## CURRICULUM FOR B.E GEOINFORMATICS ENGINEERING

### SEMESTER III

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## ELECTIVES FOR B.E. ENGINEERING TECHNOLOGY

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## APPLICATIONS

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AIM
To facilitate the understanding of the principles and to cultivate the art of formulating physical problems in the language of mathematics.

OBJECTIVES

- To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems
- To acquaint the student with Fourier transform techniques used in wide variety of situations in which the functions used are not periodic
- To introduce the effective mathematical tools for the solutions of partial differential equations that model physical processes
- To develop Z- transform techniques which will perform the same task for discrete time systems as Laplace Transform, a valuable aid in analysis of continuous time systems

UNIT I
FOURIER SERIES
Dirichlet’s conditions – General Fourier series – Odd and even functions – Half-range Sine and Cosine series – Complex form of Fourier series – Parseval’s identity – Harmonic Analysis.

UNIT II
FOURIER TRANSFORM

UNIT III
PARTIAL DIFFERENTIAL EQUATIONS
Formation – Solutions of first order equations – Standard types and Equations reducible to standard types – Singular solutions – Lagrange’s Linear equation – Integral surface passing through a given curve – Solution of linear equations of higher order with constant coefficients.

UNIT IV
APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS
Method of separation of Variables – Solutions of one dimensional wave equation and one-dimensional heat equation – Steady state solution of two-dimensional heat equation – Fourier series solutions in Cartesian coordinates.

UNIT V
Z- TRANSFORM AND DIFFERENCE EQUATIONS

L: 45, T: 15, TOTAL: 60 PERIODS

TEXT BOOK

REFERENCES
OBJECTIVE:
The main objective of this course is to introduce the rudiments of Land Survey methods and principles to Geoinformatics Engineers. This is the correct term and it falls under the general title of Land Surveying.

UNIT I  FUNDAMENTALS OF SURVEYING  4

UNIT II  CHAIN SURVEYING  9

UNIT III  COMPASS SURVEYING AND PLANE TABLE SURVEYING  12

UNIT IV  LEVELLING  14

UNIT V  AREAS AND VOLUMES  6

TOTAL : 45 PERIODS

TEXT BOOKS:

REFERENCES:
OBJECTIVE:
The main objective of this course is to introduce Cartography and its elements as the Art and Science of Map Making. The course also describes its connections with the Communication Science and Digital Computer as structured and need based information of Spatial Data.

UNIT I  FUNDAMENTALS OF CARTOGRAPHY 9

UNIT II  EARTH 9

UNIT III  SOURCES OF DATA 9

UNIT IV  PERCEPTION AND DESIGN 9
Cartographic design – Colour theory and models – Colour and pattern creation and specification – colour and pattern – Typography and lettering the map – Map compilation – Demography and Statistical mapping.

UNIT V  CARTOGRAPHY ABSTRACTION 9

TOTAL : 45 PERIODS

TEXT BOOKS:

REFERENCES:
OBJECTIVE:
The objective of this course is to introduce basics and concepts of optics, Aerial photography acquisition and mapping from aerial photographs.

UNIT I BASIC OPTICS AND PRINCIPLES OF PHOTOGRAPHY 15

UNIT II CAMERAS AND CO-ORDINATE MEASUREMENT 8

UNIT III STEREOSCOPIC AND PLANIMETRIC MAPPING WITH VERTICAL, TILTED AND OBLIQUE PHOTOGRAPHS 20

UNIT IV PROJECT PLANNING AND GROUND CONTROL SURVEY 8

UNIT V PHOTO INTERPRETATION 9

L:45 + T:15 TOTAL : 60 PERIODS

TEXTBOOKS:

REFERENCES:
OBJECTIVE:
The objective of this course is to introduce the students to basic concepts of database, file systems and organization, Database Management System (DBMS) and .Net for database.

UNIT I  Introduction  7
Data – Information - File system vs DBMS – Data models – Hardware and software requirements – Database Management Systems – Database languages, Database Architecture, users and administrators – Classification of Database Management Systems

UNIT II  Relational Data Model  9
Relational model – Data Structure – Constraints – Keys – Codd’s Rule – Relational Algebra – Fundamental operations - Additional operations – Extended operations – Null values

UNIT III  SQL  9
SQL – Data Definition - Basic structure of SQL queries – Set operations – Aggregate Functions – Null values – Nested sub queries – Complex queries – Views – Embedded SQL – Dynamic SQL – Triggers

UNIT IV  Database Design and Management  10

UNIT V  Accessing Data Using ADO.NET and VB.NET  10
ADO.Net Object Model using OLE DB managed provider – Other data providers – Accessing XML data – Building Windows application using VB.Net – Programming web applications with web form

TOTAL : 45 PERIODS

TEXT BOOKS:

REFERENCES:
OBJECTIVE:
To familiarize the student about the various geological and methods for Geomorphological processes and the exploration of various natural resources

UNIT I  INTRODUCTION
Geology for natural resources inventory – Branches of geology - Scope. Interior of the Earth, Weathering, Plate Tectonics, Structural geology and introduction to geological structures – folds, faults, joints, lineaments

UNIT II  GEOMORPHOLOGY
Landforms and geomorphic process – Classification and description of Structural, Denudation, Fluvial, Aeolian, Glacial and Coastal landforms. Drainage pattern and morphometry.

UNIT III  MINERALS AND ROCKS
Physical properties of important rock and ore forming minerals- Classification and description of rocks - Forms and mode of occurrence - outline and distribution of economic minerals

UNIT IV  GEO-EXPLORATION

UNIT V  NATURAL HAZARDS
Classification – Causes for natural hazards – Mitigation - Earthquakes – Landslides – Volcanism – Tsunami - Cyclones and Floods

TOTAL : 45 PERIODS

TEXT BOOKS:

REFERENCES:
OBJECTIVE:
The objective of this course is to introduce the principles of surveying, instruments and various methods.

UNIT I  CHAIN SURVEYING

a) Study of chain and its accessories  
b) Ranging, chaining and Pacing  
c) Chain traversing without cross staff  
d) Chain traversing with cross staff

UNIT II  COMPASS SURVEYING

a) Study of Prismatic and Surveyor’s Compasses  
b) Triangulation problem  
c) Compass traversing

UNIT III  PLANE TABLE SURVEYING

a) Study of plane table and its accessories  
b) Radiation  
c) Intersection: Triangulation problem  
d) Resection – Three point problem  
e) Mechanical method  
f) Trial and error method  
g) Graphical solution  
h) Resection – Two Point problem  
i) Plane table traversing

UNIT IV  STUDY OF MINOR INSTRUMENTS

TOTAL : 60 PERIODS

OBJECTIVES:
- To determine the stereoscopic acuity for stereo measurement,  
- To provide exposure in handling basic equipment like stereoscope, parallax bar  
- To provide details about project planning activities and selection of Ground Control Points.

