

नेपाल सरकार
नेपाल कृषि अनुसन्धान परिषद्
पदपूर्ति समिति

मुख्यवैज्ञानिक, एस-५, (Principal Scientist, S-5), सबै उपसमूहको आन्तरिक प्रतियोगितात्मक
लिखितपरीक्षाको लागि पाठ्यक्रम

यस पाठ्यक्रम योजनालाई दुई चरणमा विभाजन गरिएको छ ।

प्रथम चरण: लिखित परीक्षा (Written Examination)

पूर्णाङ्क: २००

द्वितीय चरण: अन्तरवार्ता (Interview)

पूर्णाङ्क: ३०

१. प्रथम चरण (First Phase): लिखित परीक्षा (Written Examination)

पूर्णाङ्क: २००

Paper	Subject	Mark	Full Mark	Pass Mark	No. Questions (Q)xMark (M) = Total Marks	Time Allowed
I	Part I: Management	20	100	40	2Q x 10M = 20 (Long Answer)	3.00 Hours
	Part-II: Agriculture Research and development Issues	80			6Q x 10M = 60 (Short Answer) 1Q x 20M = 20 (Long Answer)	
II	Technical Subject		100	40	5Q x 10M = 50 (Critical Analysis) 2Q x 25M = 50 (Problem Solving)	3.00 Hours

२. द्वितीय चरण(Second Phase): Interview

पूर्णाङ्क: ३०

Subject	Full Marks	System
Interview	30	Oral

द्रष्टव्य:

- यो पाठ्यक्रम योजनालाई प्रथम चरणमा लिखित परीक्षा र द्वितीय चरणमा अन्तरवार्ता परीक्षा गरी दुई चरणमा विभाजन गरिएको छ ।
- लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुबै हुन सक्ने छ ।
- समान पद/तहको प्रथम पत्र सबै उपसमूहको लागि पाठ्यक्रम एउटै भएको कारण एकिकृत परीक्षा सञ्चालन हुनेछ । तर द्वितीय पत्र Technical Subject को पाठ्यक्रम उपसमूह अनुरूप फरक फरक हुनेछ ।
- प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।
- प्रथम पत्रको Part-I र Part-II का लागि छुट्टाछुट्टै एक एक वटा उत्तर पुस्तिका हुनेछन् ।
- परीक्षामा कुनै प्रकारको विद्युतीय उपकरण तथा क्याल्कुलेटर (Calculator) प्रयोग गर्न पाइने छैन ।
- यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयबस्तुमा जेसुकै लेखिएको भएतापनि पाठ्यक्रममा परेका कानून, ऐन, नियम, विनियम तथा नीतिहरू परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाइएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा परेको सम्झनु पर्दछ ।
- पाठ्यक्रममा भएका यथासम्भव सबै पाठ्याशहरूबाट प्रश्नहरू सोधिने छ । प्रथम चरणको लिखित परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र द्वितीय चरणको अन्तरवार्तामा सम्मिलित गराइने छ ।
- प्रथम चरणको लिखित परीक्षाबाट छनौट भएका उम्मेदवारको प्राप्ताङ्क र द्वितीय चरणको अन्तरवार्तामा प्राप्त गरेको अंक जोडी योग्यताक्रम अनुसार सिफारिस गरिनेछ ।
- पाठ्यक्रम लागू मिति: २०७६/१२/२०
- यस भन्दा अगाडि लागू भएको पाठ्यक्रम खारेज गरिएको छ ।

मुख्यवैज्ञानिक, एस-५, (Principal Scientist, S-5), सबै उपसमूहको आन्तरिक प्रतियोगितात्मक
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Paper: I

