carbondioxide, apnoea, dyspnoea, hypoxia, asphyxia, carbon monoxide poisoning, bronchitis, asthma. Physiological effects of smoking.

Module 2 (3 marks)

Types of muscles, red and white muscles. Ultra structure of striated muscle fibre, muscle proteins, muscle twitch, all or none law, summation, tetanus, tonus, fatigue, oxygen debt, rigor mortis. Physiological and biochemical events in muscle contraction.

Structure of brain. Neurons - structure, types of neurons, nerve impulse propagation. Synapses and synaptic transmission, neurotransmitters. Reflex action, electroencephalogram.

Endocrine glands in man, hormones and disorders.

Module 3 (4 marks)

Cell theory, prokaryotic cells and eukaryotic cells, structure and functions of Mitochondria, Golgi bodies, Lysosomes, Ribosomes and Nucleus.

Chromatin - euchromatin and heterochromatin, nucleosomes, Watson - Crick model of DNA. Chromosome ± structure, giant chromosomes- polytene and lamp brush chromosomes.

Human karyotype, pedigree analysis, DNA fingerprinting, chromosomal anomalies in man- autosomal (Down's syndrome, Edward's syndrome), allosomal (Klinefelter's syndrome, Turner's syndrome). In born errors of metabolism- Phenylketonuria, Alkaptonuria, Albinism.

Module 4 (3 marks)

Types of immunity- innate, acquired, active, passive, humoral and cell mediated. Cells of immune system - T cells, B cells and plasma cells. Primary and secondary lymphoid organs. Antigens, haptens, epitopes, antibodies - general structure, different classes of antibodies. Hypersensitivity, immunodeficiency diseases, immunization-passive and active, vaccination.

PART – VI BOTANY (14 Marks)

Module-1 The plant Kingdom (2 marks)

Plant cell- structure, cell wall and organelles, totipotency, diversity of cells and tissues (types)

Plant groups- algae, bryophytes, pteridophytes, gymnosperms and angiosperms- diversity of thallus structure and modes of reproduction

Mesophytes, hydrophytes, epiphytes and halophytes- adaptations- morphological, anatomical and physiological

Module-2 Plant morphology and anatomy (3 marks)

Modifications- Root, stem and leaf modifications with examples

Inflorescence- Major Types (racemose and cymose) with examples

Fruits- kinds of fruits (simple fleshy, simple dry, multiple and aggregate fruits) with suitable examples

Primary structures of dicot and monocot stem and roots; structure of dicot and monocot leaves

Secondary growth- normal secondary growth in dicot stem and root; anomalous secondary growth (examples only)

Module ±3 Plant Physiology (3 marks)

Absorption of water- Transpiration pull theory only

Translocation- Munch's hypothesis and bidirectional transport only

Photosynthesis- cyclic and noncyclic electron flow for trapping solar energy by green plants- Co_2 fixation by Calvin cycle, Warburg effect

Growth and Phytohormones- growth curve and major physiological effects of hormones like auxins, gibberellins, cytokinins, abscisic acid and ethylene

Module-4 Economic Botany (2 marks)

Major pulses, cereals and millets

Sugar yielding and fibre yielding plants- sugar cane, *Beta vulgaris*, cotton and hemp

Oil yielding plants- mustard, sunflower, oil palm and coconut

Morphology of useful parts in jack fruit, pine apple and coconut

Module -5 Plant Biodiversity and conservation (4 marks)

Biodiversity hotspots, environment protection laws, deforestation and impacts, forest fires and biodiversity depletion, anthropogenic factors

Conservation strategies- exsitu and insitu- wild life sanctuaries, National parks, Botanic Gardens; Major Wild life sanctuaries, National Parks and Botanic Gardens of India and Kerala.

Environmental Science

1. Environmental Pollutions:- Air pollution, Water Pollution, Soil Pollution, Marine Pollution, Noise Pollution, Thermal Pollution.
2. Solid Waste Management:- Waste Minimization, Recycling and Re-use, Consuming environment friendly products. E- waste Management.

3. Enviromental Issues:- Climate Changes, GlobalWarming, Acid Rain, Ozone layer depletion

PART – VII Mathematics (14 Marks)

Module 1 :- Linear Algebra: Matrix – multiplication - determinants – transpose – symmetric matrix – Hermitian matrix – rank – characteristic roots-Cayley's theorem

(2 Marks)

Module 2 :- Complex numbers: Basic definitions-basic operations with complex numbers-Real and imaginary part - polar form of a complex number- products- quotients – powers - modulus - roots of complex number- n^{th} root of unity

(2 Mark)

Module 3: - Analytic Geometry: distance formula - straight line – angle between lines – general second degree equation to represent circle – ellipse – parabola- hyperbola- polar coordinate – cylindrical coordinate – spherical coordinates.

(2 Mark)

Module 4 :- Calculus: limit of a function – indeterminate form – L'Hospital's rule – continuous function – derivatives – increasing and decreasing function – critical points – stationary points – maxima and minima – concave up and concave down – point of inflexions

(2 Mark)

Module 5:- First Order Deferential Equation: Order – degree – separable equation – linear equation – exact equation – homogeneous equation with constant coefficients.

(2 Mark)

Module 6 : -Vector calculus: Position vector of a point – magnitude – dot product – projection of vector – angle between vectors – cross product – scalar triple products – gradient – divergent – curl- solenoidal vector – irrotational vector.

(2 Marks)

Module 7 : - Abstract Algebra: Group – properties and examples – subgroup- cyclic groups – Permutations – rings – integral domains – ideals – fields.

(2 Marks)

V. Regional Language (10 Marks)

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1) പദശുദ്ധി
2) വാക്യശുദ്ധി
3) പരിഭാഷ
4) ഒറ്റപ്പദം
5) പര്യായം
6) വിപരീത പദം
7) ശൈലികൾ പഴഞ്ചൊല്ലുകൾ
8) സമാനപദം

9) ചേർത്തെഴുതുക
10) സ്ത്രീലിംഗം പുല്ലിംഗം
11) വചനം
12) പിരിച്ചെഴുതൽ
13) ഘടക പദം (വാക്യം ചേർത്തെഴുതുക)

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1) Word Purity / Correct Word
2) Correct Sentence
3) Translation
4) One Word / Single Word / One Word Substitution
5) Synonyms
6) Antonyms
7) Idioms and Proverbs
8) Equivalent Word
9) Join the Word
10) Feminine Gender, Masculine Gender
11) Number
12) Sort and Write

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1) Correct Word
2) Correct Structure of Sentence
3) Translation
4) Single Word
5) Synonyms
6) Antonyms / Opposite
7) Phrases and Proverbs
8) Equal Word
9) Join the Word
10) Gender Classification – Feminine, Masculine
11) Singular, Plural
12) Separate
13) Adding Phrases

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.