EXERCISE DESCRIPTION
1. Testing Stereovision with test card  
2. Finding stereoscopic acuity
3. Determination of photo scale  
4. Mirror Stereoscope – Base lining and Orientation of Aerial Photographs  
5. Use of parallax bar to find the height of point  
6. Determination of slope using parallax point  
7. Aerial photograph i) direct tracing of features for Urban planning and Highway planning ii) Radial line triangulation  
8. Study of Aerial camera / Terrestrial camera  
9. Preparation of flight plan  
10. Selection of ground control point (horizontal & vertical)  
11. Introduction to Analytical Stereo plotting instrument  

TOTAL : 30 PERIODS

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<thead>
<tr>
<th>GI9207</th>
<th>DATABASE SYSTEMS LABORATORY</th>
<th>LT P C</th>
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OBJECTIVE:
To get practical experience on the server – client setup on the database management  
1. Server / client operations  
   The server / client – Starting / Shutdown of server - Configuring client over network  
2. Data Definition of Tables and Views  
   Exercises on Creation, Deletion and Modification of definition  
3. Data Manipulation of Tables and views  
   Exercises on queries and to insert, delete and modify rows  
4. Data Control of Tables and Views  
   Exercises on control of tables and views  
5. Database triggers  
   Use of queries on complex integrity constraints  
6. Forms designing  
   Designing of forms for input/output  
7. Menu designing  
   Designing of user menus for database interactions  
8. Report preparations  
   Generating formatted reports  
9. Front end tool – applications  
   Designing of database application with any front end tool  

TOTAL : 60 PERIODS
AIM:
This course aims at providing the required skill to apply the statistical tools in engineering problems.

OBJECTIVES:
- The students will have a fundamental knowledge of the concepts of probability.
- Have knowledge of standard distributions which can describe real life phenomenon.
- Have the notion of sampling distributions and statistical techniques used in management problems.

UNIT I RANDOM VARIABLES
Discrete and Continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential, Gamma, Weibull and Normal distributions - Functions of a random variable.

UNIT II TWO-DIMENSIONAL RANDOM VARIABLES
Joint distributions – Marginal and Conditional distributions – Covariance – Correlation and Linear regression – Transformation of random variables – Central limit theorem (for independent and identically distributed random variables).

UNIT III TESTING OF HYPOTHESIS

UNIT IV DESIGN OF EXPERIMENTS
Completely randomized design – Randomized block design – Latin square design - $2^2$ - factorial design.

UNIT V STATISTICAL QUALITY CONTROL
Control charts for measurements ($\bar{X}$ and R charts) – Control charts for attributes (p, c and np charts) – Tolerance limits - Acceptance sampling.

L: 45 + T: 15 TOTAL : 60 PERIODS

TEXT BOOKS:

REFERENCES:
OBJECTIVE:
This subject deals with angular measurements, distance measurements and Control Survey methodology. The student is introduced briefly to Hydrographic Survey operations also.

UNIT I THEODOLITE SURVEYING 10

UNIT II TACHEOMETRIC SURVEYING 8
Tacheometric systems – Tangential, Stadia and Subtense methods – Stadia systems – Horizontal and inclined sights, vertical and normal staffing, fixed and movable hairs – stadia constants – Anallactic lens – Subtense bar.

UNIT III CONTROL SURVEYING 15

UNIT IV HYDROGRAPHIC SURVEYING 7

UNIT V TOPOGRAPHIC SURVEYING 5

TOTAL : 45 PERIODS

TEXT BOOKS:

REFERENCES:
GI 9252 DIGITAL IMAGE PROCESSING  L T P C  3 0 0 3

OBJECTIVE:
To make the undergraduate students gain knowledge and learn analytic background of digital image processing system to enable them in building one.

UNIT I  FUNDAMENTALS  6
Computers imaging systems, image representation- colour space, image sampling-quantization – quality measurement-data products – storage and retrieval- Photowite systems- dip systems and software.

UNIT II  PREPROCESSING  6
Encoding and decoding- sources of image degradation – atmospheric, radiometric and geometric errors – systematic and non-systematic correction – image geometry operations

UNIT III  IMAGE ENHANCEMENT  15
Image characters – histogram, scatter plots, statistics and spatial statistics for processing –image models, spatial transforms – enhancements: radiometric and geometric operators- Fourier transforms, scale space transforms, image fusion, texture analysis

UNIT IV  IMAGE CLASSIFICATION  9
Spectral discrimination pattern matching –Baye's theorem- signature and feature extraction- training and classification – supervised and unsupervised methods – error matrix and accuracy estimates

UNIT V  IMAGE ANALYSIS  9

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:

GI9253 OBJECT ORIENTED PROGRAMMING  L T P C  3 0 2 4

OBJECTIVE:
This course will facilitate the student to develop Object Oriented Programming and GIS Customisation programming using Visual Basic.
UNIT I
CONCEPTS OF OBJECT ORIENTED PROGRAMMING
12

UNIT II
C++ PROGRAMMING
14
Introduction to C++ - Keywords, Identifiers – Data types – Variables – Operators – Manipulators – Operator Overloading – Operator Precedence – Control Statements – Functions – Call by Reference – Arguments – Function Overloading – Exercises

UNIT III
CLASSES AND OBJECTS
17
Classes and Objects – Member Functions – Private and Public Member function – Nesting of Member Functions – Array of Objects – Pointer to Members – Constructors – Destructors – Type Conversions – Exercises

UNIT IV
INHERITANCE AND POLYMORPHISM
16

UNIT V
GIS CUSTOMISATION PROGRAMMING USING VISUAL BASIC
16

L: 45 + P: 30 TOTAL : 75 PERIODS

TEXT BOOKS:

REFERENCES:

GI9254
ELECTRONIC SURVEYING
L T P C
3 0 2 4

OBJECTIVE:
To understand the working of Total Station equipment and solve the surveying problems with an Total Station equipment.
UNIT I  FUNDAMENTALS
Methods of Measuring Distance, Basic Principles of EDM, Historical Development
Classifications, applications and comparison with conventional surveying.

UNIT II  BASIC ELECTRONICS
Oscillators (Crystal controlled and Gunn diode) - Kerrcell / Pockel’s modulator-
Frequency mixing - modulation and Demodulation - Measurement of phase
differences - reflectors (Corner, Antenna) - Transducers and power sources.

UNIT III  ELECTROMAGNETIC WAVES
Classification and applications of Electromagnetic waves, Propagation properties,
wave propagation at lower and higher frequencies. Refractive index, factors affecting
RI, Computation of group refractive index for light and near infrared waves at
standard conditions and ambient conditions. Computation of RI for microwaves.
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 and pressure
transducers.

UNIT IV  TOTAL STATION
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 applications. Care and
maintenance of Total Station instruments. Modern positioning systems.

UNIT V  FIELD WORK
Study of different Total Station instruments - Setting out works - Base line
Measurement - Total Station traversing: observations and computation of area -
Trilateration.

L: 45 + P: 30 TOTAL : 75 PERIODS

TEXTBOOKS:

REFERENCES:
1. Burnside, C.D. Electromagnetic distance measurement Crosby Lock wood
   staples, U.K. 1991..
2. Soastamoinen, J.J. Surveyor's guide to Electro-magnetic Distance Measurement,

GE9261  ENVIRONMENTAL SCIENCE AND ENGINEERING  L T P C
17

AIM
To create awareness in every engineering graduate about the importance of
environment, the effect of technology on the environment and ecological balance and
make them sensitive to the environment problems in every professional endeavour that they participates.

**OBJECTIVE**
At the end of this course the student is expected to understand what constitutes the environment, what are precious resources in the environment, how to conserve these resources, what is the role of a human being in maintaining a clean environment and useful environment for the future generations and how to maintain ecological balance and preserve bio-diversity. The role of government and non-government organization in environment managements.

**UNIT I**

**ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY**

Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeo graphical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

Field study of common plants, insects, birds
Field study of simple ecosystems – pond, river, hill slopes, etc.

**UNIT II**

**ENVIRONMENTAL POLLUTION**

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – soil waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides.

Field study of local polluted site
Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

**UNIT III**

**NATURAL RESOURCES**

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.

Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.
UNIT IV  SOCIAL ISSUES AND THE ENVIRONMENT  7

UNIT V  HUMAN POPULATION AND THE ENVIRONMENT  6

TOTAL: 45 PERIDOS

TEXT BOOKS

REFERENCES

GI9255  SURVEY PRACTICAL II  L  T  P  C
0  0  4  2

OBJECTIVE:
The objective of this course is to train the students to acquire skill in making precise measurements and obtaining accurate results.

