SYLLABUS

FOR

GLOBAL POSITIONING SYSTEM(GPS)

SURVEY TRAINING INSTITUTE, H-8/2 ISLAMABAD

SURVEY OF PAKISTAN

SURVEY TRAINING INSTITUTE ISLAMABAD

COURSE : Global Positioning System (GPS)   **DURATION :- 4 Weeks**

BREAKDOWN SCHEDULE

ACTIVITY	Duration (Weeks)
• **Theory** • **Handling of GPS instrument**	**1**
• **Field Training-GPS observations**	**2**
• **Introduction to GPS Software(Ski PRO , TGO)** • **Data Downloading and Baselines Processing**	**1/2**
• **Project** • **Final Test**	**1/2**

SYLLABUS

A). THEORY:

1. Introduction to Global Positioning System

    a) What is GPS ?

    b) Why did the GPS developed ?

    c) History of GPS

    d) How GPS works?

2. Components / Segments of Global Positioning System

    a) Space Segment

    b) Control Segment

    c) User Segment

3. Some Basic Terminologies used in GPS Survey

    a) TRANSIT

    b) NAVSTAR

    c) C/A-Code

    d) P-Code

    e) Y-Code

    f) SPS

    g) PPS

    h) PDOP

    i) GDOP

    j) VDOP

    k) TDOP

    l) NGS

    m) AS

    n) WGS-84

    o) GLONASS

    p) JAG

    q) L1, L2

    r) NGRS

    s) SA

4 .Various Types of GPS Receivers

    a) Hand Held Navigator

    b) L1 Single frequency GPS

    c) L1,L2 dual frequency GPS

    d) RTK, Carrier phase GPS

5. GPS Survey Techniques:

    a) Static Surveys

    b) Rapid Static Surveys

    c) Kinematics Surveys

    d) Real Time Kinematics Surveys

6. **GPS Survey Planning:**

    a) Pre-mission Briefing

    b) GPS Survey Party Staffing

    c) Vehicles Consideration

    d) Reconnaissance

    e) Site Selection

    f) Monumentation

    g) Station Notes

7. Main Steps involved in GPS Project:

    a. GPS-Mission Planning

    b. Reconnaissance of GPS Stations

    c. Observation of Data

    d. Processing of Data

    e. Adjustment of Data

    f. Detection of Blunders

    g. Adjustment of GPS Network according to Absolute GPS Stations

    h. Submission of Final Reports and Results

    i. GPS-Files

        i.   Almanac File

        ii.   Observation Files

        iii.   Processing Files

        Iv.   Adjustment Files

8. **Sources of Error**

    a) Atmospheric Effects in the Ionosphere and Troposphere

    b) Satellite Clock Synchronization Error

    c) Electronic Noise

    d) Multipath Error

    e) Uncertainty in Satellite Position (Ephemeris Error)

    f) Intentional Degradation

9. **PDOP (Position Dilution of Precision)**

    a) Satellite Geometry

    b) Mask angle

    c) Number of Satellites

    d) Obstructions

10. **Improving Accuracy through Advanced forms of GPS**

    a) Differential GPS

    b) Community Base Stations

    c) CORS

    d) WAAS

    e) LAAS

    f) Carrier-Phase GPS

    g) Real time kinematics

11. **GPS Network Design**

    a. International GPS Network

    b. A-Order GPS Network

    c. AB-Order GPS Network

    d. B-Order GPS Network

    e. GPS-Tracking Stations

12. <u>**Coordinate systems**</u>

      a)   Introduction to basic terms such as Latitude, Longitude, datum, Reference ellipsoid   etc.

      b)   Geographic Coordinate System

      c)   Plane-Cartesian Coordinates System

      d)   World Geodetic System **-**WGS 84

      e)   SOP Grid Coordinates

      f)   UTM Grid Coordinates

13. <u>**GPS Applications/Uses.**</u>

14. <u>**GPS Survey Vs Conventional Survey**</u>

15. <u>**Scope of GPS in Survey of Pakistan**</u>

B).   <u>**PRACTICAL:**</u>

      a)   Introduction to GPS Software

      b)   GPS-Mission Planning

      c)   Reconnaissance of Area and Establishment of GPS Stations

      d)   Introduction to GPS Instrument

      e)   Components of the Instrument

      f)   Reference Receiver

      g)   Rover Receiver

      h)   Setting up the instrument properly

      i)   Proper operation of the instrument

      j)   Dealing Jobs

      k)   Configuring the GPS instrument

      l)   Selecting various options and Input data

      m)   GPS-Observation

      n)   GPS-Baselines Processing

      o)   GPS-Data Adjustment

      p)   Adjustment of Data with reference to 'A' or 'AB' order Network

q)   Detection of Blunders and Improvement of Accuracy Standards

r)   Comparison of GPS Coordinates with Local Everest coordinates

s)   Transformation Parameters

t)   Conversion of Coordinates from WGS-84 to Everest and Vice Versa

u)   Submission of Final Results and Reports