**Management and Agricultural Research and Development
(Common For all Sub-groups)**

Part-I: Management

A. Management:

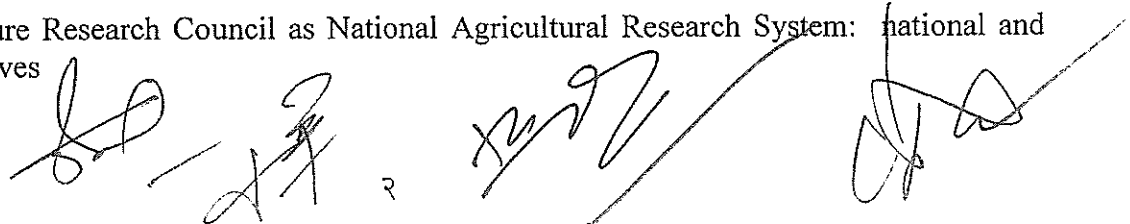
1. Concept, principles, functions, scope, challenge, leadership style
2. Participative Management: concept, opportunity, techniques of participation
3. Conflict management: concept, approaches to conflict, levels of conflict, causes of conflict and strategies for conflict management
4. Stress management: Concept, causes and sources of stress, techniques of stress management

B. Finance and Human Resource:

1. Human resources management: concepts, approaches and functions
2. Leadership: concept, opportunity and functions
3. Coordination: concept, need, types, techniques and approaches for effective coordination
4. Motivation: Concept, theories of motivation, reasons for low productivity, techniques of employ motivation
5. Decision making: importance, types, rational process of decision process
6. Financial management: concept, approaches, budget formulation, and implantation, auditing and reporting

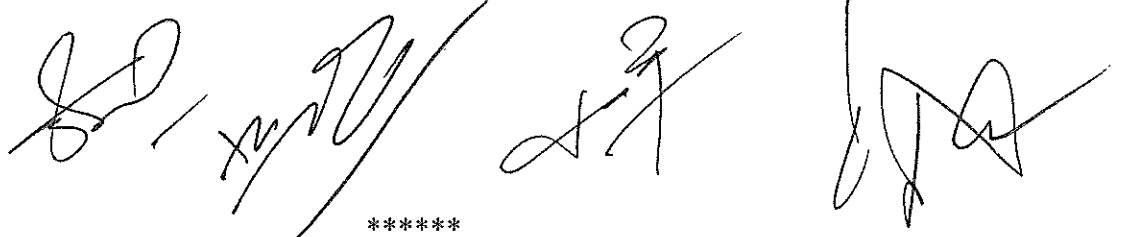
Part-II: Agriculture Research and Development Issues

1. Constitution of Nepal: Food, agriculture and natural resources related issues
2. Current national agricultural policies, strategies and plans: National Agriculture Policy, Agricultural Biodiversity Policy, Climate Change Policy, Agriculture Development Strategy (ADS), Seed Vision, Poultry Policy, Pasture Policy and Floriculture Promotion Policy and agriculture related issues in periodic plan
3. Nepal Agriculture Research Council as National Agricultural Research System: national and global perspectives



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4. International Agricultural Research Organizations: CGIAR and IARCS - CIAT, CIMMYT, CIP, ICRISAT, ICARDA, World Fish, ICRAP, IFPRI, IITA, ILRI, Bioversity international, IRRI, IWMI, AVRDC, ICIMOD, ICRAF, IFDC, IFAD and FAO
5. Agricultural Innovation System: concept, actors, relationship between actors and accountability to stakeholders
6. Agricultural research farm management
7. Agricultural research project management: Problem and objective tree analysis, logframe development, effect and impact assessment and its linkage with technology users
8. Public private partnership in agriculture research
9. Entrepreneurs and agri-business development through agricultural research
10. Approaches of agricultural research in the context of federalism



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मुख्य वैज्ञानिक, एस-५, (Principal Scientist, S-5), एग्रोनोमी, प्लाण्ट ब्रिडिङ एण्ड जेनेटिक्स उपसमूहको
आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको लागि पाठ्यक्रम

