This program is conducted in two phases. The first phase is a written examination, and the second phase is an interview.

### First Phase: Written Examination

<table>
<thead>
<tr>
<th>Paper</th>
<th>Subject</th>
<th>Mark</th>
<th>Full Mark</th>
<th>Pass Mark</th>
<th>No. Questions (Q) x Mark (M)</th>
<th>Time Allowed</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Part I: Management</td>
<td>20</td>
<td></td>
<td>40</td>
<td>$2Q \times 10M = 20$ (Long Answer)</td>
<td>3.00 Hours</td>
</tr>
<tr>
<td></td>
<td>Part II: Agriculture Research</td>
<td>80</td>
<td>100</td>
<td>40</td>
<td>$6Q \times 10M = 60$ (Short Answer)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>and Development Issues</td>
<td></td>
<td></td>
<td></td>
<td>$1Q \times 20M = 20$ (Long Answer)</td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>Technical Subject</td>
<td>100</td>
<td>100</td>
<td>40</td>
<td>$5Q \times 10M = 50$ (Critical Analysis)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$2Q \times 25M = 50$ (Problem Solving)</td>
<td></td>
</tr>
</tbody>
</table>

### Second Phase: Interview

<table>
<thead>
<tr>
<th>Subject</th>
<th>Full Marks</th>
<th>System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview</td>
<td>30</td>
<td>Oral</td>
</tr>
</tbody>
</table>

### Instructions:

1. The first phase of the program is a written examination conducted in two parts. The first part is a management examination, and the second part is an agriculture research and development issues examination.

2. The examination is conducted in a written format, with each part consisting of two questions. The marks are allocated as follows:
   - Part I: Management: 20 marks
   - Part II: Agriculture Research and Development Issues: 80 marks

3. The written examination is conducted in a written format, with each part consisting of two questions. The marks are allocated as follows:
   - Part I: Management: 20 marks
   - Part II: Agriculture Research and Development Issues: 80 marks

4. The second phase of the program is an interview. The interview is conducted in an oral format.

5. The interview is conducted in a written format, with each part consisting of two questions. The marks are allocated as follows:
   - Interview: 30 marks
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
4. International Agricultural Research Organizations: CGIAR and IARCS - CIAT, CIMMYT, CIP, ICRISAT, ICARDA, World Fish, ICRAP, IFPRI, IITA, ILRI, Bioversity international, IRRI, IWM, 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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Paper: II

Technical Subject
Sub-Group: Soil Science

1. Scientific and Technical Knowledge related to Soil Science
   1.1 Surface soil and sub-soil as a natural body
   1.2 Morphology, colour, constituents, profile, horizons, texture, structure, consistency, concretions of soil in agriculture
   1.3 Classification of Soil and land use planning
   1.4 Soil genesis, weathering, factors and process of soil formation
   1.5 Dynamic properties of soil
   1.6 Soil pollution and its control
   1.7 Soil erosion and Soil conservation
   1.8 Soils of Nepal and their classification
   1.9 Problem soils of Nepal
   1.10 Soil management for sustainable farming in Nepal

2. Soil and Water Relation
   2.1 Water in soils - where and how the water is held, suction and pF curves for soils, movement of water in soils, permeability, field capacity, evaporation, the transfer of water from soil to plant, amount of water used by different crops
   2.2 Plant-foods and their sources
   2.3 Amount of nutrients removed by plants
   2.4 Response of major and trace elements in major crops in Nepalese soils
   2.5 Nitrogen cycle in the soil - mineralization and nitrification
   2.6 Phosphorus fixation
   2.7 Role of potassium in plant nutrition
   2.8 Different tillage systems
   2.9 Cation Exchange Capacity and factors affecting them
   2.10 Principles underlying the control of soil erosion, wind erosion and soil drifting, erosion by run-off water

3. Soil Fertility Management
   3.1 Recommended doses of nutrients, method and timing of application
   3.2 Effect of imbalanced fertilizer use on soil health and environmental pollution.
   3.3 Methods of soil chemical analysis for different elements
   3.4 Recommendation of nutrients on the basis of soil chemical analysis
   3.5 Soil reaction (soil pH), its measurement, liming material their response when applied in soil, reclamation of acidic, saline, alkaline and sodic soil
   3.6 Nature of Cation and Anion Exchange, Cation Exchange Capacity versus Soil pH
   3.7 Classification of elements on the basis of their functions
   3.8 Deficiency symptoms of elements on the crops
   3.9 Forms of element utilized by plants
3.10 Inorganic fertilizer, composition, formula and their transformation from fertilizer to available form of element
3.11 Absorption process of nutrients by plant roots
3.12 Plant nutrients - losses from soil
3.13 Determination of nutrients requirement of crops

4. **Soil Ecology**
4.1 Microbial population of the soil, their function, their role on ammonification, nitrification, denitrification
4.2 Function and importance of rhizobium, azotobacter, clostridium, algae, phosphor-bacterium, worms, nematodes, fungi, virus, rodents, ants
4.3 Decomposition of plant material, composting, micro-organisms responsible for the decomposition of plant remains, green manuring, desirable characteristics of green manure, plants suitable for green manure, green manuring and the maintenance of soil fertility, constraints of green manuring
4.4 Bio-fertilizers, their types and commercially available bio-fertilizers
4.5 Nitrogen fixing microbes and their plant association
4.6 Azolla and biogas, and their economic importance
4.7 Plant nutrition management in organic farming and its importance in Nepalese context
4.8 Composition of soil organic matter, nutrient content of different animal dung, humus, composition of humus colloids, carbon - nitrogen (C/N) ratio, its importance in nutrient uptake, properties of soil humus, the clay - humus complex, decomposability of soil humus
4.8 Moisture conservation and weed management in rainfed agriculture

5. **National and International Research on Soil Science**
5.1 Major issues and achievements of soil science research in Nepal
5.2 Major issues and achievements of soil science research in neighboring countries and international institutions

6. **Statistics**
6.1 Probability
6.2 Estimate of error: replication and randomization
6.3 Control of error, field plot technique and data analysis
6.4 Different statistical design for field crops (RCBD, Latin Square, Split Plot Design and other factorial experiment)
6.5 Comparison: Least significant difference (LSD) and Duncan's Multiple Range Test (DMRT), group comparison between groups and within group, trend comparison, factorial comparison and interpretation of results
6.6 Regression and correlation and their use in agronomical researches
6.7 Data transformation and missing plot techniques