PUNJAB PUBLIC SERVICE COMMISSION
COMBINED COMPETITIVE EXAMINATION (CCE) SYLLABUS

AGRICULTURE

Total Marks: 100

AGRICULTURE COMPONENT-I: FIELD CROPS AND SOIL SCIENCE		
1	**Agriculture and Cropping Systems**	Agro-Meteorology, Artificial Intelligence in Agriculture: Importance, Conservation Agriculture, Cotton, Crop Nutrition, Crop Physiology Basics, Crop Rotation and Cropping Systems, Cropping Patterns, Disease Management, Insect Pest Management, Intercropping, Maize, Novel Concepts of Agriculture, Oilseeds, Pakistan's Agriculture, Plant Biotechnology, Plant Tissue Culture, Pulses, Relay Cropping, Rice, Seed Science and Technology, Soil and Tillage, Sugarcane, Weed Management, Wheat, Yield Gaps.
2	**Genetic Improvements of Crop Plants**	Basic Control System of Gene Expression, Breeding Methods of Self-Pollinated, Cross-Pollinated and Asexually Propagated Crops, Breeding Strategies, Chemical Composition of Hereditary Material, Basic Concepts of Genetics, Molecular Basis of Genetic Code, Process of Variety Development, Role of Genetics and Genomics in Crop Improvement, Variation: The Basis of Plant Breeding, Its Creation, and Exploitation.
3	**Modern Plant-Breeding Techniques and Biotechnology**	Biofortification, Biosafety Rules, CRISPR, Doubled Haploid Breeding, GM Crops and Bt Cotton, Heteroploid Breeding, Hybrid Breeding, Hybrids and Varieties, Impact of Cultivation of Transgenic Crops on Biodiversity, Marker-Assisted Breeding, Modern Plant Breeding: Concepts, Mutation Breeding, Plant Variety Protection, Role of Agriculture Biotechnology in Crop Improvement, Seed Certification, Transgenic Breeding, Transgenic Plants: Development Techniques and Applications in Plant Breeding.
4	**Plant Protection, Diseases and Integrated Pest Management**	Agricultural Pollution: Types and Management, Apiculture, Biological Control, Causes, Nature, and Economic Importance of Losses Caused by Plant Diseases, Economics of Pest Management, Economic Importance, Transmission and Control of Plant Viruses, Entomological Industries, Host-Plant Genetic Resistance, Integrated Pest Management, Insecticides: Mode of Action, Hazards and Safety Measures, Locust, Methods of Screening Crop Germplasm of Disease Resistance, Methods to

		Control and Manage Plant Diseases, Principles and Methods of Insect Control, Pesticide Regulation, Pink Bollworm, Quarantine, Resistance Breeding, Pesticide Residues and Safety, Rusts, Sericulture, Whitefly, Lac culture, Genetic and Physiological Mechanisms of Stress Tolerance in Crop Plants, Major Insect Pests of Important Agricultural Crops
5	**Soil Science, Water Resources and Irrigation System**	Application of GIS and Remote Sensing in Soil Survey, Canal Irrigation versus Tubewell Irrigation, Dams and Groundwater Depletion, Drip Irrigation, Factors Affecting Crop Growth and Growth Expression Models, Integrated Plant Nutrition System, Indus Waters Treaty, IRSA, Types and Levels of Soil Survey, Laser Leveling, Role of the Indus Basin Irrigation System in the Agricultural Development in Pakistan, Salt Affected and Waterlogged Soils; Reclamation and Management, Soil Erosion: Types, Control and Management, Soil Fertility Problems in Pakistan's Soils, Soil Formation and Soil Profile, Sources and Significance of Organic Matter in Agriculture, Sprinkler, Types of Soil, Water-Use Efficiency
	AGRICULTURE COMPONENT-II: NATURAL RESOURCES AND ENVIRONMENT	
6	**Climate-Smart Agriculture and the Environment**	Agro-Ecological Zones of Pakistan and Their Features, Biological Nitrogen Fixation and Factors Affecting It, Bio fertilizers and Biopesticides and Uses of Natural Products: Carbon and Water Footprint, Climate-Change Adaptation and Mitigation, Climate-Smart Crop Production, Climate-Smart Livestock Production, and Climate-Smart Agriculture, Dry Farming, Fisheries and Aquaculture, Floods, Genetic Resources, Heat Waves, Natural Resources of Pakistan (Land, Water, Biological and Climatic) and Their Impact on Crop Production, Organic Farming and Management of Agricultural Environmental Pollution, Residue Burning and Smog, Sustainable Food Production, Water and Soil Management, Drought, Climatic Factors and Their Relationship with Crop Growth Processes (Photosynthesis, Respiration and Transpiration)
7	**Mechanization and Post-Harvest**	Combine Harvesters, Current and Future Scope of Farm Mechanization in Pakistan, Farm Power and Machinery, Grain Losses, Happy Seeder, Renewable Energy on Farms, Storage and Silos, Zero Tillage
8	**Role of Horticulture in Agriculture**	Classification, Citrus, Cultivation, Production, Chemical and Pharmacological Properties of Medicinal Plants, Dates, Export Quality, Floriculture, Fruit and Ornamental Plant Nurseries:

