विद्युत नियमन आयोग
इन्जिनिरिङ सेवा, हाइड्रोलोजी समूह, तह ७, हाइड्रोलोजिस्ट पदको
खुला/आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

यस पाठ्यक्रमलाई दुई चरणमा विभाजन गरिएको छः

प्रथम चरण :- लिखित परीक्षा (Written Examination) पूर्णाङ्क :- २००

द्वितीय चरण :- अन्तर्वार्ता (Interview) पूर्णाङ्क :- ३०

परीक्षा योजना (Examination Scheme)

१. प्रथम चरणः लिखित परीक्षा (Written Examination) **पूर्णाङ्क :- २००**

पत्र	विषय	पूर्णाङ्क	उत्तीर्णाङ्क	खण्ड	परीक्षा प्रणाली	प्रश्न संख्या	अङ्क भार	समय
प्रथम	सामान्य ज्ञान, बौद्धिक परीक्षण तथा विद्युत नियमन सम्बन्धी	१००	४०	(क)	वस्तुगत बहुवैकल्पिक प्रश्न (MCQs)	५०	१	१ घण्टा ३० मिनेट
	General Technical Subject			(ख)	वस्तुगत बहुवैकल्पिक प्रश्न (MCQs)	५०	१	
द्वितीय	Technical Subject	१००	४०	(क)	छोटो उत्तर आउने प्रश्न	२	५	३ घण्टा
					लामो उत्तर आउने प्रश्न	४	१०	
				(ख)	छोटो उत्तर आउने प्रश्न	२	५	
					लामो उत्तर आउने प्रश्न	४	१०	

२. द्वितीय चरणः अन्तर्वार्ता (Interview) **पूर्णाङ्क :- ३०**

विषय	पूर्णाङ्क	परीक्षा प्रणाली
अन्तर्वार्ता	३०	मौखिक

द्रष्टव्यः

१. लिखित परीक्षाको माध्यम भाषा नेपाली अथवा अंग्रेजी वा नेपाली र अंग्रेजी दुवै हुन सक्नेछ।

२. प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ।

३. लिखित परीक्षामा सोधिने प्रश्न संख्या र अङ्कभार यथासम्भव सम्बन्धित पत्र / विषयमा दिइए अनुसार हुनेछ।

४. वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नहरूको गलत उत्तर दिएमा प्रत्येक गलत उत्तर बापत २० प्रतिशत अङ्क कट्टा गरिनेछ । तर उत्तर नदिएमा त्यस बापत अङ्क दिइने छैन र अङ्क कट्टा पनि गरिने छैन।

५. वस्तुगत बहुवैकल्पिक प्रश्नहरू हुने परीक्षामा परीक्षार्थीले उत्तर लेख्दा अंग्रेजी ठूलो अक्षर (Capital Letter) A, B, C, D मा लेख्नुपर्नेछ। सानो अक्षर (Small Letter) a, b, c, d लेखेको वा अन्य कुनै सङ्केत गरेको भए सबै उत्तरपुस्तिका रद्ध हुनेछ।

६. बहुवैकल्पिक प्रश्नहरू हुने परीक्षामा कुनै प्रकारको क्याल्कुलेटर (Calculator) प्रयोग गर्न पाइने छैन।

७. विषयगत प्रश्नहरूको हकमा एउटा लामो प्रश्न वा एउटै प्रश्नका दुई वा दुई भन्दा बढी भाग (Two or more parts of a single question) वा एउटा प्रश्न अन्तर्गत दुई वा बढी टिप्पणीहरू (Short notes) सोध्न सकिनेछ।

८. विषयगत प्रश्न हुने पत्र/ विषयको प्रत्येक खण्डका प्रश्नका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरू हुनेछन्। परीक्षार्थीले प्रत्येक खण्डका प्रश्नको उत्तर सोही खण्डको उत्तरपुस्तिकामा लेख्नुपर्नेछ।

९. यस पाठ्यक्रम योजना अन्तर्गतका प्रश्न/ विषय विषयवस्तुमा जुनसुकै कुरा लेखिएको भए तापनि पाठ्यक्रममा परेको कानुन, 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।

१०.प्रथम चरणको परीक्षाबाट छनौट भएका उमेदवारहरूलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ।

११.पाठ्यक्रम स्वीकृत मिति : २०८२/०१/०८

विद्युत नियमन आयोग

इन्जिनिरिङ सेवा, हाइड्रोलोजी समूह, तह ७, हाइड्रोलोजिस्ट पदको

खुला/आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

प्रथम पत्र :

