Syllabus
for
Post Graduate Diploma Programme
in
Geographic Information System (GIS) and Remote Sensing

आर्यभट्ट ज्ञान विश्वविद्यालय
ARYABHATTA KNOWLEDGE UNIVERSITY

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POST GRADUATE DIPLOMA IN GIS AND REMOTE SENSING

Semester -1 (REMOTE SENSING) Credits: L: 3 T: 12 P: 2 = 17

COURSE CODE	COURSE TITLE	L	T	P	CREDIT
PGDRSGIS 101	PRINCIPLES OF REMOTE SENSING	0	3	0	3
PGDRSGIS 102	DIGITAL SATELLITE IMAGE PROCESSING	0	3	0	3
PGDRSGIS 103	AERIAL AND SATELLITE PHOTOGRAMMETRY & IMAGE INTERPRETATION	0	3	0	3
PGDRSGIS 104	STATISTICAL METHODS FOR RESEARCH	0	3	0	3
PGDRSGIS 105	PRACTICAL/ LAB	3	0	2	5

Semester -2 (GEOGRAPHIC INFORMATION SYSTEM) Credits: L: 2 T: 12 P: 2 = 18

PGDRSGIS 201	GEOGRAPHIC INFORMATION SYSTEM AND SATELLITE NAVIGATION SYSTEMS	0	3	0		3
PGDRSGIS 202	SPATIAL INFORMATION SYSTEM	0	3	0		3
PGDRSGIS 203	DIGITAL SURVEYING	0	3	0		3
PGDRSGIS 204	GEOSPATIAL WEB TECHNOLOGY AND DATA DATABASE	0	3	0		3
PGDRSGIS 205	PRACTICAL	2	0	2		4

Semester -1 (REMOTE SENSING)

PGDRSGIS 101 (PRINCIPLES OF REMOTE SENSING & DIGITAL SATELLITE IMAGE PROCESSING)

UNIT 1: BASIC CONCEPTS

Remote Sensing: History, Development, Definition, Concept & Principles, Electromagnetic Radiation (EMR) and Its Characteristics, Wavelength Regions and their Significance, Interaction of EMR with Atmosphere and Earth's Surface: Absorption, Reflectance and Scattering, Atmospheric Windows, Energy Balance Equation, Spectral Response and Spectral Signature, Spectral, Spatial, Temporal and Radiometric resolutions.

UNIT 2: DATA ACQUISITION

Platform: Balloon, Rocket, Helicopter, Aircraft and Spacecraft, Aerial vs. Satellite Remote Sensing, Satellites and their Specifications: LANDSAT, SPOT, ENVISAT, RADARSAT, IRS, IKONOS, Sensors and their Specifications: MSS, TM, LISS (I,II,III,IV), PAN, WiFS, AWiFS, MODIS, Weather & Communication Satellites.

UNIT 3: OPTICAL, THERMAL AND MICROWAVE REMOTE SENSING

Imaging and Non-Imaging, Active and Passive, Multispectral, Superspectral and Hyperspectral Sensors, Electro-Optical Systems, Opto-Mechanical Scanners, Infrared Scanners, Scatterometer, Thermal Properties of Terrain, Thermal IR Environmental Considerations, Thermal Infrared and Thermal Scanners, Microwave Remote sensing concepts:, Backscattering, Range Direction, Azimuth Direction, Incident Angle, Depression Angle, Polarization, Dielectric Properties, Surface Roughness and Interpretation, Speckle and Its Reduction, Applications of optical, thermal and microwave remote sensing.

UNIT 4: IMAGE ENHANCEMENT AND FILTERING TECHNIQUES

Concepts about digital image and its characteristics, Sources of image degradation - Image restoration and Noise Abatement , Radiometric and Geometric correction technique, linear and non linear transformation for geometric corrections, Look-up Tables (LUT) and Types of image displays and FCC, Radiometric enhancement techniques, Spatial enhancement techniques, Contrast stretching: Linear and non-linear methods, Low Pass Filtering: Image smoothing, High Pass Filtering: Edge enhancement and Edge detection, Gradient filters, Directional and non-directional filtering.

