

**लोक सेवा आयोग**  
नेपाल इन्जिनियरिङ्ग सेवा, मेटेरियोलोजी समूह, राजपत्राङ्कित तृतीय श्रेणीका पदहरूको खुला र  
आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

पाठ्यक्रमको रूपरेखा :- यस पाठ्यक्रमको आधारमा निम्नानुसार दुई चरणमा परीक्षा लिइने छ :

प्रथम चरण :- लिखित परीक्षा पूर्णाङ्क :- २००  
द्वितीय चरण :- अन्तर्वार्ता पूर्णाङ्क :- ३०

**प्रथम चरण – लिखित परीक्षा योजना (Examination Scheme)**

पत्र	विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली	प्रश्न संख्या X अङ्कभार	समय
प्रथम	मेटेरियोलोजी	१००	४०	वस्तुगत बहुउत्तर (Multiple Choice)	१००X१ = १००	१ घण्टा १५ मिनेट
द्वितीय	विज्ञान	१००	४०	विषयगत (Subjective)	१०X१० = १००	३ घण्टा

**द्वितीय चरण**

विषय	पूर्णाङ्क	परीक्षा प्रणाली
व्यक्तिगत अन्तर्वार्ता	३०	मौखिक

- लिखित परीक्षाको माध्यम भाषा अंग्रेजी वा नेपाली, अथवा अंग्रेजी र नेपाली दुवै हुन सक्नेछ ।
- माथि उल्लिखित समूहको पाठ्यक्रमको प्रथम तथा द्वितीय पत्रको विषयवस्तु एउटै हुनेछ ।
- प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।
- प्रथम तथा द्वितीय पत्रहरूका एकाईहरूबाट सोधिने प्रश्नसंख्या निम्नानुसार हुनेछ :

प्रथम पत्रका एकाई	1	2	3	4	5	6	7	8	9
प्रश्न संख्या	15	15	15	15	10	10	10	5	5
द्वितीय पत्रका एकाई	1	2	3	4	5	6	7	8	9
प्रश्न संख्या	1	2	1	2	1	1	1		1

- द्वितीय पत्रको विषयगत प्रश्नहरूको स्वरूप निम्नानुसार हुन सक्नेछ :
  - ५.१ लामो उत्तर दिने १० अङ्कका पूरा प्रश्नहरू सोध्न सकिनेछ ।
  - ५.२ एउटै प्रश्नलाई दुई वा दुई भन्दा बढी भागमा (Two or more parts of a single question) विभाजन गरी सोध्न सकिनेछ ।
  - ५.३ एउटा प्रश्न अन्तर्गत दुई वा बढी टिप्पणीहरू (Short notes) सोध्न सकिने छ ।
- प्रथम पत्रमा वस्तुगत बहुउत्तर (Multiple Choice) प्रश्नहरूको उत्तर सही दिएमा प्रत्येक सही उत्तर बापत १ (एक) अङ्क प्रदान गरिनेछ भने गलत उत्तर दिएमा प्रत्येक गलत उत्तर बापत २० प्रतिशत अर्थात् ०.२ अङ्क कट्टा गरिनेछ । तर उत्तर नदिएमा त्यस बापत अङ्क दिइने छैन र अङ्क कट्टा पनि गरिने छैन ।
- यस पाठ्यक्रममा जेसुकै लेखिएको भएता पनि पाठ्यक्रममा परेका ऐन, नियमहरू परीक्षाको मिति भन्दा ३ (तीन) महिना अगाडि (संशोधन भएका वा संशोधन भई हटाइएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा रहेको सम्झनु पर्दछ ।
- प्रथम चरणको लिखित परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र द्वितीय चरणको अन्तर्वार्तामा सम्मिलित गराइनेछ ।
- यस भन्दा अगाडि लागू भएका माथि उल्लिखित समूहको पाठ्यक्रम खारेज गरिएको छ ।
- पाठ्यक्रम लागू मिति :- २०६२/१२/२१ देखि

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आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम  
प्रथम तथा द्वितीय पत्र :- मेटेरियोलोजी विज्ञान

