लोक सेवा आयोग

नेपाल वन सेवा, स्वायल एण्ड वाटर कन्जरभेशन समूहको राजपत्राङ्कित तृतीय श्रेणीका पदहरुको खुला र आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

द्वितीय पत्र :- स्वायल एण्ड वाटर कन्जरभेशन सम्बन्धी विषय

Section A- 20 Marks

1. Soil and Geology **20%**

1.1 Understanding soil and parent materials, soil as a product of environment, general relations of plants and soil, forest and agricultural soil

1.2 Factors responsible for soil formation and their development processes, understanding soils of Nepal

1.3 Soil forming minerals, soil profile, soil particles and size classes, soil texture and textural classification, soil structure and classification

1.4 Importance and significance of soil colloids, specific gravity, soil consistence, cohesion, plasticity, air capacity and aeration, infiltration, soil depth, color, temperature

1.5 Understanding soil moisture, water relations of soil, soil water content and their classification, hygroscopic coefficient, moisture equivalent, wilting coefficient, water table

1.6 Movement of water into soil and loss of soil water, measurement of soil moisture, bulk density and permeability of soil

1.7 Soil acidity, important nutrient elements of soil, nitrogen cycle, nitrification, ammonification

1.8 Maintenance of soil fertility and effect of vegetation on physical, chemical and biological properties of soil

1.9 Soil organic matter, decomposition of plant residues and development of humus, importance of macroscopic and microscopic organisms in soil

1.10 Soil forming rocks, relationships between rocks and soils, physical and chemical weathering of rocks, products of mineral and rock weathering and agencies responsible for their movement and deposition

1.11 Concept of geology and geologic processes, understanding the geology of Nepal, features and importance of plate tectonics, tectonics of Nepal Himalaya

1.12 Concept of engineering geology hazards like land-slide, flood etc.

1.13

Section B- 30 Marks

2. Land-Use **10%**

2.1 Land use types of Nepal

2.2 Traditional land-use system in Nepal, understanding land capability classification and their significance in land-use of Nepal.

2.3 Importance of land use practices in watershed rehabilitation and management.

2.4 Significance of land-use management in sustainable utilization and conservation of forests.

2.5 Factors responsible for soil deterioration, influences of land use on erosion and sedimentation rates.

2.6 Erosion potential of different land-use and land systems of Nepal.

2.7 Implication of linking multiple production systems in forest- watershed.

2.8 Different forms of agro-forestry practices and their roles in forest and watershed management

2.9 Basic criteria in selecting silvicultural systems suitable for watershed management in upland forest- watershed.

5. Soil Conservation Engineering. **10%**

5.1 Understanding and importance of engineering measures in soil conservation, concept of slope stability and treatment measures.

5.2 Water flow regulating structures, catchments ponds, stream gauging for measuring discharge,, weirs and flumes,
5.3 Empirical estimation of stream flow, estimation of runoff volume and yield.
5.4 Retaining walls, different kinds of check dams, embankments, spurs, spillways, chutes
5.5 Design and estimation of soil conservation engineering structures and soil conservation works

8. Surveying Remote Sensing, Aerial Photo Interpretation, GIS 10%

8.1 Fundamental concepts of remote sensing, remote sensing data acquisition and processing, application, interpretation of data/images
8.2 Understanding GIS, use of GIS to assess natural resources and land use within watershed
8.3 Integration of remote sensing and GIS
8.4 Principles of aerial photography and photo interpretation
8.5. Stereoscopic viewing, elements and steps in aerial photo interpretation
8.6 Application and use of aerial photography and topographical maps for the delineation, measurement and assessment of watershed, natural resources and land-use
8.7 Surveying and Mapping for Watershed Management
8.8 Sub watershed prioritization and planning by using GIS, GPS
8.9

Section C- 20 Marks

3. Hydrology and Watershed Management 20%

3.1 Understanding hydrology and its processes.
3.2 Precipitation, rainfall intensity, interception, evapo-transpiration, runoff, movement of water into and through the soil, water yield.
3.3 Hydrological cycle and its implication in water resource management.
3.4 Infiltration and factors affecting its capacity.
3.5 Understanding run-off, its processes and methods for estimating run-off.
3.6 Concept of hydrograph and methods to prepare hydrograph.
3.7 Understanding watershed, basin and catchments.
3.8 Concept and importance of drainage density.
3.9 General characteristics of watershed management and prioritization of watersheds.
3.10 Integrated approach of watershed management planning and criteria for developing sustainable management of watershed.
3.11 Upstream and downstream linkages of watershed and their conflict in benefit and resources sharing and resolving conflict.
3.12 Land-use problems in watershed management. Bio-physical, social, cultural, and economic factors and their importance in watershed management
3.13 Institutional aspects of watershed management at district and regional levels, enhancing institutional capacity in watershed management.
3.14 Different parameter and Criteria for the preparation of sub-watershed management plan
3.15 Coordination mechanism and integration of agriculture, forestry, livestock and water resource interventions in integrated sub-watershed management plan.

