DETAILED SYLLABUS FOR THE POST OF DEPUTY MANAGER(FERTILIZER) (RUBBERMARK)

(CATEGORY NO.467/2025)

(TOTAL – 100 MARKS)

M.COM AND MBA (MAXIMUM 50 MARKS)

Module 1: Financial Management and Accounting (6 Marks)

Financial Accounting: Accounting Standards (AS/Ind AS), Financial Statement Analysis, Ratio Analysis, Cash Flow and Fund Flow. Cost Accounting: Cost Concepts, Marginal Costing, CVP Analysis, Standard Costing, Variance Analysis, Budgetary Control, ABC. Corporate Finance: Capital Structure, Cost of Capital, Capital Budgeting (NPV, IRR, Payback), Working Capital Management, Dividend Policies, Sources of Finance for Co-operatives.

Module 2: Marketing and Distribution Management (6 Marks)

Marketing Mix (4Ps/7Ps) for Fertilizers, Distribution Channels and Dealer Networks, Agricultural Marketing, Brand Management, CRM, Digital Marketing, Sales Forecasting, Demand-Supply Analysis, Price Determination, Market Structures.

Module 3: Operations and Supply Chain Management (5 Marks)

Operations Management: Capacity Planning, Facility Location. Inventory Management: EOQ, ABC Analysis, JIT, Safety Stock. Supply Chain: Procurement, Warehousing, Distribution, Logistics. Quality Management: TQM, Six Sigma, ISO Standards. Materials Handling and Storage of Fertilizers, Vendor Management, Digital Supply Chain.

Module 4: Strategic Management (5 Marks)

Strategic Management Process (Vision, Mission, Objectives), Environmental Scanning (SWOT, PESTLE), Porter's Five Forces, Competitive Strategy, Corporate/Business/Functional Level Strategies, Diversification and Integration, Strategic Alliances, Business Model Canvas, Strategic Planning for Co-operatives.

Module 5: Co-operative Management and Legal Framework (6 Marks)

Co-operative Principles, Kerala Co-operative Societies Act and Rules, Organizational Structure, Governance Framework, Financial Management in Co-operatives, Role of Rubbermark. Taxation: GST (Input Tax Credit, Compliance), Income Tax for Co-operatives, TDS/TCS. Legal: Indian Contract Act 1872, Sale of Goods Act 1930, Companies Act 2013, Competition Act 2002, Consumer Protection Act 2019, Essential Commodities Act 1955.

Module 6: Human Resource and Organizational Management (4 Marks)

HR Planning, Recruitment and Selection, Training and Development, Performance Management, Compensation Management, Industrial Relations, Labour Laws. Organizational Behaviour: Personality, Perception, Motivation Theories, Group Dynamics, Leadership Styles, Conflict Management, Organizational Culture, Change Management.

Module 7: Banking and Risk Management (4 Marks)

Banking Operations: Loans, Overdrafts, Letter of Credit , Bank Guarantees, Credit Rating and Appraisal. Insurance: Fire, Marine, Stock, Liability Insurance. Financial Risk Management: Foreign Exchange, Interest Rate, Commodity Price Risk, Hedging Strategies.

Digital Payments: UPI, NEFT, RTGS, Digital Wallets. Auditing: Standards, Internal Controls, Fraud Prevention.

Module 8: Entrepreneurship and Project Management (4 Marks)

Entrepreneurship: Concepts and Types, Business Plan Development, Feasibility Analysis, Innovation Management, Government Schemes (Startup India, MSME), Agri-Entrepreneurship. Project Management: Project Life Cycle, Work Breakdown Structure, Network Analysis (PERT/CPM), Project Cost Management, Risk Management, Project Evaluation (Cost-Benefit Analysis).

Module 9: Information Technology and Business Analytics (5 Marks)

Management Information Systems, Decision Support Systems, ERP Systems, Business Analytics (Descriptive, Predictive, Prescriptive), Big Data and Data Warehousing, Cloud Computing, AI and Machine Learning Applications, E-Commerce Models, Digital Marketing, Cyber Security, IT in Agricultural Supply Chain.

Module 10: Business Economics (5 marks)

Business Economics: National Income Accounting, Economic Indicators, Inflation, Monetary and Fiscal Policy, Economic Reforms, Agriculture Sector Development. Business Environment: Economic, Political, Social, Technological Factors, Globalization, International Business. CSR and Sustainability, Business Ethics, Environmental Management, Green Business Practices.

