4/4 B.Tech - EIGHTH SEMESTER

EC 8T2D   **Global Positioning System (GPS)**   **Credits: 3**

Lecture: 3 periods/week   **Internal assessment: 30 marks**
Tutorial: 1 period /week   **Semester end examination: 70 marks**

Course Objectives:
- To be able to utilize GPS/GIS applications and techniques for environmental inventory and research.
- To understand the mechanics of GPS/GIS, including software, hardware and available resources.
- To interpret and analyze data in a GIS environment.
- To gain 'real-world' experience while serving the local community through service-learning projects

Learning Outcomes:

Student will be able to
- analyze GPS signals and their characteristics
- understand GPS errors and sources causing those errors
- simulate different algorithms of GPS using MATLAB programming and results can be analyzed to study different parameters
- Find new applications of GPS in medicine, transportation, manufacturing and engineering for the betterment of human life.

UNIT-I

Overview of GPS : Basic concept, system architecture, space segment, user segment.
GPS Signals : Signal structure, anti-spoofing (AS), selective availability, Difference between GPS and GALILEO satellite construction.

UNIT-II

GPS orbits and satellite position determination: GPS orbital parameters, description of receiver independent exchange format (RINEX) – Observation data and navigation message data parameters, GPS position determination.

UNIT-III

GPS Errors: GPS error sources – clock error, ionospheric error, tropospheric error, multipath, ionospheric error estimation using dual frequency GPS receiver.

UNIT-IV

Parameterization and Algorithms of GPS Data Processing II: Non-Equivalent Algorithms: Standard Algorithms of GPS Data Processing, Preparation of GPS Data Processing, Single Point Positioning, Standard Un-Differential GPS Data Processing, Equivalent Method of GPS Data Processing, Relative Positioning, Velocity Determination, Kalman Filtering Using Velocity Information

UNIT-V

Applications of GPS Theory and Algorithms: Software Development : Functional Library, Data Platform, A Data Processing Core, Concept of Precise Kinematic Positioning and Flight-State Monitoring: Introduction, Concept of Precise Kinematic Positioning, Concept of Flight-State Monitoring.

Learning Resources
Text Books:
1. GPS – Theory andPractice, B. Hoffman – Wellenhof, H. Liehtenegger and J. Collins, Springer–Wien, NewYork, 2001.
2. GPS Theory, Algorithms and Applications, Guochang Xu, 2nd Edition ,Springer

References:

1. Fundamentals of GPS receivers – A software approach, James Ba, Yen Tsui, John Wiley & Sons, 2001.