		Propagation Methods, Management Practices, and Marketing, Mango, Nursery, Potato, Post-Harvest Handling, Processing, Propagation, Role of Tissue Culture in Agriculture, Tunnel Farming, Vegetables, Horticultural Crops: Management Practices and Post-Harvest Handling
	AGRICULTURE COMPONENT-III: LIVESTOCK, ECONOMICS, AND MARKET	
9	**Agricultural Economics and Sectoral Challenges**	Analytical Overview: Issues and Strategies for Improving Crop Management, Cottage Industry, Fisheries, Livestock Management, Resource Management and Rural Development, Indicators and Issues of Pakistan's Agricultural Sector and Its Role in the National Economy, Land Reforms in Pakistan, Land Tenure Systems, Principles, Objectives, and Functions of World Trade Organization (WTO), Role of IT in Agriculture.
10	**Agribusiness Marketing and Finance**	Cold Chain, Contract Farming, Cooperatives, Crop and Livestock Insurance, Exports, Kissan Card, Mandi System and Arhtis, Microfinance, Risk Management, SBP Credit Targets, Subsidies and Reforms, Value Chains, World Trade Organization (WTO) and Sanitary and Phytosanitary (SPS) Standards, ZTBL.
11	**Livestock and Dairy, Poultry, Fisheries, and Apiculture**	Aquaculture and Inland Fisheries, Biosecurity, Breeds of Cattle, Buffalo, Goats, and Sheep, Broiler and Layer Production Systems, Dairy Value Chain, Disease Control, Halal Meat Exports, Honey and Silk Production, Marine Resources, Nutrition and Fodder, Artificial Insemination (AI) and Embryo Transfer.
	AGRICULTURE COMPONENT-IV: EXTENSION SERVICES, POLICY, AND INNOVATION	
12	**Agricultural Extension and Rural Development**	Audiovisual Aids in Agricultural Extension: Types, Principles, Strategies, and Significance, Extension Models, Farmer Field Schools, Global Overview of Agricultural Extension, Methods and Steps to Evaluate Extension Activities, Role of Agricultural Extension in Present and Future Agricultural Development in Pakistan, Rural Infrastructure, Women in Agriculture, Youth and Agripreneurship
13	**Food Security and Nutrition**	Basic Nutrition Requirements of the Human Body and Their Relationship with Nutrition-Related Diseases, Food Contamination and Its Control Measures, Food Analysis, Food Industries in Pakistan and Their Role in the National Economy, Food Processing and Preservation, Four Pillars of Food Security, Global Hunger Index, Population Pressure, Processing and Uses of Dairy Products, Stunting and Nutrition, Storage and

		Procurement, Implications of WTO Agreement for Food Business, Wheat and Sugar Crises
14	**Precision Agriculture, Innovation and Technology**	AI-Based Advisory Apps, Agricultural Start-ups, Blockchain-Based Traceability, Data-Driven Farming, Digital Platforms, Drones, Geospatial Analysis, GIS and Remote Sensing, GPS Applications, Hydroponics, Kitchen Gardening, Precision Farming, Remote Sensing, Sensor-Based Technologies, Solar Pumps, Soil and Crop Mapping, Urban and Vertical Farming, Water Management
15	**Policy and Governance Framework**	18th Amendment, Agriculture Emergency, CPEC Agri-Cooperation, Extension Services and Farmer Training, FAO, IFAD, Monitoring and Evaluation Systems, National Food Security Policy, Pakistan Agricultural Research Council (PARC) and Provincial Agriculture Departments, Public-Private Partnerships, Seed Laws, Sustainable Agriculture Policies and Strategies, Biosafety Regulations and Trade Policies, Role of WTO Agreements in Agriculture, World Bank's contribution.
	AGRICULTURE COMPONENT-V: FORESTRY AND BIODIVERSITY CONSERVATION	
16	**Biodiversity**	Biodiversity Conservation: Impacts of Environmental Change, Threats and Biodiversity Loss.
17	**Forestry, Rangelands, Watersheds**	Agroforestry: Importance, Potential, and Principles, Agroforestry Systems, Billion Tree and Green Pakistan Programmes, Desertification, Forest Products and Utilization, National Forest Policy and Other Land-Use Policies, Major Wildlife Species of Pakistan: Morphological Features, Behaviour and Habitats, Rangeland Management in Pakistan: Characteristics and Utilization, Rangeland Management, Watershed and Soil Conservation