UNIT 5: PATTERN RECOGNITION

Concept of Pattern Recognition, Multi-spectral pattern recognition, Spectral discrimination, Signature bank, Parametric and Non-Parametric classifiers, Unsupervised classification methods, Supervised classification techniques, Limitations of standard classifiers

PGDRSGIS 102 (DIGITAL SATELLITE IMAGE PROCESSING)

OBJECTIVE:

- The objective of the course is to describe about the procedure of satellite data acquisition and analysis.

UNIT I : FUNDAMENTALS

Satellite systems and data – acquisition - storage - orbits – Data formats –Data products – Image processing system – factors to be considered- Image display systems – Image sampling and quantization - Basic relationship between pixels.

UNIT II: SENSOR AND DATA MODEL

Sensor model – pixel characters - Image formation – Histogram -Types- Uni-variate & multi-variate image statistics – spatial statistics – Image registration and ortho rectification - Geometric and radiometric correction - noise models.

UNIT III: IMAGE ENHANCEMENTS

Spectral signatures – Image characteristics, feature space scatterogram- point, local and regional operation – contrast, spatial feature and multi-image manipulation techniques - Fourier transform - principle component analysis - Optimal Rotation Transformation – Scale-space transform, wavelet transform. multi-image fusion

UNIT IV: INFORMATION EXTRACTION

Training sits - Supervised, Unsupervised and Hybrid classifiers -– Baye's Theorem – parametric Classification - -Decision tree – other non-parametric classifiers - sub-pixel and super-pixel classification – Hyper-spectral image analysis – Accuracy assessment.

UNIT V : IMAGE ANALYSIS

Pattern recognition - boundary detection and representation - textural and contextual analysis - decision concepts: Fuzzy sets - evidential reasoning - Expert system - Artificial Neural Network – Case studies

OUTCOME:

On completion of this course, the student shall be able to Get familiarized about various image enhancement and image processing techniques.

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REFERENCES:

1. Digital Image Processing (3rd Edition) Rafael C. Gonzalez, Richard E. Woods Prentice Hall, 2007.
2. John A.Richards, Springer – Verlag, Remote Sensing Digital Image Analysis, 2005, ISBN:3540251286..
3. John R. Jensen, Introductory Digital Image Processing: A Remote Sensing Perspective, 4th Edition, 2015.
4. Robert Shcowebgerdt, Remote sensing models & methods for image processing, 3rd edition, 2004.
5. W.G.Rees - Physical Principles of Remote Sensing, Cambridge University Press, 2nd edition, 2001.

PGDRSGIS 103 (AERIAL AND SATELLITE PHOTOGRAMMETRY & IMAGE INTERPRETATION)

UNIT 1: ENVIRONMENTAL MAPPING & INTERPRETATION

Importance of Image Interpretation, Image interpretation for delineation of lithology (Rocks), minerals and their characteristics, Geological structures - Folds, Faults and Joints and their field characteristics, Various important land forms, Image characteristics of geological structures and major land forms, Visual and Digital Satellite Image Interpretation, Elements of image interpretation, development of interpretation keys, Image interpretation for LU/LC and Vegetation mapping, Image interpretation for ocean and coastal monitoring.

UNIT 2: GEOMETRY OF AERIAL PHOTOGRAPHS

Need for Photogrammetry, Historical developments in Photogrammetry, Fundamental concepts and Importance of flight planning, End Lap, Side Lap, Scale, Ground Coverage, Weather Conditions, Purpose, Flying Height, Projection, Tilt, Swing, Scale, Image Displacement due to relief, due to lens distortion, due to tilt, Parallax, stereoscopic depth perception, overlaps in stereo pairs, principles of floating marks, Parallax bar and types, measurement of absolute and differential parallax, Parallax ,height measurement, correction to measure parallaxes – contouring from stereometric heights., Types of photographs, Vertical and Tilted photographs.