**1. Physical Meteorology**

- 1.1 Introduction of the atmosphere
  - 1.1.1 Characteristics of the atmosphere
  - 1.1.2 Composition of the atmosphere
- 1.2 Radiation
  - 1.2.1 Energy sources and radiation principles
  - 1.2.2 Solar radiation
  - 1.2.3 Albedo
  - 1.2.4 Absorption of terrestrial radiation
  - 1.2.5 The effect of the line structure of the water vapour spectrum on the atmospheric emission and absorption
  - 1.2.6 Nocturnal radiation and the cooling of the surface layers
- 1.3 The principles of thermodynamics
  - 1.3.1 Work, heat
  - 1.3.2 The law of conservation of energy
  - 1.3.3 Internal energy and heat capacities of an ideal gas
  - 1.3.4 Adiabatic processes
  - 1.3.5 Entropy and second law of thermodynamics
  - 1.3.6 Summary of thermodynamic variables
- 1.4 Hydrostatic equilibrium
  - 1.4.1 The hydrostatic equation
  - 1.4.2 Height computation of upper air sounding
  - 1.4.3 The hydrostatics of special atmosphere
  - 1.4.5 Altimetry
  - 1.4.6 Reduction of pressure to sea level
- 1.5 Hydrostatic stability
  - 1.5.1 Stability criteria
  - 1.5.2 Absolute stability
  - 1.5.3 Absolute instability
  - 1.5.4 Conditional instability
  - 1.5.5 Parcel method
  - 1.5.6 Slice method
  - 1.5.7 Entrainment theory

**2. Dynamic Meteorology**

- 2.1 Coordinate system
- 2.2 Inertial versus non-inertial coordinate system
- 2.3 Dynamical equation in rotation coordinate system
- 2.4 Concept of gravity and gravitation
- 2.5 The pressure gradient force
- 2.6 Inertia motion
- 2.7 Individual versus local and convective derivatives
- 2.8 Equation of continuity
- 2.9 Complete set of equations governing the atmosphere
- 2.10 Horizontal motion under balanced forces
  - 2.10.1 Geostrophic flow
  - 2.10.2 Gradient flow
  - 2.10.3 Cyclostrophic flow
  - 2.10.4 The thermal wind

- 2.11 The mechanism and influence of pressure changes
  - 2.11.1 The pressure tendency equation
  - 2.11.2 The Bjerkenes-Holmboe theory
  - 2.11.3 The isallobaric wind
- 2.12 Circulation and vorticity
  - 2.12.1 The circulation theorem; Physical interpretation and application
  - 2.12.2 Vorticity theorem
  - 2.12.3 Divergence
- 2.13 Numerical weather prediction
  - 2.13.1 Fundamentals of NWP
- 2.14 General Circulation of the Atmosphere
  - 2.14.1 The mean circulation in the troposphere and lower stratosphere
  - 2.14.2 Meridional circulation
  - 2.14.3 Model of general circulation
- 3. Synoptic Meteorology**
  - 3.1 Air mass and front
    - 3.1.1 Definition of air mass, source region
    - 3.1.2 Classification and its symbols
    - 3.1.3 Modification of air mass
    - 3.1.4 General characteristics, classification of fronts
    - 3.1.5 Weather associated with idealized fronts
    - 3.1.6 Frontogenesis and frontolysis
  - 3.2 Extra-tropical cyclone
  - 3.3 Thunderstorms and tornadoes
  - 3.4 Weather analysis and forecasting
    - 3.4.1 The concept of synoptic analysis
    - 3.4.2 Preparation of synoptic charts
    - 3.4.3 Isobars on a level surface and contours of the isobaric surfaces and thickness of isobaric layers
    - 3.4.4 Synoptic representation of the pressure field
  - 3.5 Meteorological codes and symbols
    - 3.5.1 SYNOP, TEMP
    - 3.5.2 Meteorological symbols
- 4. Tropical Meteorology**
  - 4.1 The scope of tropical meteorology
  - 4.2 The equatorial trough
  - 4.3 Mean sea level circulation
  - 4.4 The trade winds
  - 4.5 Weather in tropics
  - 4.6 Inter tropical convergence zone
  - 4.7 Tropical disturbances and cyclones
    - 4.7.1 Classification and definition of tropical disturbances
    - 4.7.2 Global climatology of tropical cyclones
    - 4.7.3 Tropical storms, their formation, movement and forecasting
  - 4.8 Monsoon
    - 4.8.1 Global monsoons
    - 4.8.2 Differential heating
    - 4.8.3 Heat low
    - 4.8.4 Monsoon depressions
    - 4.8.5 Monsoon climatology
  - 4.9 Waves in the easterlies
  - 4.10 El Nino, La Nina, Southern Oscillation