Suggested readings:

1. Abbas, M. A. 2006. General Agriculture. Emporium Urdu Bazar, Lahore.
2. Acquaah, G. 2016. Horticulture: Principles and Practices (4th ed.). Pearson Education, Inc. New Jersey, USA.
3. Adams, C. Brook, J. Francis, D. and Early, M. 2025. Principles of Horticulture (8th ed.).
4. Agricultural Marketing and Trade (2024): Aligns with the 6th Deans Committee report, focusing on market structures, channels, and trade policy.
5. Agricultural Marketing: Principles, Practices, and Perspectives (2024): Covers market segmentation, supply chain, pricing, and digital marketing.

6. Agrios' Plant Pathology 6th Edition. 2024. Oliver, R. P. (eds). Academic Press (Elsevier), USA.

7. Artificial Intelligence for Sustainable Agriculture. Open-access resource covering AI applications in precision agriculture and sustainable farming systems.

8. Artificial Intelligence in Agriculture. CRC Press. Selected chapters on machine learning, computer vision, and plant disease detection.

9. Atwal, A.S. and Dahliwal G.S., (2026) Agricultural Pests of South Asia and their Management, Kalyani Publishers India

10. Awan, J.A. 2011. Food Science and Technology. Unitech Communications, Faisalabad, Pakistan.

11. Balasubramaniyan. 2004. Principles and Practices of Agronomy. Agrobios, Jodhpur, India.

12. Bashir, E. and R. Bantel. 2019. Soil Science. National Book Foundation, Islamabad.

13. Brady, N.C. and R.R. Weil. 2023. The Nature and Properties of Soils. Pearson Education.

14. Breeding Field Crops By Poehlman

15. Brown, T. A. (2016). Gene cloning and DNA analysis: An introduction (7th ed.). Wiley-Blackwell.

16. Diseases of Field Crops: Diagnostics and Management. Singh, V. K., et al. (Eds.). (2025).

17. Khalil, I . A and A . Jan. 2002. Cropping Technology. National Book Foundation, Islamabad.

18. Khan S.R.A. 2001. Crop Management in Pakistan with Focus on Soil and Water. Directorate of Agricultural Information, Punjab, Lahore.

19. Khan, A.S. and Ziaf, K. 2017. Horticulture: Science & Technology. Endowment Funds Secretariat, University of Agriculture Faisalabad.

20. Leather, S. R. (2022). Insects : a very short introduction (First edition). Oxford University Press.

21. Nazir, M.S., E. Bashir and R. Bantel. (Eds.) 1994. Crop Production. National Book Foundation, Islamabad.

22. Pedigo, L. P., Rice, M.E., Krell, R.K. (2021). Entomology and Pest Management 7th Edition, Waveland Press, Inc.

23. Plant Pathology and Disease Management: Principles and Practices. Parthasarathy, S., et al. (2024). Plant Pathology and Disease Management: Principles and Practices. CRC Press.

24. Principles of Agricultural Economics" by Andrew Barkley and Paul W. Barkley Third Edition published by Routledge on February 12, 2020

25. Qureshi, M.A. M.A. Zia and M.S. Qureshi. 2006. Pakistan Agriculture Management and Development. A-One Publisher, Urdu Bazar, Lahore.

26. Rai, M., Rai, A., & Kumar, S. (2021). Fundamentals of field crop breeding. Springer.

27. Range Management: Principles and Practices (6th Edition) by Jerry L. Holechek, Rex D. Pieper and Carlton H. Herbel Deceased. (2010).

28. Singer, M.J. and D.N. Munns. 2021. Soils: An Introduction. Pearson Education.

29. Singh, D. 2012. Agricultural Extension and Rural Development, Kalyani Publishers, India.

30. Singh, Y.S., Suresh, C.P. Momin, K. 2017. A Textbook of Horticulture. Biotech Books, New Delhi, India.

31. Snustad, D. P., & Simmons, M. J. (2016). Principles of genetics (7th ed.). John Wiley & Sons.

32. Thieman, W. J., & Palladino, M. A. (2020). Introduction to biotechnology. Pearson.

33. Vaclavik, V.A. & Christian, E.W. (2014). Essentials of Food Science (4th ed.). Springer, New York.

Note: **The above list is only suggestive and not exhaustive. Candidates may consult other standard books and relevant material covering the prescribed syllabus.**

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