UNIT 3: ANALYTICALPHOTOGRAMMETRY

Co-ordinate system, air base components, degree of freedom, Elements of interior and exterior orientation of an aerial photographs, Numerical Derivations for Height based on relief displacement, coordinates, parallax, Orientation Procedures, Coordinate Transformation concepts, Epi-polar Geometry, Photo-triangularion: Pass-points for Aerotriangulation, semi-analytical aero-triangulation, analytical aero-triangulation, bundle adjustment with GNSS, Aero-triangulation with Satellite images, strategies for aero-triangulation.

UNIT 4: DIGITAL PHOTOGRAMMETRY

Analogue to Digital conversion, Image measurements, colour balancing, Image matching, Feature extraction- points, lines and regions, Planimetric Measurements, GCPs and Ortho-Rectification, Ortho-photographs, Digital Terrain Model derivation from Satellite images, Limitations, Quality checks and interactive control.

UNIT 5: TERRAIN MODELING WITH UAV

Digital Photogrammetric Images from UAV and associated concepts, UAV flight planning, coverage types, processing methods. Recent trends in its application, automated aerial triangulation: concepts, solutions, analysis, Photogrammetry work-stations, Review of available software.

PGDRSGIS 104 (STATISTICAL METHODS FOR RESEARCH)

OBJECTIVES :

- This course is designed to provide the solid foundation on topics in various statistical methods which form the basis for many other areas in the mathematical sciences including statistics, modern optimization methods and risk modeling. It is framed to address the issues and the principles of estimation theory, testing of hypothesis, correlation and regression, design of experiments and multivariate analysis.

UNIT I ESTIMATION THEORY

Estimators : Unbiasedness, Consistency, Efficiency and sufficiency – Maximum likelihood estimation – Method of moments.

UNIT II TESTING OF HYPOTHESIS

Sampling distributions - Small and large samples -Tests based on Normal, t, Chi square, and F

distributions for testing of means, variance and proportions – Analysis of r x c tables – Goodness of fit.

UNIT III CORRELATION AND REGRESSION

Multiple and partial correlation – Method of least squares – Plane of regression – Properties of residuals – Coefficient of multiple correlation – Coefficient of partial correlation – Multiple correlation with total and partial correlations – Regression and partial correlations in terms of lower order co - efficient.

UNIT IV DESIGN OF EXPERIMENTS

Analysis of variance – One way and two way classifications – Completely randomized design – Randomized block design – Latin square design - 2_2 Factorial design.

UNIT V MULTIVARIATE ANALYSIS

Random vectors and matrices – Mean vectors and covariance matrices – Multivariate normal density and its properties – Principal components : Population principal components – Principal components from standardized variables.

OUTCOMES :

After completing this course, students should demonstrate competency in the following topics:

- Consistency, efficiency and unbiasedness of estimators, method of maximum likelihood estimation and Central Limit Theorem.
- Use statistical tests in testing hypotheses on data.
- Concept of linear regression, correlation, and its applications.
- List the guidelines for designing experiments and recognize the key historical figures in Design of Experiments.
- Perform exploratory analysis of multivariate data, such as multivariate normal density, calculating descriptive statistics, testing for multivariate normality.

The students should have the ability to use the appropriate and relevant, fundamental and applied mathematical and statistical knowledge, methodologies and modern computational tools.

REFERENCES :

1. Gupta.S.C., and Kapoor, V.K., "Fundamentals of Mathematical Statistics", Sultan Chand and Sons, 11th Edition, 2002.
2. Jay L. Devore, "Probability and statistics for Engineering and the Sciences", 8th Edition, Cengage Learning, 2014.
3. Johnson, R.A. and Wichern, D. W. "Applied Multivariate Statistical Analysis", Pearson Education, Asia, 6th Edition, 2007.
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4. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.
5. Rice, J.A. "Mathematical Statistics and Data Analysis", 3rd Edition, Cengage Learning, 2015.

