Programme Educational Objectives (PEOs)

I. To prepare the students for successful careers in Geospatial Industries and Information Technology that meet the needs of India and other Countries.

II. To develop the professional ability among the students to collect various Geospatial relates from various platform, data, analysis and synthesis that create user oriented real world applications.

III. To provide an opportunity for students to work as part of teams on multidisciplinary projects.

IV. To provide students with a sound foundation in the mathematical, scientific and engineering fundamentals necessary to formulate, solve and analyze engineering and multidisciplinary problems and to prepare them for graduate studies.

V. To promote students awareness of the life-long learning and to introduce them to professional ethics and codes of professional practice.

Programme Outcomes (POs)

a) Graduates will acquire basic knowledge in B.E (Geoinformatics) and engineering.

b) Graduates will acquire the ability to model and development of application in Geospatial arena interpret and analyze data, and report results.

c) Graduates will acquire the ability to develop Geospatial system that meets desired specifications and requirements.

d) Graduates will acquire the ability to function on engineering and science laboratory teams, as well as on multidisciplinary problem solving teams.

e) Graduates will acquire the ability to identify, formulate and solve Geomatics related problems.

f) Graduates will acquire an understanding of their professional and ethical responsibilities.

g) Graduates will be able to communicate effectively in both verbal and written forms.

h) Graduates will gain confidence to apply Geospatial techniques in global and societal contexts.

i) Graduates will be capable of self - education and clearly understand the value of lifelong learning.

j) Graduates will be broadly educated and will have an understanding of the impact of engineering on society and demonstrate awareness of contemporary issues.

k) Graduates will be familiar with modern hardware and software tools and equipments to analyze Geospatial / Geomatics engineering problems.
PEOS & Pos
The B.E (Geoinformatics) Program outcomes leading to the achievements of the objectives are summarized in the following table.

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## ANNA UNIVERSITY, CHENNAI
### UNIVERSITY DEPARTMENTS
#### B. E. GEOINFORMATICS
##### REGULATIONS – 2015
###### CHOICE BASED CREDIT SYSTEM
##### CURRICULA AND SYLLABUS I - VIII SEMESTERS

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[Signature]

**Director**

Centre For Academic Courses
Anna University, Chennai-600 025.
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*Attended*

Centre For Academic Courses
Anna University, Chennai-600 025.
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**TOTAL NO. OF CREDITS: 179**

*Course from the curriculum of other UG Programmes.

*The Contact periods will not appear in the slot time table
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<td>Decision Support System for Resource Management</td>
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### PROFESSIONAL ELECTIVES (PE)

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<td>GE7071</td>
<td>Disaster Management</td>
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<td>Adjustment Computations for Geoinformatics</td>
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<td>Planetary Remote Sensing</td>
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### EMPLOYABILITY ENHANCEMENT COURSES (EEC)

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<td>Technical Seminar</td>
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<td>Survey Camp (2 Weeks - During V Semester )</td>
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<td>Industrial Training (4 weeks During VI Semester - Summer)</td>
<td>EEC</td>
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### SUMMARY

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<td>Non Credit / Mandatory</td>
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COURSE DESCRIPTION:
This course aims at developing the language skills necessary for the first year students of Engineering and Technology.

OBJECTIVES:
- To develop the four language skills – Listening, Speaking, Reading and Writing.
- To improve the students’ communicative competence in English.
- To teach students the various aspects of English language usage.

CONTENTS

UNIT I
GREETING AND INTRODUCING ONESELF
Listening – Types of listening – Listening to short talks, conversations; Speaking – Speaking about one’s place, important festivals etc.; Introducing oneself, one’s family/friend; Reading – Skimming a passage; Scanning for specific information; Writing – Guided writing; Free writing on any given topic (My favourite place/Hobbies/School life, writing about one’s leisure time activities, hometown, etc.); Grammar – Tenses (present and present continuous); Question types - Regular and irregular verbs; Vocabulary – Synonyms and Antonyms.

UNIT II
GIVING INSTRUCTIONS AND DIRECTIONS
Listening – Listening and responding to instructions; Speaking – Telephone etiquette; Giving oral instructions/Describing a process – Asking and answering questions; Reading – Reading and finding key information in a given text; Critical reading; Writing – Process description (non-technical); Grammar – Tense (simple past & past continuous); Subject – verb agreement – Active and passive voice; Vocabulary – Compound words; Word formation; Word expansion (root words).

UNIT III
READING AND UNDERSTANDING VISUAL MATERIAL
Listening – Listening to lectures/talks and completing a task; Speaking – Role play; Simulation – Group interaction; Reading – Reading and interpreting visual material; Writing – Jumbled sentences – Discourse markers and Cohesive devices; Essay writing (cause & effect/narrative); Grammar – Tenses (perfect), Conditional clauses – Modal verbs; Vocabulary – Cause and effect words; Phrasal verbs in context.