Paper: II

Technical Subject

Sub-Group: Agronomy, Plant Breeding and Genetics

A. Agronomy

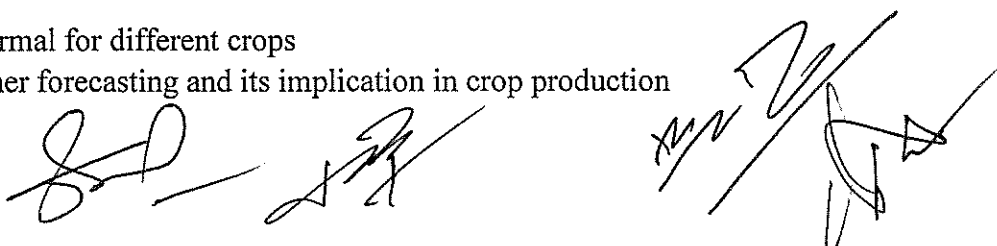
1. Crop Production

Rice, maize, wheat, finger millet, barley, buckwheat, amaranthus, lentil, soybean, chickpea, pigeonpea, mung-bean, rapeseed mustard, sunflower, mustard, groundnut, sugarcane, jute, cotton with respect to:

- 1.1 Introduction, origin and distribution
- 1.2 Botany, physiology, morphology and growth stages
- 1.3 Climate and soil
- 1.4 Released, recommended registered and pipe-line cultivars and their characteristics
- 1.5 Cultivation practices: land preparation, seed treatment, planting methods, planting time, seed rate, inter-culture operations and harvesting indices (maturity), package of practices and Integrated Crop Management (ICM)
- 1.6 Organic manures and chemical fertilizers: recommended doses, method of application, time of application and fertilizer use efficiency
- 1.7 Water management: time and frequency of water application during critical stages, irrigation methods, water requirement, and drainage
- 1.8 Plant protection measures: major insects and diseases, causal agents, symptoms and control/management practices, IPM, use of safe chemical pesticides/ non-chemical pesticides, pesticides residues and storage pests
- 1.9 Harvesting, post-harvest technologies, cleaning, transportation, storage, and marketing intelligence
- 1.10 Economics of crop production of major crops and cost-benefit

2. Climate, Land Resources and Agro-Biodiversity

- 2.1 Climate: temperature, humidity, wind pressure, rainfall, effective rainfall, sunshine hours, solar radiation and its importance in crop productivity and production
- 2.2 Climate of Nepal : climatic zones, their features and vegetation; and crop zoning
- 2.3 Physiographic distribution of Nepal
- 2.4 Land capability and irrigation suitability
- 2.5 Soils of Nepal and their classification, soil carbon sequestration and carbon trading
- 2.6 Importance of agro-biodiversity and approaches for conservation and utilization
- 2.7 Climate change and challenges in food and nutritional security
- 2.8 Greenhouse Gases (GHGs) emission, approaches to mitigate methane gas emission from paddy fields in Nepal, climate smart agriculture and its application in Nepal
- 2.9 Adaptation and mitigation measures and strategies concerning the climate change impacts
- 2.10 Agro-climatic normal for different crops
- 2.11 Concept of weather forecasting and its implication in crop production



2.12 Weather and climatic abnormalities and natural calamities and its impact on crop production and food security

3. Soil and Plant Nutrition Management

- 3.1 Soil formation and morphology
- 3.2 Soil physical properties: soil sampling, soil texture, particle density, porosity and friability
- 3.3 Soil chemical properties: cation exchange, soil reaction (pH), organic carbon and available nitrogen, phosphorus and potassium, clay minerals, organic colloids (humus), soil testing
- 3.4 Organic matter, decomposition and Vermi-compost
- 3.5 Macro and micro nutrients deficiency symptoms and their corrections
- 3.6 Balancing the plant nutrients, INM, IPNS, soil health
- 3.7 Bio-fertilizers and green manuring for soil improvement

