

GEOGRAPHICAL INFORMATION SYSTEM (G.I.S.) COURSE

(Approved by Training dte. Signal No. S.XII. 10/2014-TRG.DA.13, dtd 24/11/14)

AIM

To acquaint the officers on basic principles of remote sensing, image processing and feature extraction methods as used for GIS along with an appreciation of field-based data acquisition methods that can be used to build and update GIS spatial databases and impart training to officers on current technologies being used in GIS.

SCOPE OF THE COURSE:-The participants will be able to-

1. Understand GIS concepts and principles.
2. Use of GIS for security management.

METHODOLOGY:-

1. Lectures/Presentations and hands on practical sessions.
2. Interactive learning.

ELIGIBILITY:-

Assistant Commandants to Commandants of CRPF.

CAPACITY:-

25 (05 Commandants/2I/Cs, 10 DCs, 10 ACs)

BLOCK TIME TABLE

Duration of the course	06 working days
No. of periods in a day	08 Periods
Total periods in the course	48 Periods
Duration of each period	40 Minutes

BLOCK SYLLABUS

S/NO	SUBJECT
01	Cartography
02	Principles of Remote Sensing
03	Platforms, Sensors and Data Products
04	Introduction to GIS
05	GIS Data base
06	Use of GIS System in CRPF
07	Advance terrain modeling
08	Course overview, opening and valediction ceremony

DETAILED SYLLABUS

1. CARTOGRAPHY

S/No	Subject
1.	Defining cartography - GIS and Digital Cartography, Concept of Digital Cartography, Advantages and Disadvantages of Digital Cartography
2.	Essentials of map making: Defining Map, Projection Systems, Categories of maps, Map Scales
3.	Topo sheets numbering system.

2. Principles of Remote Sensing

S/No	Subject
1.	Definition, types and scope of remote sensing- Concept and Scope of Remote Sensing: Definitions, Process and Characteristics of Remote Sensing System, Advantages and limitations. Image Data Acquisition Systems (Various Sensors Satellite, Aerial, UAV)
2.	Stages in remote sensing data acquisition. Image processing - Definition of digital image, Source of Data, Data Formats, Hardware and Software Consideration for Digital Image Processing, Data loading, Image Restoration, Image Rectification, Image Reduction and Magnification.

3. Platforms, Sensors and Data Products

S/No	Subject
1.	Remote sensing platforms - Ground, Airborne and Space borne Platforms, Orbital Characteristics – Coverage, Passes, Pointing Accuracy, Geostationary.
2.	Introduction, types & characteristics of sensors, high resolution satellites - IRS, LANDSAT, SPOT, IKONOS, Quick Bird, Cartosat, Quickbird, OrbView, GeoEye, WorldView. Image Resolutions (Understanding the Image Resolutions, 23.5m, 5.8m, 1m, 50cm, 30cm, etc. with examples)

4. Introduction to GIS

S/No	Subject
1.	Definition and Basic Concepts of GIS, definition of GIS, Functionality of GIS, Areas of GIS application, Advantages and Limitations of GIS
2.	GIS components – Components of GIS, Variables - points, lines, and polygon. Use of Hardware, Software's, Storages.
3.	Cartography GIS interface.
4.	Recent trends and applications of GIS (2D & 3D GIS) – GIS for drawing out action plans. Case studies and recent developments.
5.	Importance of GIS for Internal Security-Build and deploy system for improving internal security preparedness.
6.	GIS for Operational commanders (before the operation starts, during the actual operation and after the operation)

5. GIS Database

S/No	Subject
1.	Geographic data - GIS Data: Spatial and Attribute Data, Information Organization and Data Structures - Raster and Vector data structures, Data file and database
2.	Spatial and non Spatial Data (Raster Data, Vector Data, Attribute Data), hands on practice for using features.
3.	Database Management System (DBMS) - Creating GIS Database: GIS Software, file organization and formats, Geo-database, Rectification, Digitization and Map Composition with hands on practice.
4.	Data Arrangement and access: Basics of Data Arrangement and access, file Environment, Relational database system, DBMS (Oracle), Data Flow Diagrams Logical Data model, Data Warehouses, Meta Data and Global Databases.
5.	GIS Data Input: Nature and Source of data, Method of spatial data capture - Primary and Secondary, digitization and scanning method, Techniques and procedures for digitizing, Errors of Digitization, Attribute data capture.

6.	Data Editing: Detecting and correcting errors, Re-projection, Transformation and Generalization, Edge matching and Rubber sheeting, Topology, Conversion from Other Digital Sources, Query and Analysis : Buffer, Proximity, Network Analysis Spatial and Attribute Query
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6. Use of GIS System in CRPF

S/No	Subject
1.	3D Data Preparation using Terra Builder -Multi-Processor extension, Terrabuilder with 3D city builder, Introduction & Features of Terra Explorer Pro, Installation of TEP & Updating of License, Using of various tools available in TEP, Mapping (Plotting of Point, Poly line, Polygon).
2.	Collaboration Server – Validation of data, collection of ground information and collaboration.
3.	Streaming Feature Server – Video streaming capabilities and requirements.
4.	Terra Explorer Pro, Terra Explorer Plus for end users – features, and Capabilities.
5.	Hands on practice on using TEP tools/features/importing excel sheet data, KML files etc.
6.	Google Earth features/Hands on practice on Google earth - Geo-referencing using Qgis software.
7.	Using any GPS software, Creation of GPX files/ KML files for GPS, Uploading files to GPS and downloading files from GPS to map and hands on practice.

7. Advance terrain modeling

S/No	Subjects
1.	Advance terrain modeling and mapping Geo intelligence for Homeland security for better effective near real time decision making. Hands on practice. Taking the 3D terrain in the field through Ipad/ Tablets.

8. Miscellaneous

S/No	Subjects
1.	Course overview, opening & valediction ceremony

Note:- 1) In addition to above, brain storming/open sessions/group discussions/workshops, screening of training films etc. will also be a part of the course in pursuance to Training Directorate, CRPF directives to include smart practices.

2) Academy can do some para-phrasing of the sub-topics mentioned in detailed syllabus as per need, requirement, immediate feedback and utility of trainees, without changing the block time table and block syllabus.