3.16 Decentralization planning process, participatory approach of watershed management and decision making, understanding participatory monitoring and evaluation of watershed management.

3.17 Emerging problems of Churia watershed and strategies to mitigate the watershed degradation problems of Churia and Bhawar Watershed to down Stream in Terai

3.18 Understanding Environment Impact Assessment (EIA) and Initial Environment Examination (IEE) and their implication in watershed management

3.19 Use of hydrological and metrological data for watershed management planning

3.20 Management of watershed for irrigation hydropower drinking water supply and roads

Section D- 30 Marks

4. **Soil and Water Conservation**. **10%**

4.1 Erosion and its dimensions of different forms of water induced erosion, wind erosion, different phases and forms of wind erosion

4.2 Natural and man made erosion, mass movement, landslides, slope failure

4.3 Factors responsible for water induced erosion

4.4 Understanding the concept of soil and water conservation, importance of soil and water conservation in different ecological zones of Nepal

4.5 Preventive and rehabilitative measures for soil conservation.

4.6 Contour trenching, bunding, diversion channels, gully plugging, shelter belt, green belt, contour planting, wattling, fascining, grass planting, reseeding, maintenance of forest biomass.

4.7 Conservation farming, cover cropping, zero tillage, crop rotation, mulching. Green manuring, contour strip cropping, terracing, runoff harvesting and gully plugging

4.8 Understanding and use of universal soil loss equation in predicting soil loss

4.9 Bio-engineering techniques and their importance to stabilize slope failure , stream/riverbank cutting

4.10 Control of erosion along small streams and rivers, improvement of irrigation canals

4.11 Sustainable soil management to land productivity conservation and its practices in Nepal

6 Extension and Conservation Education **10%**

6.1 Importance of extension and conservation education, role of demonstration sites, field visits, motivation campaigns.

6.2 Farmer to farmer exchange visits and group dynamics

6.3 Conservation education, demonstration and conservation competition programmes in schools and campus

6.4 Distribution of conservation related reading materials, posters, pamphlets, broadcasting radio and TV conservation programmes

6.5 Roles and responsibilities of motivators and extension workers

6.6 Basic guidelines to organize extension and conservation programmes

6.7 Need for organizing National extension and conservation education programmes

6.8 Basic steps of conservation education to motivate local people, ways of involving local people in planning, decision making, implementation and maintenance
6.9 General problems of extension and education programmes in Nepal
6.10 Awareness building, internalizing the importance of conservation and taking ownership by local people
6.11 Role of local and central governments, local elites and politicians, CBOs, NGOs, civil societies, user groups in conservation and education programmes
6.12 Establishment of farmer school and its importance in watershed management

7. Policy, Guidelines, Act and Legislation **10%**

Salient Features of:

7.1 Soil and Watershed Conservation Act, 1982
7.2 Soil and Watershed Conservation Regulation, 1985
7.3 Water Resource Act, 1992
7.4 Water Resource Regulation, 1993
7.5 Water Policy, 2004
7.6 Departmental Policy and Guidelines working procedures in Soil Conservation and Watershed Management.
7.7 Environment Act, 2053
7.8 Environment Regulation, 2054
7.9 Local Self Governance Act, 2055

द्वितीय पत्रको एकाईहरुको प्रश्नसंख्या निम्नानुसार हुनेछ

द्वितीय पत्रका खण्ड	**A**	**B**			**C**	**D**		
द्वितीय पत्रका एकाई	1	2	5	8	3	4	6	7
प्रश्न संख्या	2	1	1	1	2	1	1	1

विषयगत नमूना प्रश्नहरु (Sample questions)

1. Describe in detail the factors responsible for soil formation and their development processes.
2. What are soil forming rocks, describe the processes of physical and chemical weathering of rocks and agencies responsible for transportation and deposition of weathered materials.
3. What are forest and agricultural soils? Describe factors responsible for deteriorating forests soils.
4. Relate the importance of integrated natural resource management for sustainable watershed management in Nepal
5. Describe different forms of agro-forestry practices and their roles in forest and watershed management.
6. What is hydrological cycle, describe its elements and implication in watershed and water resource management.
7. Describe the general characteristics of watershed management and importance of prioritizing watersheds for sustainable management.
8. Explain the factors responsible for man made and natural process of water induced erosion.
9. What is a universal soil loss equation; describe their elements and use in estimating soil loss in hills of Nepal.
10. What are the engineering structures best suited for gully plugging; describe the various forms of such structures which are being used in Nepal.
11. What should be the roles and responsibilities of motivators, extension workers and other actors to carry out conservation education and extension? Programmes effectively.
12. Describe the Departmental policy and guidelines for conducting participatory soil conservation and watershed management activities in remote districts.
13. Describe the use of aerial photography and GIS technology in delineating watershed and land use system within the watersheds