खण्ड (क) सामान्य ज्ञान, बौद्धिक परीक्षण तथा विद्युत नियमन सम्बन्धी : ५० अङ्क

1. सामान्य ज्ञान (१५ × १ = १५ अङ्क)

1.1 नेपालको भूगोल र आर्थिक तथा सामाजिक क्रियाकलापः धरातलीय स्वरुपको किसिम र विशेषता, नेपालमा पाइने हावापानीको किसिम र विशेषता, नदीनाला, तालतलैया, खनिज पदार्थ, प्राकृतिक श्रोत साधन, विद्युत, शिक्षा, स्वास्थ्य र सन्चार सम्बन्धी जानकारी

1.2 नेपालको सामाजिक एवं सांस्कृतिक अवस्थाः परम्परा, धर्म, जाति, भाषाभाषी, कला, संस्कृति र साहित्य

1.3 नेपालमा विद्युत विकास, उर्जाका श्रोत र सम्भावना

1.4 नेपालको संघीय, प्रादेशिक र स्थानीय संरचना तथा शासन प्रणाली सम्बन्धी जानकारी

1.5 विश्वको भूगोलः महादेश, महासागर, अक्षांश, देशान्तर, अन्तर्राष्ट्रिय तिथि रेखा, समय, पर्वतशृंखला, नदी, हिमनदी. ताल, हिमताल

1.6 संयुक्त राष्ट्र संघ र यसका एजेन्सीहरू सम्बन्धी जानकारी

1.7 दक्षिण एशियाली क्षेत्रीय सहयोग संगठन (SAARC), SAARC- Energy Center, बिमस्टेक (BIMSTEC) सम्बन्धी जानकारी

1.8 राष्ट्रिय र अन्तर्राष्ट्रिय महत्त्वका समसामयिक घटना तथा नवीनतम गतिविधिहरू

2. संविधान, विद्युत क्षेत्रको नियमन र सम्बन्धित कानुनी व्यवस्था (१५ × १ = १५ अङ्क)

2.1 नेपालको संविधानः मौलिक हक र कर्तव्य, राज्यका निर्देशक सिद्धान्त, नीति तथा दायित्व, अनुसूचीहरू

2.2 विद्युत ऐन, २०४९ र विद्युत नियमावली, २०५०

2.3 विद्युत नियमन आयोग ऐन, २०७४ तथा विद्युत नियमन आयोग नियमावली, २०७५

2.4 विद्युत नियमन आयोग कर्मचारी प्रशासन विनियमावली, २०८१

2.5 सार्वजनिक खरिद ऐन, २०६३

2.6 विद्युत क्षेत्रमा नियमनको अवधारणा

2.7 विद्युत नियमन आयोगको काम, कर्तव्य तथा अधिकार

2.8 उपभोक्ता महशुल निर्धारणको सिद्धान्त तथा प्रक्रिया

2.9 विद्युत खरिद बिक्री दर निर्धारणका सिद्धान्त तथा प्रक्रिया

2.10 विद्युत नियमन आयोगको पाँच वर्षे मार्गचित्र २०८१-८६

3. Aptitude Test (20 ×1 = 20 Marks)

3.1 Verbal reasoning :

Series, analogy, classification, coding-decoding, insert the missing character, direction and distance sense test, ranking order, assertion and reason, statement and conclusion

3.2 Non-verbal reasoning:

Series, analogy, classification, matrices, figure formation and analysis, dot situation, water images, mirror images, embedded figures.

3.3 Quantitative aptitude:

Arithmetical reasoning/operation, percentage, fraction, ratio, average, profit & loss, time and work

3.4 General mental ability, logical reasoning and analytical ability, data interpretation

विद्युत नियमन आयोग

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खुला/आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

खण्ड (ख)

General Technical Subject: (50 ×1 = 50 Marks)

1. **General Hydrology**
   - 1.1 Hydrological cycle; water balance; precipitation; stream flow; evapo-transpiration; infiltration and percolation; aquifers; sub-surface flow; hydraulic wells

2. **Meteorology/Climatology**
   - 2.1 Composition and structure of atmosphere; solar radiation; terrestrial radiation; thermodynamics of atmosphere
   - 2.2 General circulation; atmospheric turbulence; climate elements (precipitation, temperature, wind, atmospheric pressure, solar radiation); climate classification; regional climatology; climatic changes