UNIT I  LEVELLING
a) Study of levels and levelling staves
b) Taking spot levels
c) Fly levelling using Dumpy level
d) Fly levelling using Tilting level
e) Check levelling
f) Permanent adjustment of levels

g) Contouring

h) LS and CS

i) Computation of volume of earth work from contours

UNIT II  THEODOLITE SURVEYING

a) Study of theodolite and its accessories

b) Measurement of horizontal angles

 c) Measurement of vertical angles

d) Traversing

UNIT III  HEIGHTS AND DISTANCES

a) Triangulation problem

b) Single plane method

TOTAL : 60 PERIODS

GI9256  DIGITAL IMAGE PROCESSING LABORATORY I

OBJECTIVE:
To familiarize the undergraduate level students in the regular Image Processing software with respect to basic processing required to generate thematic maps from Satellite date.

1. Study of image file formats and organisation
2. Loading, import and display image
3. Display, zoom, panning of Image
4. Pixel locators and DN enumeration
5. Enhancement of image
6. Filters & edge enhancement
7. Designing of spatial filters
8. Thresholding and Density slicing
9. Band ratioing and NDVI
10. Principle Component Analysis
11. Look Up Table/PCT Manipulation
12. Bitmap generation & Conversion
13. Vector layer Manipulation
14. Symbol Manipulation
15. Reprojection to different co-ordinate systems

TOTAL : 60 PERIODS

GI9301  SURVEYING III

OBJECTIVE:
The Subject of Surveying, astronomy, and setting out works have also acquired a special significance in the context of an unprecedented explosion of knowledge; thereby making radical changes in the concept of previously acknowledged thinking. The last Chapter deals with modern systems in Surveying and Mapping. It presents
an overview of the latest techniques in the field of instrumentation and methodologies being employed in Geomatics.

UNIT I ASTRONOMICAL SURVEYING 16
Celestial sphere – Astronomical terms and definitions – Motion of sun and stars –
Apparent altitude and corrections – Celestial coordinate systems – Different time
systems – Nautical Almanac – Star constellations – Practical astronomy – Field
observations and calculations for azimuth, time, longitude and latitude.

UNIT II ROUTE SURVEYING 4
Reconnaissance – Route surveys for highways, railways and waterways.

UNIT III CURVE RANGING 10
Horizontal and vertical curves – Simple curves – Compound and reverse curves –
Setting out Methods – Transition curves – Functions and requirements – Setting out
by offsets and angles – Vertical curves – Sight distances.

UNIT IV MINE SURVEYING 5
Equipment – Correlation – Weisbach triangle – Underground levelling – Tunnel
alignment and setting out – Transfer of azimuth – Gyro Theodolite - Shafts Adits.

UNIT V MODERN SYSTEMS IN SURVEYING AND MAPPING 10
General – Electronic distance Measurement (EDM) – Digital Theodolite and its
accuracy – Total Station and its inbuilt programs like Co-go, Missing Line
Measurement, Remote Elevation Measurement, 3D Coordinate Measurement,
Automatic Azimuth Angle Setting, Resection, Setting out measurements and Area
Calculation. Automatic total station – Laser Theodolite. Laser alignment instrument
and electronic level – Digital level – Instrument for measuring tunnel profiles – Inertial
positioning systems – Global Positioning System (GPS) – Digital Terrain Model

TOTAL : 45 PERIDOS

TEXTBOOKS:
1. Kanetkar T.P. Surveying and Levelling, Vols I and II, United Book Corporation,
Pune, 1994

REFERENCES:
1. James M. Anderson and Edward M. Mikhail, Surveying, Theory and Practice,
2004.
OBJECTIVE:
To impart the knowledge in Microwave Remote Sensing and its application

UNIT I  FUNDAMENTALS AND RADIOMETRY
Introduction - plane waves - antenna systems – radiometry - microwave interaction
with atmosphere constituents - Earth’s surface and vegetation - Physical
mechanisms and empirical models for scattering and emission - Radiometric systems
– Sensors - Data product and applications.

UNIT II  RADAR REMOTE SENSING
Radar interaction with Earth surface and vegetation - Surface scattering theory -
RADAR equation - Fading concept - Measurement and discrimination - Physical
mechanisms and empirical models for scattering - Geometry of RADAR images -
Radar return and image signature - Resolution concepts

UNIT III  REAL AND SYNTHETIC APERTURE RADARS
Airborne – Spaceborne - different platforms and sensors - Data products and
selection procedure - SEASAT, SIRA, SIRB, ERS , JERS, RADARSAT missions.

UNIT IV  APPLICATION OF RADAR REMOTE SENSING
Application in Agriculture – Forestry – Geology – Hydrology - ice studies – landuse-
mapping and ocean related studies.

UNIT V  SPECIAL TOPICS IN RADAR REMOTE SENSING
SAR Interferometry – Basics- Differential SAR Interferometry - Polarimetry-
Radargrammetry- applications - Altimeters.

TOTAL: 45 PERIODS

TEXTBOOKS:
1. Ulaby, F.T., Moore, R.K, Fung, A.K, Microwave Remote Sensing; active and
passive, Vol. 1,2 and 3, Addison – Wesley publication company 2001
2005.

REFERENCES:
1. Floyd, M., Handerson and Anthony J.Lewis, Principles and application of Imaging
and Sons Inc., 1998
2. Charles Elachi and Jakob Van 2y, Introduction to the Physics and Techniques of
OBJECTIVE:
The Objective of this course is to introduce the students to the cadastral survey methods and its applications in generation of Land Information System. Cadastral surveys are those classes of land surveys which are executed for the purpose of systematically recording the land rights, producing register of land holdings or an inventory of land areas, land use and determining land tax.

UNIT I INTRODUCTION

UNIT II METHODS OF SURVEYING

UNIT III MAINTENANCE AND MEASUREMENTS
Cadastral survey maintenance – Resurveys – Measurement of sub-division – Measurement of obstructed lines – Survey of urban areas – Control requirement for Urban survey

UNIT IV PHOTOGRAMMETRIC METHODS
Photogrammetry for cadastral surveying and mapping – Orthophoto map – GPS for cadastral survey.

UNIT V MAPPING PROCEDURES AND MODERN TRENDS

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
2. Survey of India, Hand book of Topography
OBJECTIVE:
To understand the concept of Geodetic Surveying and solve the geodetic problems.

UNIT I FUNDAMENTALS 5

UNIT II GEOMETRIC GEODESY 20

UNIT III PHYSICAL GEODESY 10

UNIT IV GEODETIC ASTRONOMY 15
Horizon, Hour Angle, Right Ascension and Ecliptic co-ordinate System, relationship with Cartesian System, Transformation between them. Special star positions, Major constellations, Rising and setting of Stars with respect to Declination, hour angle and Azimuth, Culmination, Prime Vertical Crossing and Elongation - Variation in celestial co – ordinates, Sidereal time, Universal time, Zone time and Atomic time. Determination of Astronomical Azimuth, latitude and longitude. Star catalogues, Ephemerides and Almanacs.

