लोक सेवा आयोग

नेपाल इञ्जिनियरिङ्ग सेवा, सिभिल समूह, हाइड्रोलोजी उपसमूह, राजपत्राङ्कित द्वितीय श्रेणी
(खुला प्रतियोगिता र आन्तरिक प्रतियोगिता) को लिखित परीक्षाको पाठ्यक्रम

द्वितीय पत्र - सेवा सम्बन्धी प्राविधिक विषय पूर्णाङ्कः- १००

1. Hydrological Principles & Techniques

1.1 Introduction

1.1.1 Scientific development of hydrology
1.1.2 Hydrological development in Nepal
1.1.3 Hydrologic cycle and hydrologic budget
1.1.4 Application of hydrology in national development

1.2 Basic Hydrologic Principles

1.2.1 Precipitation
- 1.2.1.1 Meteorological aspects
- 1.2.1.2 Temporal and spatial variation of precipitation
- 1.2.1.3 Storm analysis
- 1.2.1.4 Precipitation data sources and interpretation

1.2.2 Hydrologic abstractions
- 1.2.2.1 Interception
- 1.2.2.2 Infiltration
- 1.2.2.3 Surface and depression storage
- 1.2.2.4 Evaporation
- 1.2.2.5 Evapotranspiration

1.2.3 Runoff
- 1.2.3.1 Runoff components
- 1.2.3.2 Effects of catchment characteristics on runoff
- 1.2.3.3 Stream types
- 1.2.3.4 Rainfall-runoff relations
- 1.2.3.5 Streamflow hydrographs
- 1.2.3.6 Streamflow variability

1.3 Snow Hydrology

1.3.1 Snow formation and accumulation
1.3.2 Melting of snowpack
1.3.3 Snowmelt indexes
1.3.4 Snowmelt runoff

1.4 Hydrologic Measurements

1.4.1 Precipitation measurements
- 1.4.1.1 Ordinary and recording precipitation gauges
- 1.4.1.2 Precipitation measurements using telemetry
- 1.4.1.3 Errors in measuring precipitation data

1.4.2 Snowpack measurements
- 1.4.2.1 Snow courses
- 1.4.2.2 Radioisotope snow measurements
- 1.4.2.3 Determination water equivalent

1.4.3 Evaporation and evapotranspiration measurements
- 1.4.1.1 Class A pan

1.4.1.2 Evaporimeters
1.4.1.3 Lysimeters
1.4.4 Infiltration and soil-moisture measurements
1.4.4.1 Infiltrometers
1.4.4.2 Measurements of soil moisture
1.4.5 Streamflow measurements
1.4.5.1 Stage measurements
1.4.5.2 Discharge measurements
1.4.5.3 Indirect determination of peak discharge
1.4.6 Structural design
1.4.6.1 River gauging structure
1.4.6.2 Hydro-meteorological stations
1.4.7 Hydrological network design

1.5 Erosion and Sedimentation

1.5.1 Sediment properties
1.5.2 Sediment production
1.5.3 Upland erosion and universal soil loss equations
1.5.4 Sediment Yield
1.5.5 Sediment-delivery ratio
1.5.6 Empirical formulas for sediment yield
1.5.7 Sediment transport
1.5.7.1 Sediment transport mechanics
1.5.7.2 Sediment rating curves
1.5.8 Sediment deposition in reservoirs
1.5.8.1 Reservoir trap efficiency
1.5.8.2 Reservoir design life
1.5.9 Sediment measurement techniques
1.5.9.1 Sediment sampling equipment
1.5.9.2 Suspended-sediment discharge measurements
1.5.9.3 Bed load measurement

1.6 Water Quality

1.6.1 Properties of water
1.6.2 Water pollution
1.6.3 Water quality sampling
1.6.4 Water quality simulation

1.7 Ground Water Hydrology

1.7.1 Stream aquifer interaction
1.7.2 Base flow and physiographic characteristics

2. Hydrological Responses

2.1 Hydrology of Small and Medium Catchments

2.1.1 Rational method
2.1.2 Runoff curve number method
2.1.3 Unit hydrograph techniques

2.2 Frequency Analysis of Hydrological Extremes

- 2.2.1 Statistical series and return periods
- 2.2.2 Adjustment of data
- 2.2.3 Flood frequency analysis
- 2.2.4 Low flow frequency analysis

2.3 Regional Analysis of Hydrological Variables

- 2.3.1 Regional distribution of precipitation
- 2.3.2 Regional distribution of runoff
- 2.3.3 Regional parameters of
  - 2.3.3.1 Flood flows
  - 2.3.3.2 Low flows
  - 2.3.3.3 Long terms flows

3. Hydrological Tools, Application & Management

3.1 Reservoir and Stream Channel Routing

- 3.1.1 Muskingum method
- 3.1.2 Kinematic method

3.2 Catchment Modeling

- 3.2.1 Classification
  - 3.2.1.1 Black-box model
  - 3.2.1.2 Conceptual model
  - 3.2.1.3 Stochastic model
- 3.2.2 Model components and construction
- 3.2.3 Model calibration and verification

3.3 Flood Forecasting

- 3.3.1 Forecast formulation
- 3.3.2 Statistical approach
- 3.3.3 Physical approach
- 3.3.4 Flash floods
- 3.3.5 Verification of forecast
- 3.3.6 Dissemination of forecast
- 3.3.7 Glacier lake outburst flood

3.4 Remote Sensing

- 3.4.1 Study of hydrological regime
- 3.4.2 Snow and glacier survey

3.5 Project Management

- 3.5.1 Project development planning
- 3.5.2 Stakeholder requirements
- 3.5.3 Role of hydrology in IWRM
- 3.5.4 Project Management Information Systems, Network models; CPM, PERT