3. **Hydrological Observations (Instruments and Methods)**
   - 3.1 Precipitation: gauge location; non-recording and recording gauges; snowfall measurement; observations by satellite
   - 3.2 Snow cover: water equivalent; depth and extent of snow cover; ground surveys; radioisotope snow gauges; snow pillows; natural gamma radiation
   - 3.3 Evaporation and evapotranspiration: pan evaporation; soil evaporimeters; lysimeters; snow evaporimeters; short and long wave radiation; indirect methods
   - 3.4 Water levels of rivers, lakes and reservoirs: gauges and procedures for measurement of stage; frequency of stage measurements
   - 3.5 Discharge measurements: current meters; float method; dilution method; ultrasonic method; electromagnetic method; indirect methods; measurement under ice cover
   - 3.6 Stream gauging stations: selection of site; control sections; stage-discharge relationships
   - 3.7 Water temperature: infra-red radiation thermometer; measurement of water surface temperature for lake and reservoir evaporation

4. **Design of Hydro-Meteorological Network**
   - 4.1 General principles for design of networks: general requirements; optimum network; minimum network; optimum use of existing stations in organizing a minimum network; data to be considered in determining network density; quality of data to be collected
   - 4.2 Density of observation stations for a minimum network: factors affecting the density; minimum density limit of climatological networks; hydrometric network of minimum density
   - 4.3 Integration of bench-mark stations and representative basins in the network

5. **Snow and Glacial Hydrology**
   - 5.1 Formation of snow and ice; methods of observation
   - 5.2 Basic concept of glaciers, variation of glaciers, process of snow and glacier melting; monitoring of glaciers

5.3 Glacier Lake Outburst Floods (GLOFs)

6. **Collection, Processing and Publication of Hydro-Meteorological Data**
   - 6.1 Collection: observational procedures; transmission of hydrological observations; quality control; storage of data
   - 6.2 Special data collection: weather radar data and extreme rainfall; extreme river stages and discharges
   - 6.3 Stream flow computation: computation of average gauge height; computation of average discharge; computation of average discharge under ice cover; quality control of stream flow data; data processing through computer software
   - 6.4 Publication: purposes; requirements of hydrology; frequency of publication; contents and formats

7. **Ground Water Hydrology**
   - 7.1 Occurrence and distribution of ground water; geological formations (aquifers, aquicludes; aquitards); artesian - gravity well
   - 7.2 Flow equations for confined and unconfined aquifers; Dupit's assumption
   - 7.3 Water wells and their types; testing of wells
   - 7.4 Well hydraulics; Darcy's law; permeability; steady and unsteady flow; specific capacity and well efficiency; well losses
   - 7.5 Soil moisture: weight method and electrical resistance method

8. **Water Resources Planning**
   - 8.1 Components of water demand; components of water losses; importance of integrated water resources planning
   - 8.2 Hydrological and meteorological data requirement in water resources planning; types of water resources projects

9. **Survey and Mapping**
   - 9.1 Plan and map; principles of theory of errors in measurements; linear measurements; leveling; contouring

10. **Fluid Mechanics**
    - 10.1 Properties of fluids; fluid pressure; hydrostatic forces; buoyancy; types of fluid flow; continuity equation; Bernoulli's equation; streamlines; equipotential lines and flow net; circulation and vorticity

11. **Fluvial Hydraulics**
    - 11.1 Open channel flow: types of flow; velocity distribution, pressure distribution, specific energy and specific force and states of flow
    - 11.2 Conveyance of channel section; geometric properties of channels; uniform flow in channel; Chezy's and Manning's equations, specific energy and critical depth; critical flow; hydraulic jump and back water flow

12. **Hydrological Analysis**

12.1 Catchment characteristics and their effects to surface runoff

12.2 Interpretation of precipitation data: adjustment of data, double-mass curve analysis, evaluation of physiographic effects; average depth over a catchment; storm rainfall studies; depth-area-duration analysis, probable maximum precipitation (PMP); rainfall frequencies; drought severity; rainfall intensities

12.3 Interpretation of stream flow data: adjustment of data; spatial distribution, maps of average annual run-off; temporal distribution of runoff volume, unit hydrograph, stream flow routine, low flow analysis, flow duration curves, low for frequencies, statistical analysis of droughts, recession curve analysis, flood frequencies, statistical analysis

12.4 analysis of floods, regional generalization of flood characteristics; long period trends

12.5 Evaporation and evapotranspiration: water budget method, energy budget method, aerodynamic approach, combination of aerodynamic and energy balance equations, pan coefficient method

12.6 Runoff relations with rainfall and snowmelt: regressions analysis; runoff by storm periods, antecedent-moisture index method, initial base flow as index to rainfall runoff, moisture accounting techniques; runoff from short period snowmelt; monthly, seasonal and annual water budget

12.7 Hydrological analysis: estimation of required reservoir storage capacity, multipurpose storage requirements; reservoir system design; environmental effects.