UNIT V GEODETIC COMPUTATION 10
Rectangular and Polar Co – ordinates - First and Second geodetic problem - Similarity and Helmert’s transformation, Point determination by Intersection - Resection and Arc Section

L: 30 + T: 30 TOTAL : 60 PERIDOS

TEXT BOOK:

REFERENCES:

GI9305 GEOGRAPHICAL INFORMATION SYSTEM I L T P C
3 0 0 3

OBJECTIVE:
To introduce the fundamentals of Geographic Information System. To provide details about Spatial data, Spatial data base structures, Data structures and their utility in GIS

UNIT I FUNDAMENTALS OF GIS

UNIT II DATA AND DATA BASE STRUCTURE

UNIT III DATA STRUCTURE/ DATA MODEL

UNIT IV DATA INPUT

UNIT V CONTINUOUS SURFACE REPRESENTATION

TOTAL : 45 PERIODS

TEXT BOOK:
REFERENCES:
1. Peter A. Burrough, Rachael A. McDonnell, Principles of GIS, Oxford University Press, 2000

GI9306 SURVEY PRACTICAL III L T P C 0 0 4 2

OBJECTIVE:
The objective of this course is to train the students to acquire skill in using the instruments for various applications.

UNIT I SETTING OUT WORKS
a) Foundation marking
b) Simple curve using chain and tape only
c) Simple curve by Rankine method
d) Transition curve

UNIT II TACHEOMETRIC SURVEYING
a) Stadia method
b) Tangential method
c) Subtense method

UNIT III FIELD ASTRONOMY
a) Study of motion of the Sun
b) Determination of azimuth using known latitude
c) Determination of azimuth using hour angle
d) Determination of watch error
e) Determination of latitude

UNIT IV MEASUREMENT OF BASE LINE

TOTAL : 60 PERIODS

GI9307 GIS LABORATORY I L T P C 0 0 4 2

OBJECTIVE:
To provide practical and hands on exercises on Data Input, Data storage, Data Retrieval and Data output capabilities of GIS

1. Data Input – Digitizer, Scanning and On Screen digitization – Creation of Point, Line, Polygon and Surface Data - Data Editing – Editing digitizing errors
2. Building Topology – Measurement: Distance, Area
3. Linking Spatial and Non-spatial data – Adding Attribute data
4. Tabular data analysis- SQL, Select, Edit, Delete, Explore, Modify, Merge, Join and Descriptive Statistics from Tables
5. Generating various types of Charts from Tabular data
6. Other Data Base Connectivity: Linking external data base
7. Data Conversion – Vector to Raster, Raster to Vector
8. Data Interchange – Conversion of raster and vector to different interchange formats
9. Generation of DEM: from contours, spot heights
10. DEM display: Gridded DEM and TIN
11. DEM analysis: Derivation of Slope, Aspect Map
12. Data Output: Map compilation for Point, Line and Polygon data

TOTAL : 60 PERIDOS

GE9371 COMMUNICATION SKILLS AND SOFT SKILLS L T P C 0 0 2 1

AIM:
To enhance the overall capability of students and to equip them with the necessary Communication Skills and Soft Skills that would help them excel in their profession.

OBJECTIVES:
- To equip students of engineering and technology with effective speaking and listening skills in English.
- To help them develop their soft skills and interpersonal skills, which will make the transition from college to workplace smoother and help them excel in their jobs.
- To enhance the performance of students at Placement Interviews, Group Discussions and other recruitment exercises.

A. Viewing and discussing audio-visual materials

1. Resume / Report Preparation / Letter Writing: 2
   Letter writing – Job application with Resume - Project report - Email etiquette.

2. Presentation skills: 1
   Elements of effective presentation – Structure of presentation - Presentation tools – Body language.
3. **Soft Skills:**
   Time management – Stress management – Assertiveness – Negotiation strategies.

4. **Group Discussion:**
   Group discussion as part of selection process, Structure of group discussion – Strategies in group discussion – Mock group discussions.

5. **Interview Skills:**
   Kinds of interviews – Interview techniques – Corporate culture – Mock interviews. (Career Lab Software may be used for this section).

**NOTE:**
Career Lab software may be used to learn the skills, to be applied in the practice session.

**B. PRACTICE SESSION:**
1. Resume / Report Preparation / Letter writing: Students prepare their own resume and report. 4
2. Presentation Skills: Students make presentations on given topics. 8
   Group Discussion: Students participate in group discussions. 6
4. Interview Skills: Students participate in Mock Interviews 6

**TOTAL : 30 PERIODS**

**REFERENCES:**

**GI9351**

**SATELLITE GEODESY**

**LT P C**

**3 0 2 4**

**OBJECTIVE:**
This subject deals with satellites in space, which are used for the geodetic applications. Several satellites launched will transmit the carrier signal, by receiving the ground position are determined.

**UNIT I**

**FUNDAMENTALS**
Definition – Fundamental goals of Geodesy – Definitions – basic concepts – Historical perspective - development applications in Satellite Geodesy – Geoid and
Ellipsoid satellite orbital motion – Keplerian motion – Keplers Law – Perturbing forces – Geodetic satellite

UNIT II DIFFERENT TECHNIQUES

UNIT III SATELLITE SYSTEM

UNIT IV GPS DATA PROCESSING

UNIT V APPLICATIONS OF SATELLITE GEODESY

TEXT BOOK:

REFERENCES:

GI9352 SURVEY ADJUSTMENTS

OBJECTIVE:
To impart skills in survey calculation and adjustment to suit field conditions

UNIT I MEASUREMENT AND ERROR

UNIT II THE CONCEPT OF ADJUSTMENT
Introduction - simple adjustment methods - Least squares method - Examples of least squares problems.
UNIT III  LEAST SQUARES ADJUSTMENT  9
Techniques of least squares - concept of weight - least squares adjustment of indirect Observations - least squared adjustment of observations only.

UNIT IV  ELEMENTARY PROBABILITY THEORY  9
Random events and probability - Random variables - continuous probability distributions - normal distribution - Expectation – measures of precision and accuracy - covariance and correlation, covariance, cofactor and weight matrices - Introduction to sampling.

UNIT V  VARIANCE COVARIANCE PROPAGATION  9
Introduction – Derivation of the propagation laws - Examples - stepwise propagation - propagation of least squares - adjustment of indirect observations

TOTAL: 45 PERIODS

TEXT BOOKS:

GI9353  GEOGRAPHICAL INFORMATION SYSTEM II  L T P C
3 0 0 3

OBJECTIVES:
- To provide exposure to Raster and Vector Analysis Capabilities of GIS.
- To introduce GIS modeling concepts with applications

UNIT I  RASTER DATA ANALYSIS  9

UNIT II  VECTOR DATA ANALYSIS  9

UNIT III  SPATIAL MODELLING AND APPLICATIONS  9
UNIT IV DATA QUALITY AND ERROR PROPAGATION IN GIS

Data Quality – Accuracy, Precision, Error – Sources of Error – Components of Data Quality: Lineage, Positional Accuracy, Attribute accuracy, Logical Consistency, Completeness – Assessment of Positional and Attribute Accuracy – Error Propagation, Meta data - Spatial Data Transfer Standards – Interoperability of GIS.