MSC 105 (PRACTICAL)

REMOTE SENSING AND PHOTOGRAMMETRY LABORATORY

OBJECTIVE:

- This course will facilitate the students to have hands on experience on different steps of visual interpretation of satellite images & photographs and digital interpretation of photographs.

REMOTE SENSING EXERCISES

1. Map reading - Survey of India Topo sheets. 4
2. Preparation of Base Map from Survey of India Topo sheets 4
3. Preparation of Land use/land cover map using Satellite Data / Aerial Photograph. 4
4. Preparation and analysis of spectral signatures using handheld spectroradiometer for
(a) Vegetation 4
(b) Soil 4
(c) Water 4

PHOTOGRAMMETRY EXERCISES

1. Testing stereovision with test card and Stereoscopic acquity 4
2. Mirror stereoscope- base lining and orientation of aerial photographs 4
3. Use of parallax bar to find the height of point 4
4. Scale of vertical photographs and Photo interpretation 4
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5. Orientations using digital photogrammetric workstation 4
6. ATM using small blocks – Part I 4
7. ATM using small blocks – Part II 4
8. DEM,DSM,DTM and Orthogeneration 4
9. Feature Extraction by Stereoplotting and Monoplotting 4

OUTCOME:

• On completion of this course, the student shall be able to acquire skills to carry out the Lab Exercises independently on visual interpretation of satellite images and digital processing of aerial photographs.

Semester -2 GEOGRAPHIC INFORMATION SYSTEM

PGDRSGIS 201 (GEOGRAPHIC INFORMATION SYSTEM AND SATELLITE NAVIGATION SYSTEMS)

UNIT 1: BASIC CONCEPTS OF GIS

Definition, Philosophy & Historical evolution of GIS, Spatial vs. non-spatial data, Components of GIS, Spatial data models – Raster and Vector; advantages & disadvantages, Raster Data & its Representation: Data Structure& File format, Data Compression (block code, chain code, run length code, quadtree, MrSID), Vector data representation: Data Structure& File format,Topology, Advantage of DBMS in Context of GIS, Relational and Object Oriented DBMS.

UNIT 2: DATA INPUT AND GEO-CORRECTION

Sources of Spatial Data (Raster and Vector), Data Acquisition Through Scanners and on-screen Digitisation, Projections, Geometric Transformations of Raster and Vector Data (Affine Transformation and Transformation Coefficients), RMS Error, Types of Co-ordinate Systems, Spheroid and Datums, Sources of Errors, Spatial Data Quality: Accuracy, Precision, Error and uncertainty.

UNIT 3: SPATIAL ANALYSIS AND VISUALIZATION

Spatial Analysis: Definition, Steps and classification, Raster Data Analysis Tools – Local, Focal, Zonal and Global, Vector Data Analysis – Buffering, Distance Measurements, Analyzing Geographic Relationship, Overlay Analysis, Quantifying Change, Spatial Interpolation: Introduction, DEM Generation Surface Representation & Analysis, Network Analysis, Linkage Between Spatial and Non-Spatial Data, Basics of Geodatabase Model, Difference between 2D,2.5D, 3D and 4D GIS, Current issues and trends in GIS.

UNIT 4: SATELLITE POSITIONING SYSTEM - AN OVERVIEW

Introduction to Global Navigation Positioning System, Various Global/Regional Satellite constellations, NAVSTAR GPS signals, Geopositioning - Basic Concepts, Pseudo Range Measurement, Phase Difference Measurement, Sources of GNSS errors, DOP, Geoid, Datum/Ellipsoid - definition and basic concepts, Global Datum vs. Indian Geodetic Datum, Coordinate Systems, Transformation of coordinates, GNSS Remote Sensing.

UNIT 5: POSITIONING AUGMENTATION AND GNSS APPLICATIONS

Differential positioning concept, Various Differential survey Methods, GNSS Survey Planning, Data Processing, Site characteristics of Reference Station, Reference Station Equipment, Augmentation Systems (IRNSS, GAGAN, WAAS, LAAS, etc.) Basic concepts, Applications.

