Syllabus P.G. Diploma in Remote Sensing & GIS 2023-24



Department of Geography Utkal University, Bhubaneswar, Odisha

P.G. DIPLOMA IN REMOTE SENSING & GIS Department of Geography, Utkal University, Bhubaneswar, Odisha Session - 2023-2024

The course will comprise of three theory papers, each of four hours of duration carrying 100 marks. One practical paper of six hours duration carrying 100 marks and one dissertation to be submitted before filling up the forms carrying 100 marks. The papers are as follows:

1 . REMOTE SENSING	100 MARKS
2 . CARTOGRAPHY AND MAPPING	100 MARKS
3 . GEOGRAPHICAL INFORMATION SYSTEM	100 MARKS
4 . RS, CARTOGRAPHY & GIS APPLICATION (PRACTICAL)	100 MARKS
5 . DISSERTATION	100 MARKS

PAPER – I

REMOTE SENSING

UNIT – I (Fundamental concept of remote sensing)

Energy sources and radiation principles, Energy interaction with atmosphere and Earth surface feature, History of remote sensing, Sensors and platform, Multispectral scanning.

UNIT - II (Introduction to Aerial photography)

Types of Aerial photograph, Geometry of Aerial photographs, Principle of stereoscopic vision, Determination of scale and measurement of height of object, Technique, and principle of air photo interpretation.

UNIT – III (Satellite Remote Sensing)

Earth resource satellite – Types and Characteristics, Thermal and Multispectral Scanning, Microwave Remote sensing, Fundamentals of satellite image interpretation, Image Classification, Mosaicing and Enhancement.

UNIT – IV (Digital Image Processing)

Concept and Principle, Image Rectification and Restoration, Enhancement and Classification, Constrast Manipulation, Post classification smoothing.

UNIT – V (Remote Sensing Application)

Land cover and Land use mapping, Terrain analysis and land evaluation, Application in environmental studies, Geological and geomorphologic mapping, Application in soil and forest studies, Coastal zone management.

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PARPER – II

CARTOGRAPHY AND MAPPING

UNIT – I (History of cartography)

Earth Co-ordinate system, Concept of scale, Cartographic Data, Types of measurement- Ordinal, Nominal, Interval and Ratio, Cartographic variables, Types of symbols- point, line, Area.

UNIT - II (Surveying and Map Projection)

Principle of surveying, Types of Map projection, Fundamental properties of Map projection, Elementary ideas on – Zenithal, Conical, Cylindrical, Mercator's Projections.

UNIT - III (Materials and Techniques of Map Preparation)

Drawing instruments, Use of Inks, and colors, drawing materials, Map compilation, Map designing and layout, Map lettering and topography, Preparation of Base Map.

UNIT – IV (Map Enlargement and Reduction)

Map Reproduction, Graphs and Diagrams, Chorochromatic Maps, Isopleth Maps, Choropleth Maps, Measurement of area and Distance from Maps.

UNIT – V (Statistical techniques in Cartography)

Measurement of Central tendency and Dispersion, Relief Maps, Climatic Maps, Economic Map and Diagrams, Population Maps and Diagrams, Settlement Maps and Diagrams.

PAPER – III

GEOGRAPHICAL INFORMATION SYSTEM

UNIT – I (Introductory concept)

- 1.1 Definition, Basic concept, components of GIS- Hardware & software components.
- **1.2** Data in GIS, Data Types, sources of data & typical GIS datasets, input of different types of data, socioeconomic data for GIS, Base data, Census data, Natural Resource data, remotely sensed data, Digital elevation data.
- **1.3** Data quality and Sources of Error Micro level components (Positional accuracy, Attribute accuracy, Logical consistency, Resolution), Macro level Components (completeness, Time, Lineage), Usage components (accessibility and Direct and Indirect costs), Sources of Error.

UNIT - II (Data Models and Database)

- 2.1 Data models and Data structures Hierarchical, Network & Relational, Raster and Vector
- **2.2** Organizing GIS Database: Characteristics, Database design conceptual design, logical design, physical design, Database creation, Database updating and linkages.
- 2.3 Designing Database for natural resources, environmental management, natural disasters

UNIT - III (Digital surface Modelling)

- 3.1 Concept and background of Digital Surface Modelling (DSM) and Digital Elevation Model (DEM)
- **3.2** Needs for Digital Surface Modelling and the Methods of the representation Digital surface Modelling
- **3.3** Data sources for Digital surface Modelling, Outputs and Application of Digital Surface Modelling

UNIT - IV (GIS Tools)

- **4.1** Organizing Data, Data Input (Digitization, scanning, and Raster to Vector conversion), verification, Data storage and Retrieval
- **4.2** Manipulation (Referencing to co-ordinate system, projection), Editing (Geometrical and Attribute)
- 4.3 Analysis (Spatial Modelling and Integration GIS Analytical models)
- 4.4 Data representation and Cartographic Communication

$\mathbf{UNIT} - \mathbf{V}$

- **5.1** Implementation of GIS Need and awareness of Implementing GIS, System Requirements, Evaluating Alternatives, System justification, Implementation of Action plan. System Acquisition and start-up.
- **5.2** GIS Application in Disaster Management, Landcover and Land use Mapping, Environmental Applications, Agriculture (Land suitability Analysis), Soil, Forestry, Rural Urban Planning andmanagement.

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$\mathbf{PAPER}-\mathbf{IV}$

PRACTICAL

<u>GIS</u>

- **4.1** Basic of computer and file management
- 4.2 Text Editing
- **4.3** Data Management
- 4.4 Overview of GIS software
- 4.5 Spatial data Input (Digitization)
- **4.6** Spatial data Manipulation and Editing (Transformation, Topology Building, Editing projections)
- 4.7 Cartographic Symbolization, Map elements and Map designing
- 4.8 Spatial Analysis (Buffering, overlaying, Dissolve)

REMOTE SENSING

4.9 Aerial photographs, stereoscope, Interpretation of Aerial photo and Scale determination

- **4.10** Satellite Image and their Visual Interpretation (Water bodies, Vegetation, Land use /Land cover, Geology, Geomorphology, Soil, Wasteland)
- 4.11 Introduction to Digital Image Processing

CARTOGRAPHY

- 4.12 Introduction to GPS
- 4.13 SOI toposheets
- 4.14 Mapping Tools (Choropleth Maps and Isopleth Maps)
- 4.15 Statistical Diagrams (Histogram, Bar diagram, Pie Diagram etc.)
- 4.16 Measurement of Central tendency (Mean, Mode, Median)
- **4.17** Measures of dispersion (Mean deviation, Standard deviation, variance, co-efficient of variance)
- **4.18** Correlation and Regression.

$\mathbf{PAPER}-\mathbf{V}$

DISSERTATION

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