UNIT V MISCELLANEOUS TOPICS


TOTAL : 45 PERIODS

TEXT BOOK:

REFERENCES:
1. Peter A. Burrough, Rachael A. McDonnell, Principles of GIS, Oxford University Press, 2000

GI9354 PHOTOGRAMMETRY II L T P C 3 1 0 4

OBJECTIVES:
- To introduce the principle and concepts of Interior, Relative and Absolute Orientation for mapping using Stereoplotters.
- To introduce basics of Digital and Non-topographic photogrammetry

UNIT I STEREO PLOTTERS AND TECHNIQUES OF ORIENTATION 17

UNIT II ORTHOPHOTOGRAPHY 9
Classification of Orthophoto systems – Online and Offline instruments – Automatic Contouring – Instruments for Orthophoto productions – Orthophotos by Digital Image Processing

UNIT III AERIAL TRIANGULATION PRINCIPLES AND ADJUSTMENTS 15
Basic concepts of strips and blocks photographic aerial triangulation – Analog triangulation – Independent Model Triangulation – Strip formation, graphical strip adjustment – polynomial strip adjustment – Analytical aerial triangulation, adjustment of blocks of aerial photographs – Three-dimensional coordinate transformation
UNIT IV NON TOPOGRAPHIC PHOTOGRAMMETRY

Applications – terrestrial cameras – stereometric cameras – horizontal and vertical angles from terrestrial photographs – Camera azimuth – analytical determination of horizontal position of a point from Photographic measurement – graphical method – use of plotting equipments – control consideration for terrestrial Photogrammetry – X-ray Photogrammetry

UNIT V DIGITAL PHOTOGRAMMETRY


L: 45 + T: 15 TOTAL : 60 PERIODS

REFERENCES:


GI9355 SURVEY CAMP (DURING WINTER) LT P C 0 0 4 2

Two weeks Survey Camp will be conducted during winter in the following activities

1. Triangulation
2. Trilateration
3. Star observation to determine Azimuth
4. Rectangulation
5. GPS Surveying

GI9356 PHOTOGRAMMETRY LABORATORY II LT P C 0 0 2 1

OBJECTIVE:

To acquire knowledge about Interior, Relative and Absolute Orientation using Analog and Analytical Stereoplotters.

1. Interior Orientation, Relative Orientation, Absolute Orientation and Mapping using Analog Stereo Plotter
2. Interior Orientation, Relative Orientation, Absolute Orientation and Mapping using Analog Stereo Plotter
4. Measurement of model coordinates using Analytical Stereo Plotter
5. Mapping using Analytical Stereo Plotter

TOTAL: 30 PERIODS

GI9357 GIS LABORATORY II L T P C 0 0 4 2

OBJECTIVES:
- To understand raster and vector analytical capabilities of GIS.
- To develop problem-solving skills using GIS

1. Raster Analysis - Local operators: Arithmetic overlaying, Logical Overlaying – Neighbourhood Operators: Sum, Mean, Slope
2. Map Algebra
3. Cost Surface Analysis
5. Clip, Dissolve, Buffering: - Point, Line and Polygon
6. Network Analysis: Creation of network data - Address Geocoding
7. Network analysis – One origin and One destination - Finding the shortest path to between given origin and destination
8. Network analysis – One Origin and several destination - Determining a garbage collection route/ courier delivery applications
9. Perspective Visualization – DEM – Draping with other themes
10. DEM – Volume calculation, Profile analysis, View shed analysis
11. Demo on Web based GIS applications

TOTAL: 60 PERIODS

GI9358 TECHNICAL SEMINAR LT P C 0 0 2 1

AIM:
To work on a specific technical topic in Civil Engineering and acquire the skill of written and oral presentation. To acquire writing abilities for seminars and conferences.

SYLLABUS:
The students will work for three hours per week guided by a group of staff members. They will be asked to talk on any topic of their choice and to engage in dialogue with the audience. A brief copy on their talk also should be submitted. Similarly, the students will have to present a seminar of not more than fifteen minutes on the technical topic. They should also answer the queries on the topic. The students as the audience also should interact. Evaluation will be based on the general and technical presentation and the report and also on the interaction shown during the seminar.
OBJECTIVE:
To introduce the basic concepts of management needed for a Civil Engineer

UNIT I BASIC CONCEPTS IN MANAGEMENT 9
Types of business operations - Sole proprietorship – Partnership – Company – Public and private sector enterprises / Joint ventures, collaborations.

Functions of Management - Principles of management – Functions of management – Functions of a manager.


UNIT II INTRODUCTION TO MARKETING AND FINANCIAL MANAGEMENT 9

UNIT III MATERIALS AND EQUIPMENT MANAGEMENT 9
Planning – Identification, Procurement, Schedule and Cost control – systems approach in resource management – ABC analysis, VED analysis, FSN analysis, vendor rating evaluation, buying versus leasing of equipment

UNIT IV HUMAN RESOURCE MANAGEMENT 9

UNIT V INTRODUCTION TO COMPUTER APPLICATION IN CONSTRUCTION MANAGEMENT 9
Project identification-formulation-Preparation of detailed project report (DPR)-Planning – Scheduling and Resource analysis - Recording and operations - Project accounting, costing and finance – usage of project management software-

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
OBJECTIVE:
To make the undergraduate students understand principles, processed mad applications of thermal and hyper spectral remote sensing for earth resources.

UNIT I FUNDAMENTALS 5
Radiation science basics - Thermal radiation principles, thermal interaction behavior of terrain elements, thermal sensors and specifications – aerial thermal images

UNIT II THERMAL IMAGE AND INTERPRETATION 12
Image character, spatial and radiometry- sources of image degradation –radiometric and geometric errors and correction – interpretation of thermal image- applications and case studies.

UNIT III FIELD SPECTROMETRY 6
Diffraction principles- experimental design and instrumentation – factors affecting the field spectrum – imaging spectrometry – BDRF and hemispherical reflectance - Sensors and platform systems, including field spectroradiometers – data characteristics

UNIT IV ANALYSIS 12

UNIT V APPLICATIONS 10
Application to forestry, agriculture, geology, ecology, atmosphere, environmental and resource management.

L: 30 + P: 15 TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCE:

WEB REFERENCES:
1. www.oksi.com
2. ccrs.nrcan.gc.ca/optic/hyper
OBJECTIVE:
The main objective is focused on the large-scale mapping using the aerial and high-resolution satellite data in digital format. The natural resources of the terrain will also be extracted for developmental planning.

UNIT I  FUNDAMENTALS

UNIT II  DIGITAL CAMERA

UNIT III  SCANNERS

UNIT IV  DIGITAL PHOTOGRAMMETRIC WORKSTATION

UNIT V  APPLICATIONS

REFERENCES:
UNIT I
NATURAL RESOURCE MANAGEMENT APPLICATIONS

UNIT II
FACILITY MANAGEMENT APPLICATIONS

UNIT III
LOCATION BASED SERVICES APPLICATIONS

UNIT IV
LAND INFORMATION SYSTEM APPLICATIONS AND ALIGNMENT STUDIES
Land Information System (LIS) – Tax Mapping – Other LIS applications – Pipe line routing, Highway alignment

UNIT V
MISCELLANEOUS TOPICS
Disaster Management Applications, Web GIS applications, Health applications

TOTAL : 45 PERIDOS

TEXT BOOKS:
1. Laura Lang, Managing Natural Resources with GIS, ESRI Press, 1998.

REFERENCES:
4. Laura Lang, GIS for Health Organizations, ESRI Press, 2000

GI 9404 OPERATIONS RESEARCH FOR GEOINFORMATICS
LT P C 3 0 0 3

OBJECTIVE:
To impart knowledge in formulating the model and solving problems in Geoinformatics using Linear programming, Dynamic programming, Management tools and simulation Techniques.
UNIT I  BASIC CONCEPTS  7
Origin, Nature and significance - Models and Modeling approach – Methodology – Applications and Scope - Basic operations research models – Computer Packages

UNIT II  LINEAR PROGRAMMING  12

UNIT III  DYNAMIC PROGRAMMING  8
Characteristics –models - Deterministic case - Bellman’s optimality criteria – problem formulation and solution – Forward and Backward recursive approaches

UNIT IV  PROJECT MANAGEMENT  9
PERT and CPM – Network components and relationships – forward and Backward pass – critical path analysis - problems on crashing, Resource Leveling – Resource allocation

UNIT V  SIMULATION  9

TOTAL : 45 PERIDOS

TEXT BOOKS:

REFERENCES:

GI 9405  DIGITAL PHOTOGRAMMETRY LABORATORY  L T P C
0 0 4 2

OBJECTIVE:
The objective of this Digital Photogrammetry Lab is to give hands on exercise to practice how to orient the digital data and how to prepare maps, to generate DEM and Digital Orthophotos.