PGDRSGIS 202 (SPATIAL INFORMATION SYSTEM)

SPATIAL INFORMATION SYSTEM

OBJECTIVES:

- Expose the students with concepts of cartography as major components of input and output related to cartography.
- To provide exposure to data models and data structures in GIS and to introduce various Raster and Vector Analysis capabilities.
- To expose the concept of quality and design of cartographic outputs in open GIS environment.

UNIT I FUNDAMENTALS OF CARTOGRAPHY AND GIS 9

Definition of Map - Mapping Organsiation in India- Classification based on Function, Scale, Characteristics – Ellipsoid and Geoid – Co-ordinate Systems - Rectangular and Geographic

Coordinates – UTM and UPS - Projection – Function - Types of Map Projections – Transformations – Function - Affine transformation - Choice of Map Projection – Evolution of cartography- Geo-Spatial, Spatial and Non-spatial data – Definition of GIS – Evolution GIS – Components of GIS.

UNIT II GIS DATA MODELS AND DATA INPUT 9

Point, Line Polygon / Area, elevation and surface –Tessellations - Attributes and Levels of Measurement - Data Sources – Ground and Remote Sensing survey – Collateral data collection –

Input: Map scanning and digitization, Registration and Georeferencing – Concepts of RDBMS - Raster Data Model – Grid – Data Encoding - Data Compression – Vector Data Model

– Topological properties – Arc Node Data Structure – Raster Vs. Vector Comparison – File Formats for Raster and Vector – Data conversion between Raster and vector. 13

UNIT III RASTER AND VECTOR DATA ANALYSIS 9

Raster Data analysis: Local, Neighborhood and Regional Operations – Map Algebra – Vector Data

Analysis: Topological Analysis, point-in-polygon, Line-in-polygon, Polygon-in-Polygon – Proximity Analysis: buffering, Thiessen Polygon – Non-topological analysis: Attribute data Analysis- concepts of SQL– ODBC

UNIT IV NETWORK ANALYSIS AND SURFACE ANALYSIS 9

Network – Creating Network Data - Origin, Destination, Stops, Barriers – Closest Facility Analysis, Service Area Analysis, OD Cost matrix analysis, Shortest Path Analysis – Address Geocoding – Surface Analysis – DEM, DTM - Point data to Surface interpolation – DEM

Representaiton - Applications

UNIT V DATA OUTPUT AND WEB BASED GIS 9

Map Compilation – Cartographic functionalities for Map Design – Symbolization – Conventional

signs and symbols – Spatial Data Quality – Lineage, Positional Accuracy, Attribute Accuracy,

Completeness, Logical Consistency - Meta Data – Web based GIS: Definition, Merits - Architecture – Map Server – Spatial Data Infrastructure – Spatial Data Standards

OUTCOMES:

On completion of this course, the student shall

- Acquire knowledge about cartographic principles, spatial data models and spatial analysis.
- Understand the cartographic outputs in open GIS environment.

REFERENCES:

1. C.P. Lo, Albert K.W. Yeung, Concepts and Techniques of Geographic Information Systems, 2nd Edition, Prentice Hall, 2006, ISBN-13: 9780131495029
2. John Jensen, Ryan Jensen, Introductory Geographic Information Systems, International Edition, Pearson Publishers, 2012, ISBN-10: 0136147763, ISBN-13: 9780136147763
3. Kang-tsung Chang, Introduction to Geographic Information Systems with Data Set CDROM,
6th Edition, Mc Graw Hill, 2013, ISBN-10: 0077805402,. ISBN-13: 978-0077805401

SPATIAL INFORMATION SYSTEM LABORATORY

OBJECTIVES:

- The exercises are designed to give practical exposure to the students to data input, data storage, data analyses and data output capabilities of a standard GIS software.
- It also adds skills in mapping techniques and map outputs.

