

लोक सेवा आयोग  
नेपाल विविध सेवा, राजपत्रांकित द्वितीय श्रेणी, वरीष्ठ कार्टोग्राफर पदको खुला र आन्तरिक प्रतियोगितात्मक लिखित  
परीक्षाको पाठ्यक्रम

द्वितीय पत्र :- सेवा सम्बन्धी प्राविधिक विषय

**1. Spatial Reference Systems**

- 1.1 Coordinate system: Polar ( $r, \theta$ ) and Cartesian( $X, Y$ ) coordinate system, Spherical system, Latitude, Longitude, Graticule, Three dimensional coordinates, Geocentric and topocentric coordinates,
- 1.2 Geodesy and properties of spherical geometry: Geoid, Ellipsoid, Spheroid, Ratio of flattening, Great Circles, Area and angles in spherical triangles, Loxodrome (Rhumb line)
- 1.3 Frame of reference: Local and Global Spatial Reference Systems and Spatial Reference frames. World Geodetic Systems, WGS84, GRS, ITRS and ITRF

**2. Map compilation**

- 2.1 Map compilation: planning, Purpose, sources, accuracy analysis of sources
- 2.2 Compilation: Base map, Integration of sources, Registration, Image geometry (geometric relationship)
- 2.3 Generalization and scale changing: Procedures for scale changing, Selection, Aggregation, Reduction, Collapsing, Coarsening /Down sampling
- 2.4 Cartographic accuracy: Components of data quality, Lineage, Positional accuracy, Attribute accuracy, Logical consistency, Completeness

**3. Thematic Mapping**

- 3.1 Cartography an interdisciplinary field of study
- 3.2 Perception properties of the thematic data: Associative, selective, ordered and quantitative perception properties
- 3.3 Visualization: Dot density map, Isarithmic or Isopleth map, Dasymetric map, Choropleth map, Proportional point symbol map, Scaling of symbols (continuous or range-graded), Combination of symbols and multiple theme visualization.
- 3.4 Spatial intelligence: Communication of geospatial information
- 3.5 Geo-spatial planning: Global, National, Regional and Local level

**4. Cartographic reproduction**

- 4.1 Introduction to Map Reproduction: Reproduction tools and materials, Color separation, Drawing, Scribing, Etching, Peeling, Cutting, Sticking, Duffing, Proofing
- 4.2 Photography: Camera Elements and Lens Formula, Camera Photography and Contact Photography, Registration, Process Camera, Contact Camera, Lens Distortion, Camera Setting, Scheimpflug condition, Law of Inverse Squares, Illumination of originals, Enlargement and Reduction of Maps, Photographic Materials, Photographic Films and Their Types, Emulsions and Images, Screen and Screening Process, Photographic Process, Exposure, Developing, Fixing, Washing, Drying, Sensitivity of Emulsion, Gradation and Contrast, Densitometer
- 4.3 Copy: Diazo Copy, Litho copy, Xerox copy, In contact, Out contact, Right reading and Mirror reverse Images, Types of originals and films, screen and screening techniques
- 4.4 Printing: Printing Machines, Printing methods, Printing Plates, Negative and Positive Systems of Plate Making, Line tone, half tone and continuous tone of images, Quality of Papers and Inks, Preservation of Plates, offset printing techniques, examination of evaluation of quality prints, colour matching, screen printing

## 5. Map revision

- 5.1 Methods of map revision and map updating: Ground survey method, Optical projection method, Photogrammetric method, Remote sensing method and Computer aided method
- 5.2 Revision Cycle: Periodic, Selective, Systematic and Sporadic
- 5.3 Map verification
- 5.4 Rapid Response Cartography
- 5.5 Real time presentation and Ubiquitous GIS

## 6. Advanced Cartography

- 6.1 Digital Cartography: Analogue vs. Digital Cartography, Advantages and disadvantages of digital cartography, Digital Cartographic data and data models. Basic terms from topology. Types and forms of cartographic data
- 6.2 Hardware: Scanners, Computer, Digitisers and Plotters
- 6.3 Software: CAD, GIS, DBMS
- 6.4 Cartographic Modelling: Map algebra, processing of spatial data and information
- 6.5 Digitising: manual and automatic (scanning), Processing of vector data, Transformation of co-ordinates and transformation algorithm
- 6.6 Relief representation: Digital terrain models, Triangulated Irregular Network, Relief representation by means of contouring and shading.
- 6.7 Modern techniques: Application of remote sensing in cartography. Geo-referencing and Geo-coding, Satellites and sensors for cartography, LIDAR Mapping, Hyper spectral solutions, End to End Global Data collection & analysis
- 6.8 Data Dissemination: Digital cartographic systems. Electronic maps and atlases. Cartography and geo-information systems, National topographic and cartographic databases, Digital Landscape Model and Digital Cartographic Model, Data security
- 6.9 GIS and Internet: Internet /web maps, dynamic static digital maps, Interactive and non-interactive digital maps, Spatial data dissemination through web, Spatial Data Infrastructure (SDI), Data Standards and interoperability, Metadata and Clearing House, WMS, WFS, WCS, WPS

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### Sample Questions

1. Discuss on the perception properties of the visual variables- Position, Form, Orientation, Colour, Texture, Value and Size and explain how these variables are used to visualize thematic data of different measurement levels. **15 marks**
2. Interactive and dynamic digital maps are more informative and user-friendly than hardcopy maps and their dissemination through web provides easy access to the users too. But, in the mapping industry of Nepal digital map production and online distribution has not been fostered yet. Identify the problems behind it and explain the current policies of the Government of Nepal in this sector, recommend the means to rectify the problems together with implementation, monitoring and evaluation plan. **20 Marks**