EXERCISES
1. Digital Photogrammetric Workstation – Data input and Creation of Project
2. Image import – Image Enhancement
3. Control point editing
5. Orientation Management – Camera Calibration – Editing the Scheme point file
6. Imagery import – Relative Orientation – Absolute Orientation
7. ATM Adjustment – Automatic Point Measurement
8. DTM creation – Automatic Terrain Extraction
9. Editing the DTM
10. DTM Terrain analysis
11. Mosaic – Generating Orthophoto – Mosaic sheet cutting
12. Planimetric Mapping

TOTAL: 60 PERIDOS

GI 9406 DIGITAL IMAGE PROCESSING LABORATORY II LT P C 0 0 4 2

OBJECTIVE:
To familiarize the undergraduate level students in the regular IP software with respect to basic processing required to generate thematic maps from Satellite data.

1. To read and display image from CD
2. To Composite and extract sub area from full scene
3. To Georeference image to map
4. To Georeference image-to-image
5. To analysis the transformation errors
6. To mosaic two sub areas – colour balancing
7. To select features (bands) for classification and to form patterns
8. To generate base information using graphic planes (Vector & Raster)
9. To Convert vector information to graphic plane vice versa
10. To create and compute training set statistics
11. To apply classifiers
12. To assess the accuracy
13. To compose thematic map
14. Unsupervised classification
15. Theme merging & GIS data generation

TOTAL: 60 PERIDOS

GI 9451 PROJECT WORK LT P C 0 0 1 2 6

The objective of project work is to enable the students to work in convenient groups of not more than four members in a group on a project involving theoretical and experimental studies related to Geoinformatics.

Every project work shall have a guide who is a member of the faculty of the University. Twelve periods per week shall be allotted in the Time Table and the time shall be utilized by the students to receive directions from the guide, library reading, laboratory work, computer analysis or field work and to present the progress made in the project.
Each student shall finally produce a comprehensive report covering background information, literature survey, problem statement, project work details and conclusions. This final report shall be typewritten form as specified in the guidelines.

The continuous assessment and semester evaluation may be carried out as specified in the guidelines to be issued from time to time.

GI 9021  CLOSE RANGE PHOTOGRAMMETRY  LT P C  3 0 0 3

OBJECTIVE:
The objective of this subject is focused how the terrestrial objects can be mapped by taking photographs. This technique is used to study not only in engineering aspects but also in the Medicine, Forensic applications.

UNIT I  NON-TOPOGRAPHIC PHOTOGRAMMETRY  9
Introduction – Origin – basic Geometric concepts – Data acquisition – Camera systems – Metric - Non metric cameras – Analytic data reduction – Collinearity adjustment – Direct linear transformation – coordinate transformation – acquisition of digital imagery and processing – software modules for processing the data

UNIT II  STRUCTURAL STUDIES  9
Structural research: Deformation studies of deflection, buckling, – Advantages and disadvantages, Dam deformation, structural movement, Pavement yield. Hydraulic studies: Pipe surface roughness, shifting sand-bank, shoreline feature and coastal currents, experimental fluid mechanics.

UNIT III  MEDICINE  9
Monocular and binocular health studies, X-ray Photogrammetry, surface area and volume patients by Photogrammetry – merits over usual methods. Postural analysis – historical use of Photogrammetric methods – Study of body alignment and rate of body mechanics, remedial measures, advantages – Bio stereometrics.

UNIT IV  INDUSTRIAL PHOTOGRAMMETRY  9
Data acquisition systems - data reduction – deformation of engineering structures – pipe systems – measuring communication antennas – tunnel surveys – cooling towers and other applications – Applications in automobile industry – Architecture application: Drawing of details, monuments preservation and archaeological applications.

UNIT V  CRIMINOLOGY  9

TOTAL: 45 PERIODS
TEXT BOOK:

REFERENCES:

GI9022 ADVANCED CARTOGRAPHY LT P C
3 0 0 3

OBJECTIVE:
This subject deals with the recent advancements in the field of digital cartography and the rapid technological development in the electronic dissemination of spatial information.

UNIT I MANAGING DATA BASES
Data organisation – Data compression – Data measurement – Basic statistical processing – Geographical Information System – The measuring of GIS to cartography.

UNIT II DATA PROCESSING
Computer system for the processing of graphic data – Hardware – Software – SICAD – Digitising cartographic presentation – Structuring and storage of data – Cartographic data processing – Output of cartographic presentation – Examples and applications

UNIT III MODELLING IN DIGITAL CARTOGRAPHY

UNIT IV MAP DESIGN
Theory of communication - information and signs - methods of computer assisted design of cartographic expressions, computer assisted evaluation of geo data for thematic maps - Cartographic aspects of GIS.

UNIT V TECHNIQUES OF MAP PRODUCTION
Modern techniques in map production - Dynamic and interactive mapping, animation, navigation system, simulation, interactive cartography, map as interface - Trends for future developments - Expert systems and Web Maps.

TOTAL: 45 PERIDOS
TEXT BOOKS:


GI 9023 ADVANCED SURVEY ADJUSTMENT

OBJECTIVE:
To impart advanced skills in survey adjustment to suit field conditions

UNIT I PRE ANALYSIS OF SURVEY MEASUREMENTS
Pre analysis procedure - Horizontal angle measurement with theodolite - Distance measurement by EDM - elevation difference by Direct leveling – Survey tolerances.

UNIT II STATISTICAL ANALYSIS OF SURVEY MEASUREMENTS
Samples and statistics - The Chi-square distribution - the t-student distribution - common sample statistics - estimation of mean and variance - Confident interval for the mean and variance - statistical testing-Test or the mean of probability distribution - Test of the variance of a probability distribution. Bivariate normal distribution.

UNIT III GENERAL LEAST SQUARES ADJUSTMENT
Introduction – Derivation - Precision estimation of special cases - Application of least squares adjustment in GIS and GPS.

UNIT IV APPLICATION IN PLANE COORDINATE SURVEYS
Introduction - the distance condition and its linearization - azimuth condition and its linearization - angle condition and its linearization - position fixing by Distance - Two parameter similarity transformation - Four parameter similarity Transformation.

UNIT V SPECIAL SUBJECTS OF STATISTICS
Theory of prediction and filtering - sequential adjustment (static and Kinematic Kalman-filter) Application of Kalman-filter in Geodesy; Goodness of fit - Test of any distribution.