1. Rectification and Spatial Referencing of Digital Map
2. Onscreen Digitization and Database Creation
3. Projection and Re-projection of spatial data
4. Data Conversion – Vector to Raster, Raster to Vector
5. Populating Attribute data base and querying on attribute data
6. Generation of DEM: from contours, spot heights, GRID and TIN, Isometric mapping
7. Vector Analysis – Buffering, Overlay and Network analysis, flood mapping
8. Raster Analysis – Measurement - Arithmetic overlaying, Logical overlaying, Class interval selection, choropleth maps
9. Map Output - Bar charts, Pie charts and symbols
10. Map compilation
11. Modelling spatial variability
12. Weighted theisson polygon and districting
13. Customisation and scripting

OUTCOME:

On completion of this course, the student shall be able to

• Acquire skills to carry out the Lab Exercises independently on spatial information system analysis and customisation.

PGDRSGIS 203 (DIGITAL SURVEYING)

OBJECTIVE :

• To understand the working of Total Station, Electronic Distance Measurement and GPS equipments and solve the surveying problems.

UNIT I FUNDAMENTALS OF TOTAL STATION AND GPS

Methods of Measuring Distance, Basic Principles of Total Station, Historical Development, Classifications, applications and comparison with conventional surveying. Global Navigation System, Regional Navigation System and SBAS - Basic concepts of GNSS, Glonass,IRNSS -Historical perspective and development - applications - Geoid and Ellipsoid- satellite orbital motion

- Keplerian motion – Kepler"s Law - Perturbing forces - Geodetic satellite - Doppler effect- Different Coordinate and Time System.

UNIT II ELECTROMAGNETIC WAVES

Classification - applications of Electromagnetic waves, Propagation properties, wave propagation

at lower and higher frequencies- Refractive index (RI) - factors affecting RI-Computation of group for light and near infrared waves at standard and ambient conditions-Computation of RI for microwaves at ambient condition - Reference refractive index- Real time application of first velocity correction. Measurement of atmospheric parameters- Mean refractive index- Second velocity correction -Total atmospheric correction- Use of temperature - pressure transducers.

UNIT III ELECTRO OPTICAL AND MICRO WAVE SYSTEM

Electro-optical system: Measuring principle, Working principle, Sources of Error, Infrared and Laser Total Station instruments. Microwave system: Measuring principle, working principle, Sources of Error, Microwave Total Station instruments. Comparison between Electro-optical and Microwave system. Care and maintenance of Total Station instruments– Applications of COGO functions -Traversing and Trilateration – Downloading and mapping - Recent trends.

UNIT IV GPS SATELLITE SYSTEM

GPS - Different segments - space, control and user segments - satellite configuration - GPS signal structure - Orbit determination and representation - Anti Spoofing and Selective Availability – Task of control segment - GPS receivers.

UNIT V GPS DATA PROCESSING

GPS observables - code and carrier phase observation - linear combination and derived observables - concept of parameter estimation – downloading the data -data processing –

software modules -solutions of cycle slips, ambiguities, RINEX format. Concepts of rapid, static methods with GPS - semi Kinematic, pure Kinematic and Real time kinematic methods -basic constellation of satellite geometry & accuracy measures - applications- use of different softwares.

OUTCOMES:

On completion of this course students shall be able to

- Understanding the concepts of Electromagnetic waves and impact of Refractive Index.
- Work with Electro optical and microwave Total Station and understand error sources.
- Understand the advantages of electronic surveying over conventional surveying methods
- Understand the working principle of GNSS , its components, signal structure, and error sources
- Understand various GNSS surveying methods and processing techniques used in GNSS observations
- Familiarise various areas of GNSS applications and new developments.