UNIT IV
CRITICAL READING AND WRITING
Listening – Watching videos/documentaries and responding to questions based on them; Speaking – Informal and formal conversation; Reading – Critical reading (prediction & inference); Writing – Essay writing (compare & contrast/analytical); Interpretation of visual materials; Grammar – Tenses (future time reference); Vocabulary – One word substitutes (with meanings); Use of abbreviations & acronyms – Idioms in sentences.

UNIT V
LETTER WRITING AND SENDING E-MAILS
Listening – Listening to programmes/broadcast/telecast/podcast; Speaking – Giving impromptu talks, Making presentations on given topics; Discussion on the presentation; Reading – Extensive reading; Writing – Poster making – Letter writing (Formal and E-mail); Grammar – Direct and Indirect speech – Combining sentences using connectives; Vocabulary – Collocation;

TEACHING METHODS:
Interactive sessions for the speaking module.
Use of audio – visual aids for the various listening activities.
Contextual Grammar Teaching.
EVALUATION PATTERN:
Internals – 50%
End Semester – 50%

TOTAL: 60 PERIODS

OUTCOMES:
- Students will improve their reading and writing skills
- Students will become fluent and proficient in communicative English
- Students will be able to improve their interpersonal communication

TEXTBOOK:

REFERENCES:
3. Redston, Chris & Gillies Cunningham Face2Face (Pre-intermediate Student’s Book & Workbook) Cambridge University Press, New Delhi: 2005

MA7151 MATHEMATICS – I
(Common to all branches of B.E. / B.Tech. Programmes in I Semester)

L T P C
4 0 0 4

OBJECTIVES:
- The goal of this course is for students to gain proficiency in calculus computations. In calculus, we use three main tools for analyzing and describing the behavior of functions: limits, derivatives, and integrals. Students will use these tools to solve application problems in a variety of settings ranging from physics and biology to business and economics.
- To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.

UNIT I DIFFERENTIAL CALCULUS 12
Representation of functions - New functions from old functions - Limit of a function - Limits at infinity - Continuity - Derivatives - Differentiation rules - Polar coordinate system - Differentiation in polar coordinates - Maxima and Minima of functions of one variable.

UNIT II FUNCTIONS OF SEVERAL VARIABLES 12
multipliers.

UNIT III INTEGRAL CALCULUS 12
Definite and Indefinite integrals - Substitution rule - Techniques of Integration - Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals.

UNIT IV MULTIPLE INTEGRALS 12

UNIT V DIFFERENTIAL EQUATIONS 12
Method of variation of parameters – Method of undetermined coefficients – Homogenous equation of Euler’s and Legendre’s type – System of simultaneous linear differential equations with constant coefficients.

TOTAL : 60 PERIODS

OUTCOMES:
- Understanding of the ideas of limits and continuity and an ability to calculate with them and apply them.
- Improved facility in algebraic manipulation.
- Fluency in differentiation.
- Fluency in integration using standard methods, including the ability to find an appropriate method for a given integral.
- Understanding the ideas of differential equations and facility in solving simple standard examples.

TEXTBOOKS:

REFERENCES:
PH7151
ENGINEERING PHYSICS
(Common to all branches of B.E. / B.Tech. Programmes)

L T P C 3 0 0 3

OBJECTIVE:
- To introduce the concept and different ways to determine moduli of elasticity and applications.
- To instill the concept of sound, reverberation, noise cancellation, and ultrasonic generation, detection and applications.
- To inculcate an idea of thermal properties of materials, heat flow through materials and quantum physics.
- To promote the basic understanding of interferometers, principles and applications of lasers, optical fibers and sensors.
- To establish a sound grasp of knowledge on the basics, significance and growth of single crystals.

UNIT I  PROPERTIES OF MATTER

UNIT II  ACOUSTICS AND ULTRASONICS

UNIT III  THERMAL AND MODERN PHYSICS

UNIT IV  APPLIED OPTICS

UNIT V  CRYSTAL PHYSICS
Single crystalline, polycrystalline and amorphous materials – Single crystals: unit cell, crystal systems, Bravais lattices, ditections and planes in a crystal, Miller indices - interplanar distance for a cubic crystal - coordination number and packing factor for SC, BCC, FCC, HCP and diamond structures - structure and significance of NaCl, CsCl, ZnS and graphite - crystal imperfections.
point defects, line defects – Burger vectors, dislocations and stacking faults – Growth of single crystals: Bridgman and Czochralski methods.

**TOTAL: 45 PERIODS**

**OUTCOME:**
- The students will understand different moduli of elasticity, their determination and applications.
- The students will gain knowledge on the properties of sound, noise cancellation, and production, detection and applications of ultrasonics.
- The students will acquire sound knowledge on thermal expansion and thermal conductivity of materials. Further they will gain an idea of quantum physics.
- The students will gain knowledge on interferometers, lasers and fiber optics.
- The students will secure knowledge on the basics of crystal structures and their significance. Further they gain basic ideas of growing single crystals.