B.Sc. (Agriculture)(Maximum Mark-25)

Crop production

Module 1. Production technology of Rubber: Importance-origin- distribution- area, production, botany varieties-clones – primary, secondary, tertiary; Climate and soil- site selection- layout and planting- nursery techniques, Propagation, planting materials; fertiliser management of rubber trees before and after commencement of tapping-cover cropping-intercropping- bee keeping; Rubber Tapping - systems of tapping- -plugging mechanism-tapping tools- different methods of tapping –micro tapping, slaughter tapping- controlled upward tapping, ladder tapping- latex stimulation- rain guarding -Primary Processing of Rubber; Marketable forms of rubber – Preserved field Latex, Latex concentrate, sheet rubber, Crepe rubber, block rubber, TSR – other ancillary products (4 marks)

Module 2. Intercropping in Rubber- Intercrops for immature and mature rubber plantation; -Crop production, crop protection, fertiliser management cultural practices of intercrops like Fruits crops (Banana and Pineapple), Tuber crops (Amorphophallus, Dioscorea, Colocasia and arrowroot), Medicinal and aromatic crops *(Aratha (Alpinia calcarata)*, Karimkurinji (*Strobilanthes haenianus*) and Chuvanna koduveli (*Plumbago rosea*), Spices (Black pepper, Ginger, Turmeric, Vanilla), Plantation Crops – (Cocoa, Coffee), Vegetables- (Amaranthus, Cowpea, Bhindi, Cucumber, chilli) (2 marks)

Crop Protection

Module 3. Disease management- Diseases of Rubber and its intercrops and their management; Introduction to conventional fungicides and new generation fungicides for the disease management. Biological control of diseases. Integrated disease management. Nature,

chemical combination, classification, mode of action and formulations of fungicides and antibiotics. Safety issues in fungicide uses. (2 marks)

Module 4. Pest management- Pests of Rubber and its intercrops and their management; Principles of Integrated Pest Management, Biocontrol of pests; Pesticides: Insecticide act and rules. Insecticides – classification, mode of action and formulations - advantages and limitations. Newer trends in insect pest management – pheromones, Insect Growth Regulators, Chitin synthesis Inhibitors. Classification of plant parasitic nematodes based on feeding habits – Symptoms of nematode damage-Principles of nematode management (physical methods; cultural methods; biological control; chemical control) (2 marks)

Module 5. Weed management- Methods of weed control- Manual. Cultural, Chemical, Integrated weed magament. Weedicides and mode of action of weedicide. (1 mark)

Soil Science

Module 5. Soil physical properties - soil texture -. Soil compaction- Soil structure Classification - soil aggregates. Soil taxonomy- land capability classification- Soil consistency - soil crusting. Bulk density and particle density of soils and porosity- Characterization of soils of Kerala. Soil water - retention and potentials - soil moisture constants - movement of soil water – infiltration – percolation – permeability – drainage - methods of determination of soil moisture. Thermal properties of soils - soil temperature - soil air. Concept of pH - soil acidity - -saline, sodic and calcareous soils. Soil organic matter – composition – decomposability – humus - fractionation of organic matter. Carbon and nitrogen cycle - C: N ratio. (2 marks).

Module 6, Manures and Fertilisers- Introduction and importance of organic manures, properties and methods of preparation of bulky and concentrated manures. Green/leaf manuring. Fertilizer recommendation approaches. Integrated nutrient management. Chemical fertilizers: classification, composition and properties of major nitrogenous, phosphatic, potassic fertilizers, secondary & micronutrient fertilizers, Straight and Complex fertilizers, nano fertilizers Soil amendments, Fertilizer Storage, Fertilizer Control Order. (4 marks)

Module 7. Criteria of essentiality. Role, deficiency and toxicity symptoms of essential plant nutrients. Critical levels of different nutrients in soil. Soil testing and plant analysis. Methods of fertilizer recommendations to crops. Nutrient deficiency disorders in rubber and its intercrops (2 marks).

Module 8. Precision agriculture: concepts and techniques; Geoinformatics- definition, concepts, tool and techniques; their use in Precision Agriculture. Crop discrimination and Yield monitoring, soil mapping; fertilizer recommendation using geospatial technologies; Remote sensing concepts and application in agriculture; Image processing and interpretation; Global positioning system (GPS), components and its functions; Soil Test Crop Response (STCR) approach for precision agriculture; Nanotechnology, definition, concepts and techniques, nano-particles, nano-pesticides, nanofertilizers, nano-sensors. (2 marks)

Agronomy

Module 9. Soil and Water Conservation - Causes of soil erosion. Definition and agents of soil erosion, water erosion. Forms of water erosion. Soil loss estimation by Universal Soil Loss

Equation. Soil loss measurement techniques. Principles of erosion control. Measures of soil and water conservation - contouring, contour bund, graded bund and bench terracing. Water harvesting and its techniques. Introduction to irrigation – terminologies – irrigation methods – micro irrigation –drip and sprinkler irrigation - fertigation. Introduction to irrigation pumps and their selection; Wind break (2 marks)

Agricultural Economics

Module 10. Agricultural economics- Basic concepts: Goods and services, desire, want, demand, utility, cost and price, wealth, tax, capital, income and welfare. Theories- Utility theory; law of diminishing marginal utility, equi-marginal utility principle. Agricultural Marketing: Concepts and definitions of market, marketing, agricultural marketing, market structure, marketing mix and market segmentation, classification and characteristics of agricultural markets- demand, supply and producer's surplus of agri-commodities: nature and determinants of demand and supply of farm products, producer's surplus (2 marks)