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REFERENCES :

1. Alfred Leick, GPS satellite surveying, John Wiley & Sons Inc., Fourth Edition, 2015, ISBN: 978-1-118-67557-1.
2. Guocheng Xu, GPS Theory, Algorithms and Applications, Springer Science & Business Media, Second Edition, 2007, ISBN: 3540727159, 9783540727156
3. Laurila, S.H. Electronic Surveying in Practice, John Wiley and Sons Inc, 1993.
4. R.Subramanian, Surveying and Levelling, Oxford University Press, Second Edition, 2012.
5. Rueger, J.M. Electronic Distance Measurement, Springer-Verlag, Berlin, 1990.
6. Satheesh Gopi, rasathishkumar, N.madhu, — Advanced Surveying , Total Station GPS and Remote Sensing — Pearson education , 2007 isbn: 978-81317 00679
7. Seeber G, Satellite Geodesy, Walter De Gruyter, Berlin, 1998

DIGITAL SURVEYING LABORATORY

OBJECTIVE :

- To train the students to acquire skill in making precise measurements and obtaining accurate results with Total Station, Electronic Distance Measurement and GPS equipments.

EXERCISES:

1. Study of Total Station and EDM
2. Distance and Coordinate Measurement
3. Missing Line Measurement
4. Remote Elevation Measurement
5. Resection
6. Setting out : Point and Line
7. Taking Offsets
8. Area Measurement
9. Total Station Traversing
10. Study of Hand held GPS
11. Study of Geodetic GPS
12. Static and semi kinematic survey
13. Differential Positioning
14. Precise Positioning
15. GPS Traversing

OUTCOMES:

At the end of the course the student will be able to

- Work with Total Station and GPS instruments for measurement and mapping

• Use ofTotal Station and GPS for alignment and setting out works

PGDRSGIS **204** (GEOSPATIAL WEB TECHNOLOGY AND DATA DATABASE)

OBJECTIVE:

• This course provides skills in learning a set of scripts and their applications for providing web based services using GIS technology.

UNIT I INTRODUCTION ON HTML 6+6

Internet Standards – Introduction to www – www Architecture – Protocols – HTTP, FTP, SMTP.

Markup Language (HTML): Introduction to HTML and HTML5 - Formatting and Fonts – Commenting Code – Anchors – Backgrounds – Images – Hyperlinks – Lists – Tables – Frames -

HTML Forms.

UNIT II CASCADING STYLE SHEET (CSS)

The need for CSS, Introduction to CSS – Basic syntax and structure - Inline Styles – Embedding

Style Sheets - Linking External Style Sheets – Backgrounds – Manipulating text - Margins and

Padding - Positioning using CSS.

UNIT III JAVA SCRIPT

Data types and Variables - Operators, Expressions, and Statements -Functions - Objects - Array,

Date and Math related Objects - Document Object Model - Event Handling - Controlling Windows

& Frames and Documents - Form handling and validations.

UNIT IV PHP

Introduction - Programming basics - Print/echo - Variables and constants – Strings and Arrays –

Operators, Control structures and looping structures – Functions – Reading Data in Web Pages -

Embedding PHP within HTML – Establishing connectivity with database.

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UNIT V GEOSERVER

Introduction – Web Administration – Geoserver data directory –loading and working with data –

shape file – postgis file – other web format data - styling the layers – services : WMS, WFS, WCS

– security – demos and case studies on Geo server.

OUTCOME:

• On completion of this course, the student shall be able to write scripts for web technology programming for GIS.

REFERENCES:

1. Harvey & Paul Deitel & Associates, Harvey Deitel and Abbey Deitel, "Internet and World Wide Web - How To Program", Fifth Edition, Pearson Education, 2011. ISBN-13: 978-0132151009

2. http://docs.geoserver.org/

3. Stefano Iacovella, Brian Youngblood "GeoServer Beginner's Guide" Packt Publishing 2013, ISBN-13: 978-1849516686

4. Steven Holzner, "PHP: The Complete Reference" 1st Edition TATA McGraw Hill ,2008 ISBN: 9780070223622
5. Thomas Powell, "HTML & CSS: The Complete Reference" Fifth Edition, McGraw-Hill, 2010
ISBN-13: 978-0071496292
6. Thomas Powell, Fritz Schneider "JavaScript The Complete Reference" 3rd Edition, TATA McGraw Hill, 2013 ISBN-13: 9781259064685