- 5. Climatology**
  - 5.1 Definition and scope of climatology
  - 5.2 Solar radiation and terrestrial heat balance
  - 5.3 Spatial and temporal variation of temperature
  - 5.4 Spatial and temporal variation of winds and pressure
  - 5.5 Climatic classification and description of climatic classification
  - 5.6 Climates of Nepal
  - 5.7 Climate change and its impact
  - 5.8 Statistics in climatology
- 6. Applied Meteorology**
  - 6.1 Air pollution, pollutants and its dispersion
  - 6.2 Agriculture meteorology
    - 6.2.1 General physiology of plant growth
    - 6.2.2 Role of soil and atmosphere
  - 6.3 Weather and climate in relation to the plant growth and development of vegetation
    - 6.3.1 Photosynthesis
    - 6.3.2 Soil temperature
    - 6.3.3 Wind profile near ground
    - 6.3.4 Lysimeters
    - 6.3.5 Frost and frost protection
  - 6.4 Aviation meteorology
    - 6.4.1 Visibility
    - 6.4.2 Fog
    - 6.4.3 Turbulence
    - 6.4.4 Jet stream
    - 6.4.5 Aircraft icing
    - 6.4.6 Altimeter setting
    - 6.4.7 Route forecast
    - 6.4.8 Clouds
    - 6.4.9 Meteorological Aviation Report (METAR), Terminal Aerodrom Forecast (TAF)
- 7. Instrumentation and method of observation**
  - 7.1 Precipitation
  - 7.2 Surface wind
  - 7.3 Pressure
  - 7.4 Temperature
  - 7.5 Humidity
  - 7.6 Sunshine and Radiation
  - 7.7 Evaporation
  - 7.8 Upper air observation
- 8. Hydrometeorology**
  - 8.1 Hydrologic cycle and application of hydrology
  - 8.2 Precipitation
  - 8.3 Infiltration
  - 8.4 Evapotranspiration
  - 8.5 Runoff
  - 8.6 Hydrographs
  - 8.7 Ground water
  - 8.8 Water balance
- 9. Satellite and radar Meteorology**
  - 9.1 Introduction
  - 9.2 Satellite Sensors

- 9.3 Image Interpretation
- 9.4 Quantitative Information from Satellites
- 9.5 Fundamentals of Radar
- 9.6 Bright Bands

**वस्तुगत बहुउत्तर नमूना प्रश्नहरू (Sample questions)**

1. The word 'monsoon' is derived from the:  
A. Latin            B. Arabic            C. Chinese            D. French

**Correct Ans. (B)**

2. The line of equal pressure tendency is called:  
A. Isobar            B. Streamline. C. Isoline            D. Isallobar

**Correct Ans. (D)**

3. How many types of sunshine cards are used in a Campbell sunshine recorder?  
(A) One (B) Two            (C) Three            (D) Four

**Correct Ans. (C)**

4. In which of the following regions, tropical cyclones are called hurricanes?  
A. Pacific            B. Atlantic            C. Indian            D. Mediterranean

**Correct Ans. (B)**

5. Terrestrial radiation is the radiation emitted by the:  
A. Earth            B. Sun            C. Atmosphere            D. Moon

**Correct Ans. (A)**

**विषयगत नमूना प्रश्नहरू (Sample questions)**

1. Discuss how Thornthwaite's classification of the world differs from that of Koppen. Which one do you think is more useful and why?
  2. Where do tropical cyclones form? How do you distinguish tropical cyclones from extra-tropical cyclones? Give an overview of the surface pressure systems in tropical cyclones.
  3. What is vorticity? What happens when a westerly current blows over a ridge? Explain with the help of potential vorticity equation.
  4. What is the difference between funnel cloud and tornado? Why do meteorologists cannot measure pressure and wind speed of a tornado?
  5. Explain with diagram the conditional instability in a parcel of air that moves vertically without mixing and disturbing the environment.
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