POST GRADUATE IN CHEMISTRY(Maximum Mark-25)

Module-1 Inorganic Chemistry. (Marks-4)

- Chemical Bonding and Molecular Structure- Ionic, covalent, coordinate and metallic bonding-Theories of bonding.
- Chemistry of Main Group Elements- Nitrogen. Phosphorus. Sulphur, Halogens, Alkali and alkaline earth metals and their compounds.
- Coordination Chemistry- Nomenclature (IUPAC) of coordination compounds, Stability constants and chelate effect, EDTA and other chelating agents in agriculture, Metal complexes in micronutrient fertilisers.
- Acid-Base Chemistry- pH, pOH and buffer solutions, Hydrolysis of salts, Common ion effect and solubility equilibria. Hard and Soft Acids and Bases. HSAB principle.

Module-2 Organic Chemistry. (Marks-4)

2.1 Nomenclature (IUPAC) - alkanes, alkenes, alkynes, aromatics. Acidity and basicity of organic compounds.

2.2 Reaction Mechanisms- Nucleophilic and electrophilic substitution, Elimination reactions, Addition reactions, Aromatic electrophilic substitution.

2.3 Important Functional Groups- Alcohols, phenols, ethers, Aldehydes; ketones, Carboxylic acids and derivatives, Amines, amides, Nitro Compounds-Preparation and Properties.

2.4 Organic Compounds in Fertiliser Industry- Urea chemistry - synthesis, hydrolysis, derivatives, Formaldehyde-urea condensation products, Amino acids and proteins in organic fertilisers, Carboxylic acids and their salts.

Module-3 Analytical Chemistry. (Marks-4)

3.1 Volumetric analysis, Gravimetric analysis.

3.2 Instrumental Methods of Analysis- Spectroscopic Methods- UV-Visible spectrophotometry, Atomic Absorption Spectroscopy, Flame Photometry, Infrared Spectroscopy (IR)

3.3 Chromatographic Techniques- Gas Chromatography (GC), High-Performance Liquid Chromatography (HPLC), Thin Layer Chromatography (TLC), Ion Exchange Chromatography (IC)

1. Quality Control- Sampling theory and techniques, Sample preparation. Determination of Nitrogen. Phosphorus and Potassium. Moisture content determination, Particle size analysis, Heavy metal analysis.

Module-4 Chemical Equilibrium and Chemical Kinetics. (Marks-4)

4.1 Equilibrium Principles- Law of mass action and equilibrium constant, Le Chatelier's principle -applications. Effect of temperature on equilibrium (Van't Hoff equation).

4.2 Rate Laws and Rate constants, Arrhenius equation, Heterogeneous catalysis in industries. Reaction rate optimization.

4.3 Phase Equilibria- Three component liquid systems, Solid- liquid system: Two salts and water systems. Clausius-Clapeyron equation, Triple point, Critical point, Eutectics.

Module-5 Soil chemistry Fundamentals. (Marks-2)

Soil pH, Ion speciation in soil solution, Cation exchange capacity, Acidity in soil materials. Acid neutralization capacity and the quantification of the soil acidity. alkalinity and acidity management, Nutrient availability and fixation.

Module-6 Electrochemistry and corrosion. (mark-2)

Standard electrode potentials, Electrochemical series, Nernst equation applications. Potentiometric titrations, Conductometric analysis, Redox potential measurements in soil. Corrosion-Mechanism of corrosion, Types of Corrosion, Corrosion in fertiliser plants. Prevention and control of Corrosion.

Module-7 Environmental Chemistry & Waste management. (Marks-2)

Environmental impact of fertilizers- Nutrient runoff, eutrophication, greenhouse effect. Effluent treatment-Nitrogenous and phosphate industrial waste.

Green chemistry- Atom economy, Design of safer chemicals-Nano fertilisers and Bio fertilisers.

Module-8 Industrial Chemistry & Fertilizer Manufacturing (Marks-1)

Fertilizer production processes- Raw materials, process chemistry and by-products, Storage, handling, and safety of fertilizers, Waste management in fertilizer industries.

Module-9 Polymers in Fertiliser Industry (Mark-1)

Polymer-coated urea and NPK fertilisers. Mechanism of nutrient release. Biodegradable and Green Polymers in Fertilisers. Hydrogels and Superabsorbent Polymers.

Module-10 Fertiliser Control Order (FCO) & Regulations (Mark-1)

Fertiliser Control Order- Quality standards and specifications for various fertilisers, Sampling and analysis procedures, Penalties and enforcement.

Bureau of Indian Standards (BIS)- BIS specifications for fertilisers, Certification and quality marks, Standard testing methods.

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