TOTAL : 45 PERIODS

TEXT BOOK:

REFERENCE:
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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>GI 9024</td>
<td>AIRBORNE LASER TERRAIN MAPPING</td>
<td>3-0-0-3</td>
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<td><strong>OBJECTIVE:</strong></td>
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<td></td>
<td>To introduce the concepts of LASER Terrain mapping and modelling</td>
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<td><strong>UNIT I</strong> FUNDAMENTALS</td>
<td>9</td>
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<td></td>
<td>Introduction - Principle and properties of LASER, LIDAR - Different LIDAR systems - Applications - Comparison - Airborne LIDAR missions - Typical parameters of a LIDAR system.</td>
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<td><strong>UNIT II</strong> LIDAR</td>
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<td>Laser Altimetry System - Components of the system - GPS, IMU LASER, LIDAR data formats – LIDAR Systems specification and accuracy standards</td>
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<td><strong>UNIT III</strong> DATA PROCESSING</td>
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<td></td>
<td>Data Processing - Strip Adjustment - Geometric Correction - Data quality enhancement - Filtering - Ground Point filtering – Digital Elevation Model</td>
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<td><strong>UNIT IV</strong> OVERVIEW OF APPLICATIONS</td>
<td>9</td>
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<td></td>
<td>Overview of LIDAR Applications in various domains - Disaster Mitigation and Management - 3D city models - Telecommunication Modelling - Feature extraction, vectorisation - Surface and landuse classification</td>
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<td><strong>UNIT V</strong> LIDARGRAMMETRY</td>
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<tr>
<td></td>
<td>LIDAR for Orthophoto - Digital Photogrammetry software and LIDAR - Integration of LIDAR DEM with other hyperspectral data</td>
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**REFERENCES:**

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<td>GI 9025</td>
<td>REMOTE SENSING AND GIS FOR HYDROLOGY AND WATER RESOURCES</td>
<td>3-0-0-3</td>
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<td><strong>OBJECTIVE :</strong></td>
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<tr>
<td></td>
<td>To impart knowledge in basics of Remote Sensing and GIS in various applications of hydrology and water resources.</td>
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</table>
UNIT I  BASICS  9

UNIT II  DRAINAGE BASIN  8

UNIT III  AREAL ASSESSMENT  8
Mapping of snow covered area - snow melt runoff - flood forecasting and inundated area - soil moisture area - drought affected area - Drought prone area programme - Applications in aerial assessment.

UNIT IV  GROUND WATER AND WATER QUALITY  10

UNIT V  IRRIGATION AND WATERSHED MANAGEMENT  10
Project investigation, implementation, maintenance stage - location of storage/diversion works - capacity curve generation - conjunctive use of surface and ground water - Mapping and monitoring the catchment and command area - artificial recharge of groundwater - water harvesting structures - sediment yield, modelling of reservoir siltation - prioritization of watershed - sustainable development.

REFERENCES:

GI9026  REMOTE SENSING AND GIS FOR OCEAN ENGINEERING AND COASTAL ZONE MANAGEMENT  3 0 0 3

OBJECTIVE:
To familiarize the students about the basics and application of Remote Sensing and GIS in the field of Ocean Engineering and Coastal Management.
UNIT I  OCEAN ENGINEERING  9

UNIT II  OCEAN GENERAL STUDIES  8

UNIT III  COASTAL ENGINEERING  8

UNIT IV  REMOTE SENSING APPLICATION FOR OCEAN  10

UNIT V  COASTAL ZONE MANAGEMENT  10

TOTAL: 45 PERIODS

REFERENCES:

GI9027  REMOTE SENSING AND GIS FOR ENVIRONMENTAL MONITORING  L T P C
3 0 0 3

OBJECTIVE:
The objective of this course is to expose the students to the applications of Remote Sensing and GIS for water quality assessment, soil degradation assessment and monitoring pollution.
UNIT I  WATER AND THE ENVIRONMENT  10

UNIT II  SOIL CONSERVATION AND MANAGEMENT  12

UNIT III  ECOLOGY AND ECOSYSTEM  8

UNIT IV  SENSORS AND DATA FOR ENVIRONMENTAL MONITORING  5

UNIT V  AIR POLLUTION AND GLOBAL CLIMATOLOGY  10

TOTAL : 45 PERIDOS

REFERENCES:

GI9028  REMOTE SENSING AND GIS FOR URBAN AND REGIONAL PLANNING  L T P C
3 0 0 3

OBJECTIVE:
To impart knowledge to the students to understand scope of Remote Sensing and GIS for Urban and Regional planning
UNIT I  FUNDAMENTALS

UNIT II  URBAN AND REGION MAPPING

UNIT III  URBAN AND REGIONAL PLANNING

UNIT IV  URBAN ANALYSIS

UNIT V  SYSTEMS AND MODELLING

TOTAL: 45 PERIODS

REFERENCES:
1. Jean-Paul Donnay, Mike J Barnsley and Paul A Longley, Remote Sensing and Urban Analysis, Taylor and Francis, 2001

GI 9029  REMOTE SENSING AND GIS FOR EARTH SCIENCES  L T P C
3 0 0 3

OBJECTIVE:
The objective of this course is to impart knowledge to the students about the application potentials of Remote Sensing and GIS in earth science. The contents of this course enable the students to understand the controls of Earth Science on the occurrence and management of natural resources.
UNIT I REMOTE SENSING APPLICATIONS TO LITHOLOGY 9

UNIT II REMOTE SENSING APPLICATIONS TO GEOMORPHOLOGY 9
Introduction - Nature and type of different Landforms such as Structural, Denudational, fluvial, Aeolian, glacial and volcanic landforms – their pattern configuration. Mapping Geomorphic Landforms using satellite data - theory and Practical

UNIT III REMOTE SENSING APPLICATIONS TO STRUCTURAL ANALYSIS 9
Introduction - Different types and Geometry of folds, nature, mode of origin, and mode of occurrence of faults. Structural analysis and mapping using aerial and satellite data, theory and practicals – digital techniques for structural analysis.

UNIT IV SUB–SURFACE EXPLORATIONS 6
Different types of geophysical surveys, Electrical Resistivity surveys, aeromagnetic and Electromagnetic surveys for subsurface explorations. Planning geophysical field surveys using satellite data.

UNIT V REMOTE SENSING AND GIS APPLICATIONS IN GEOLOGICAL INVESTIGATIONS 12

REFERENCES:

TOTAL: 45 PERIODS
OBJECTIVES:
This course enables the students to understand and apply remote sensing and GIS techniques in various fields of agriculture, soil, land and forest resources.

UNIT I CROPS 9

UNIT II SOILS 9

UNIT III LAND EVALUATION AND MANAGEMENT 9

UNIT IV DAMAGE ASSESSMENT 9

UNIT V FORESTRY 9

TOTAL: 45 PERIODS

REFERENCES:
OBJECTIVE:
The main objective of this subject is to give information of the climate, weather forecasting using RADAR and Geo stationary satellites. It deals with weather conditions, sensors, satellites and the data interpretation for various applications.

UNIT I  GENERAL CONCEPTS IN METEOROLOGY  9

UNIT II  RADIO METEOREOLOGY  9
Principles and classifications of Radar – components of Radar – Meteorological applications. Upper air temperature exploration of the atmosphere (Radio Sonde) – Upper air wind estimation through Pilot Baloon – Wind estimation through Radar (Rawin Sonde), Doppler technique - Precipitation estimation through Radar and problems associated with it – Precipitation Radar (PR) on-board satellites such as Tropical Rainfall Measuring Mission (TRMM), Global Precipitation Measurement (GPM) Ozone soundings – general principle and special satellite measurements of ozone – Aerosol soundings - Tracking of weather systems such as Thunderstorms. Tropical cyclones, Tornadoes through Radar – Structure of weather systems as observed by Radars – Hydro meteorological applications of Radar - Application to aviation meteorology.