4. Soil Water and Water Management for Plants

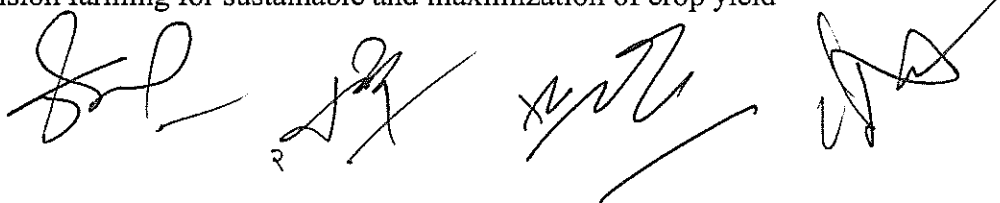
- 4.1 Soil water classification for water management
- 4.2 Water flow into soil, its uptake by plants
- 4.3 Reducing water losses and managing in field crops
- 4.4 Water requirements of crops, water table, water-harvesting and water use efficiency
- 4.5 Innovative irrigation techniques and irrigation efficiency
- 4.6 Drainage systems and its management in field crops
- 4.7 Water-saving technologies

5. Tillage, Weed and Weed Management

- 5.1 Conservation Agriculture (CA) and Resource Conservation Technologies (RCTs)
- 5.2 Weed problems and their management in crop production
- 5.3 Pattern of weed distribution and common weeds of major field crops
- 5.4 Herbicides: types of herbicides, herbicide formulation, application, mode of action, physiology of herbicides and herbicides use in Nepal
- 5.5 Integrated weed management in important crops: rice, maize, wheat, finger millet, lentil, soybean
- 5.6 Economic use of herbicides

6. Sustainable Agriculture, Agro-ecologies and Food Security

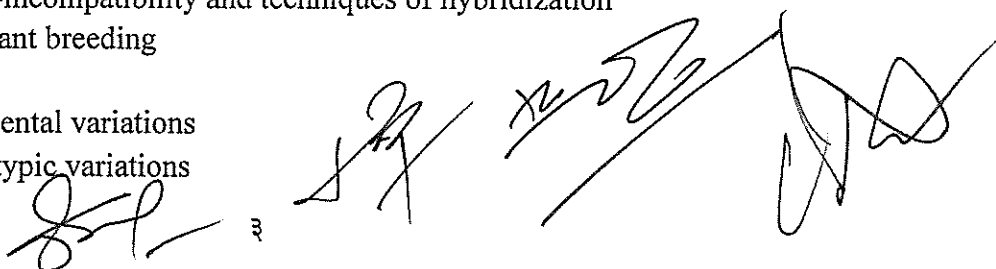
- 6.1 National food production, requirement and balance
- 6.2 Agro industry and commercialization
- 6.3 Sustainable agriculture and agro-ecologies
- 6.4 Traditional and modern sustainable agriculture
- 6.5 Environmental-friendly technologies
- 6.6 Positive and negative aspects of sustainable and modern agriculture
- 6.7 Pros and cons of green revolution
- 6.8 Technology generation, adaptation and adoption for sustainability in agriculture in Nepal
- 6.9 Organic and precision farming for sustainable and maximization of crop yield



- 6.10 Food Security: concept, basis principles, issues related to national and global food production and consumption, challenges in food and nutritional security - nationally and globally
- 6.11 Weather and climate hazards and its impact on food and nutritional security
- 6.12 Sustainable crop production under rainfed condition and different agro-ecologies
- 6.13 Agro-forestry system for sustainable agriculture
7. **Crop Physiology**
 - 7.1 Growth and development: stages, cell division, enlargement and differentiation crop growth stages, LAI and HI
 - 7.2 Photo-periodism, photosynthesis, photorespiration, transpiration, respiration absorption and translocation
 - 7.3 Stress physiology: cold and heat stresses, low and high moisture stresses
8. **Farming System and Outreach Research**
 - 8.1 Crop rotation, relay cropping, cropping intensity and farming system.
 - 8.2 Socio-economic and institutional aspects of farming system
 - 8.3 On-farm farming system research methodology, characteristics of FSR, and diagnostic phase of FSR (RRA, agro-ecosystem analysis, RRA, conventional survey)
 - 8.4 Gender perspective of technology generation and adoption
 - 8.5 Out-reach research: definition, concept, importance
 - 8.6 Out-reach research as means of technology transfer and dissemination
 - 8.7 Indexes of different cropping sequences
9. **Agri-mechanization**
 - 9.1 Agri-mechanization for Terai and Hills: Prospects, objectives, concepts, opportunities and limitations
 - 9.2 Agri-mechanization in the perspective of gender and youth farmers
 - 9.3 Agri-mechanization and commercial farming