12.8 Design of urban and small rural watershed drainage works regional method; unit hydrograph and time area curves; distributed system models; rainfall data required for design of drainage works

12.9 Influences of hydrological factors on water quality: general causes of water quality changes, reaction to pollutants; eutrophication; self-purification; absorption and accumulation; rise in water temperature

13. **Sediment Measurement Techniques and Analysis**

13.1 Source of sediment; geo-morphology of rivers; seasonal variation of sediment load; types of sediment; physical and chemical characteristics of water (turbidity, color, conductivity etc.)

13.2 Measurement of sediment; bed load; suspended load

13.3 Sediment yields; sediment yield modeling; Musgrave equation; Universal Soil-Loss Equation (USLE); run off-sediment relation; sediment concentration graph; unit sediment graph; reservoir and lake sedimentation

13.4 Estimation of bed load and suspended load; estimation of sediment load in the absence of local data

14. **Hydrological Forecasting**

14.1 Hydrological forecasts and warnings: classification of hydrological forecasts, types of warnings

14.2 Hydrological forecasting services: operation; organization; collection of data and issue of forecasts and warnings; data requirements accuracy and frequency of data measurements, operational data acquisition, use of radar observations for hydrological forecasting, use of snow and ice observations from meteorological satellites, technical equipment for hydrological forecasting services

14.3 Forecast method: seasonal and annual flow forecasts; stages and flows, flood forecasts, rainfall runoff computations, conceptual catchment models, stream flow simulation; short- and long-term forecasts of ice formation and break up

14.4 Evaluation and verification of hydrological forecasts: formulation of hydrological forecasts; evaluation of forecasting method; verification of operational forecasts; relation between meteorological and hydrological forecasting; benefit-cost analysis for hydrological forecasting

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खुला/आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम
द्वितीय पत्र :
Technical Subject
खण्ड (क) : ५० अङ्क

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7.3 Water wells and their types; testing of wells
7.4 Well hydraulics; Darcy's law; permeability; steady and unsteady flow; specific capacity and well efficiency; well losses
7.5 Soil moisture: weight method and electrical resistance method

खण्ड (ख): ५० अङ्क

8. Water Resources Planning

8.1 Components of water demand; components of water losses; importance of integrated water resources planning
8.2 Hydrological and meteorological data requirement in water resources planning; types of water resources projects

9. Survey and Mapping

9.1 Plan and map; principles of theory of errors in measurements; linear measurements; leveling; contouring

10. Fluid Mechanics

10.1 Properties of fluids; fluid pressure; hydrostatic forces; buoyancy; types of fluid flow; continuity equation; Bernoulli's equation; streamlines; equipotential lines and flow net; circulation and vorticity

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12.9 Influences of hydrological factors on water quality: general causes of water quality changes, reaction to pollutants; eutrophication; self-purification; absorption and accumulation; rise in water temperature

13. Sediment Measurement Techniques and Analysis

13.1 Source of sediment; geo-morphology of rivers; seasonal variation of sediment load; types of sediment; physical and chemical characteristics of water (turbidity, color, conductivity etc.)

13.2 Measurement of sediment; bed load; suspended load

13.3 Sediment yields; sediment yield modeling; Musgrave equation; Universal Soil-Loss Equation (USLE); run off-sediment relation; sediment concentration graph; unit sediment graph; reservoir and lake sedimentation

13.4 Estimation of bed load and suspended load; estimation of sediment load in the absence of local data

14. Hydrological Forecasting

14.1 Hydrological forecasts and warnings: classification of hydrological forecasts, types of warnings

14.2 Hydrological forecasting services: operation; organization; collection of data and issue of forecasts and warnings; data requirements accuracy and frequency of data measurements, operational data acquisition, use of radar observations for hydrological forecasting, use of snow and ice observations from meteorological satellites, technical equipment for hydrological forecasting services

14.3 Forecast method: seasonal and annual flow forecasts; stages and flows, flood forecasts, rainfall runoff computations, conceptual catchment models, stream flow simulation; short- and long-term forecasts of ice formation and break up

14.4 Evaluation and verification of hydrological forecasts: formulation of hydrological forecasts; evaluation of forecasting method; verification of operational forecasts; relation between meteorological and hydrological forecasting; benefit-cost analysis for hydrological forecasting