UNIT III  INTRODUCTION TO SATELLITE METEOREOLOGY  9

UNIT IV  SATELLITE METEOREOLOGY APPLICATIONS – I  9
Precipitation – Outgoing Longwave Radiation (OLR) and Sea Surface Temperature (SST) estimation and their applications – Normalised Digitised Vegetation Index – Ocean colour monitoring – coastal pollution Image interpretation - Satellite communication systems in operational meteorological application (Cyclone Warning Dissemination system / Automatic Weather stations – Meteorological data dissemination) - Estimation of snow and ice cover – Waterbody boundary mapping – Atmospheric aerosols – Dust storms – Volcanic ash clouds and fires

UNIT V  SATELLITE METEOREOLOGY APPLICATIONS – II  9

TOTAL: 45 PERIODS
REFERENCES:

GI9032 REMOTE SENSING AND GIS FOR TRANSPORTATION PLANNING  L T P C  3 0 0 3

OBJECTIVE:
- This course intends to prepare students for the following:
- To develop an understanding of the issues and challenges facing mobility in urban areas.
- To understand the utility of Remote Sensing and GIS for transportation planning

UNIT I ELEMENTS OF TRANSPORTATION SYSTEMS AND PLANNING 12
Geographical perspective on transportation - Transportation and energy - Equity issues - Urban transportation: policy alternatives - Transportation and the environment - Urban transport planning processes - Transportation agencies - Roles and responsibilities - Socio-demographic data and travel surveys - Transportation modeling - Traffic congestion - Plan evaluation and implementation - Planning and financing - Critiques of transportation modeling and forecasting – Web resources

UNIT II REMOTE SENSING IN TRANSPORTATION 10

UNIT III GIS AND TRANSPORTATION ANALYSIS 11
Transportation analysis in GIS: Introduction - network flows - shortest path algorithms - transportation databases: creation and maintenance - transportation analysis in GIS - facility location - vehicle routing – highway alignment – railway alignment
UNIT IV GIS-T DATA MODELS
GIS and Spatial analysis – coupling transportation models with GIS - TRANUS – UPLAN – MetroSIM – Modelling land use transport interaction.

UNIT V INTELLIGENT TRANSPORTATION SYSTEMS (ITS)

REFERENCES:

OBJECTIVE:
To understand various technological options especially Remote Sensing and GIS in Disaster management.

UNIT I DISASTER PRINCIPLES
Basic concepts and principles – Hydrological and geological disasters, characteristics, crisis and consequences – Role of Government administration, University research organization and NGO’s – International disaster assistance – Sharing technology and technical expertise.

UNIT II LONG TERM MITIGATION MEASURES

UNIT III SAFETY RATING OF STRUCTURES

UNIT IV SPACE SCIENCE INPUT IN DISASTER MANAGEMENT
UNIT V   EMERGENCY PLANNING USING SPATIAL AND NON SPATIAL DATA
Information systems management – Spatial and non-spatial data bank creation – Operational emergency management – Vulnerability analysis of infrastructure and settlements – Pre-disaster and post disaster planning for relief operations – Potential of GIS application in development planning – Disaster management plan – Case studies.

REFERENCES:

TOTAL: 45 PERIDOS
TEXT BOOKS:

REFERENCES:

<table>
<thead>
<tr>
<th>GE 9072</th>
<th>INDIAN CONSTITUTION AND SOCIETY</th>
<th>L T P C</th>
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UNIT I

UNIT II
9 Union Government – Structures of the Union Government and Functions – President – Vice President – Prime Minister – Cabinet – Parliament – Supreme Court of India – Judicial Review.

UNIT III

UNIT IV
9 Indian Federal System – Center – State Relations – President’s Rule – Constitutional Amendments – Constitutional Functionaries - Assessment of working of the Parliamentary System in India.

UNIT V
9 Society : Nature, Meaning and definition; Indian Social Structure; Caste, Religion, Language in India; Constitutional Remedies for citizens – Political Parties and Pressure Groups; Right of Women, Children and Scheduled Castes and Scheduled Tribes and other Weaker Sections.

TOTAL: 45 PERIODS

TEXT BOOKS:
REFERENCES:

GE 9073  CONTRACT LAWS AND REGULATIONS  L T P C
3 0 0 3

UNIT I  CONSTRUCTION CONTRACTS  10

UNIT II  TENDERS  10

UNIT III  ARBITRATION  5

UNIT IV  LEGAL REQUIREMENTS  10

UNIT V  LABOUR REGULATIONS  10

REFERENCES:
2. Tamilnadu PWD Code, 1986

TOTAL : 45 PERIODS
AIM
To provide comprehensive knowledge about the principles, practices, tools and techniques of Total quality management.

OBJECTIVES
• To understand the various principles, practices of TQM to achieve quality
• To learn the various statistical approaches for quality control.
• To understand the TQM tools for continuous process improvement.
• To learn the importance of ISO and Quality systems.

UNIT I INTRODUCTION

UNIT II TQM PRINCIPLES
Leadership – Strategic quality planning, Quality statements - Customer focus – Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Employee involvement – Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement – PDSA cycle, 5s, Kaizen - Supplier partnership – Partnering, Supplier selection, Supplier Rating.

UNIT III TQM TOOLS & TECHNIQUES I

UNIT IV TQM TOOLS & TECHNIQUES II

UNIT V QUALITY SYSTEMS

TOTAL: 45 PERIODS

TEXT BOOK

REFERENCES

GE 9021 PROFESSIONAL ETHICS IN ENGINEERING

AIM
To sensitize the engineering students on blending both technical and ethical responsibilities.

OBJECTIVES
- Identify the core values that shape the ethical behavior of an engineer.
- Utilize opportunities to explore one’s own values in ethical issues.
- Become aware of ethical concerns and conflicts.
- Enhance familiarity with codes of conduct.
- Increase the ability to recognize and resolve ethical dilemmas.

UNIT I ENGINEERING ETHICS

UNIT II ENGINEERING AS SOCIAL EXPERIMENTATION
Engineering as Experimentation – Engineers as responsible Experimenters – Research Ethics - Codes of Ethics – Industrial Standards - A Balanced Outlook on Law – The Challenger Case Study

UNIT III ENGINEER’S RESPONSIBILITY FOR SAFETY

UNIT IV RESPONSIBILITIES AND RIGHTS

UNIT V GLOBAL ISSUES

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES

GE 9023 FUNDAMENTALS OF NANOSCIENCE L T P C
3 0 0 3

AIM
To make the students understand the importance, relevance and potentialities of this emerging field of study.

OBJECTIVES
- Study the basic nano technology and nano science.
- Understand interdisciplinary nature of this field.
- Understand the importance role of physics, chemistry, biology.
- Recognize that the rules of nano science are fundamentally different than those we experience.
- Study the basic fabrication strategies of nano science.

UNIT I INTRODUCTION
Nanoscale Science and Technology- Implications for Physics, Chemistry, Biology and Engineering-Classifications of nano structured materials- nano particles-quantum dots, nanowires-ultra-thinfilms-multilayered materials. Length Scales involved and effect on properties: Mechanical, Electronic, Optical, Magnetic and Thermal properties. Introduction to properties and motivation for study (qualitative only).

UNIT II PREPARATION METHODS
Bottom-up Synthesis-Top-down Approach: Precipitation, Mechanical Milling, Colloidal routes, Self-assembly, Vapour phase deposition, MOCVD, Sputtering, Evaporation, Molecular Beam Epitaxy, Atomic Layer Epitaxy, MOMBE.

UNIT III PATTERNING AND LITHOGRAPHY FOR NANOSCALE DEVICES
Introduction to optical/UV electron beam and X-ray Lithography systems and processes, Wet etching, dry (Plasma /reactive ion) etching, Etch resists-dip pen lithography
UNIT IV  PREPARATION ENVIRONMENTS  10
Clean rooms: specifications and design, air and water purity, requirements for particular processes, Vibration free environments: Services and facilities required. Working practices, sample cleaning, Chemical purification, chemical and biological contamination, Safety issues, flammable and toxic hazards, biohazards.

UNIT V  CHARACTERISATION TECHNIQUES  10
X-ray diffraction technique, Scanning Electron Microscopy - environmental techniques, Transmission Electron Microscopy including high-resolution imaging, Surface Analysis techniques- AFM, SPM, STM, SNOM, ESCA, SIMS- Nanoindentation

TOTAL : 45 PERIODS

TEXT BOOKS

REFERENCES