B. Plant Breeding and Genetics

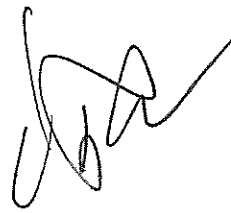
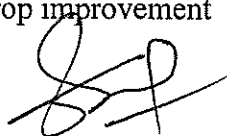
1. **Plant Genetic Resources and Ecosystems**
 - 1.1 Plant distribution and their limiting factors
 - 1.2 Origin of cultivated plants and the ecotype concept
 - 1.3 Crop germplasm conservation, evaluation and their utilization
 - 1.4 Crop ecosystem
2. **Plant Genetics**
 - 2.1 Reproductive systems:
 - 2.1.1 Sexual Reproduction
 - 2.1.2 Asexual Reproduction
 - 2.2 Male sterility, self-incompatibility and techniques of hybridization
 - 2.3 Genetic basis of plant breeding
 - 2.3.1 Variation
 - Environmental variations
 - Agro-ecotypic variations



- 2.3.2 Ecotypes
- 2.3.3 Heredity
 - Inheritance of qualitative characters
 - Inheritance of quantitative characters
- 2.3.4 Methods of estimating genetic parameters
- 2.4 Heterosis
- 2.5 Selection
 - 2.5.1 Natural selection
 - 2.5.2 Directional selection
 - 2.5.3 Genetic advance under selection
- 2.6 Inter-specific and inter-generic hybridization

3. Methods of Plant Breeding

- 3.1 Pure line selection
- 3.2 Pedigree method
- 3.3 Bulk population method
- 3.4 Backcross method
- 3.5 Population improvement
 - 3.5.1 Intra-population methods
 - 3.5.2 Inter-population methods
- 3.6 Recurrent selection
- 3.7 Composite and synthetic varieties
- 3.8 Asexually propagated crops
- 3.9 Apomictic grasses
- 3.10 Maize hybrids
- 3.11 Hybrid varieties
- 3.12 Mutation Breeding
- 3.13 Polyploid Breeding
- 3.14 Disease resistance breeding
- 3.15 Insect resistance breeding
- 3.16 Abiotic stresses
- 3.17 Breeding for specific traits
- 3.18 Plant tissue culture
 - 3.18.1 Micro-propagation
 - 3.18.2 Production of virus free plants.
 - 3.18.3 Embryo culture
 - 3.18.4 Anther culture
 - 3.18.5 Ovule culture
- 3.19 Genetic Engineering
 - 3.19.1 Gene cloning
 - 3.19.2 Gene transfers in plants
 - 3.19.3 Application and use of genetic engineering in plant breeding
 - 3.19.4 GMOs for crop improvement



4. National Seed Production System

- 4.1 Plant variety release, National seed act and National Agricultural Extension System
- 4.2 Plant varieties diffusion through private sector: current status and future scope
- 4.3 Plant variety protection
- 4.4 Hybrid seed production

5. Agricultural Statistics

- 5.1 Field plot techniques
- 5.2 Experimental designs
- 5.3 Chi-square test, probability
- 5.4 Analysis of variance and covariance
- 5.5 Correlation and regression analysis
- 5.6 Stability and adaptability analysis
- 5.7 Statistical methods for cropping systems research

6. Others

- 6.1 Status of plant breeding activities in Nepal
- 6.2 Collaboration with IARCs in crop improvement: their scope and limitations
- 6.3 Bio-Technology Revolution: Implications for Agriculture
- 6.4 Bio-Technology Policy: Public Perception, Participation and the Law
- 6.5 International Dimensions of Bio-technology



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