**TEXTBOOKS:**

**REFERENCES:**

**CY7151 ENGINEERING CHEMISTRY**

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**OBJECTIVE**
- To develop an understanding about fundamentals of polymer chemistry.
- Brief elucidation on surface chemistry and catalysis.
- To develop sound knowledge photochemistry and spectroscopy.
- To impart basic knowledge on chemical thermodynamics.
- To understand the basic concepts of nano chemistry.

**UNIT I POLYMER CHEMISTRY**

Introduction: Functionality-degree of polymerization. Classification of polymers- natural and synthetic, thermoplastic and thermosetting. Types and mechanism of polymerization: addition (free radical, cationic, anionic and living); condensation and copolymerization. Properties of polymers: Tg, tacticity, molecular weight-weight average, number average and polydispersity index. Techniques of polymerization: Bulk, emulsion, solution and suspension.

**UNIT II SURFACE CHEMISTRY AND CATALYSIS**

UNIT III PHOTOCHEMISTRY AND SPECTROSCOPY 9

UNIT IV CHEMICAL THERMODYNAMICS 9
Second law: Entropy-entropy change for an ideal gas, reversible and irreversible processes; entropy of phase transitions; Free energy and work function: Helmholtz and Gibbs free energy functions; Criteria of spontaneity; Gibbs-Helmholtz equation; Clausius Clapeyron equation; Maxwell relations-Van’t Hoff isotherm and isochore. Chemical potential; Gibbs-Duhem equation- variation of chemical potential with temperature and pressure.

UNIT V NANO CHEMISTRY 9

TOTAL: 45 PERIODS

OUTCOME
- Will be familiar with polymer chemistry, surface chemistry and catalysis.
- Will know the photochemistry, spectroscopy and chemical thermodynamics.
- Will know the fundamentals of nano chemistry.

TEXTBOOKS

REFERENCES
and Full wave rectifiers, Zener effect, Zener diode, Zener diode Characteristics, Zener diode as a regulator.

UNIT II TRANSISTOR AND AMPLIFIERS
Bipolar junction transistors – CB, CE, CC configurations and characteristics, Biasing circuits – Fixed bias, Voltage divider bias, CE amplifier, Concept of feedback, Negative feedback, voltage series feedback amplifier, Current series feedback amplifier.

UNIT III FET AND POWER ELECTRONIC DEVICES
FET – Configuration and characteristics, FET amplifier, Characteristics and simple applications of SCR, Diac, Triac and UJT.

UNIT IV SIGNAL GENERATORS AND LINEARICS

UNIT V DIGITAL ELECTRONICS
Boolean algebra, Logic Gates, Half and Full adders, Decoder, Encoder, Multiplexer, Demultiplexer, Flip flops, Digital to Analog converters - R-2R and weighted resistor types, Analog to Digital converters - Successive approximation and Flash types.

OUTCOMES:
- Ability to identify electronics components and use of them to design circuits.

TEXTBOOK:

REFERENCES:

OBJECTIVES:
- To develop in students, graphic skills for communication of concepts, ideas and design of engineering products and expose them to existing national standards related to technical drawings.

CONCEPTS AND CONVENTIONS (NOT FOR EXAMINATION)
Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

UNIT I PLANE CURVES AND FREE HANDSKETCHING
Basic Geometrical constructions, Curves used in engineering practices-Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid –
construction of involutes of square and circle – Drawing of tangents and normal to the above curves. Visualization concepts and Free Hand sketching: Visualization principles – Representation of Three Dimensional objects – Layout of views- Free hand sketching of multiple views from pictorial views of objects.

UNIT II  PROJECTION OF POINTS, LINES AND PLANE SURFACES  14
Orthographic projection- principles-Principal planes-First angle projection-Projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes-Determination of true lengths and true inclinations by rotating line method and trapezoidal method and traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III  PROJECTION OF SOLIDS  14
Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to both the principal planes by rotating object method and auxiliary plane method.

UNIT IV  PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF 14 SURFACES
Sectioning of solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinder sand cones. Development of lateral surfaces of solids with cut-outs and holes.

UNIT V  ISOMETRIC AND PERSPECTIVE PROJECTIONS  15
Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions and miscellaneous problems. Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method and vanishing point method.

COMPUTER AIDED DRAFTING (DEMONSTRATION ONLY)  3
Introduction to drafting packages and demonstration of their use. 
L=45+T=30, TOTAL: 75 PERIODS

OUTCOMES:
- On Completion of the course the student will be able to
- Perform free hand sketching of basic geometrical shapes and multiple views of objects.
- Draw orthographic projections of lines, Planes and Solids
- Obtain development of surfaces.
- Prepare isometric and perspective views of simple solids.

TEXTBOOKS:

REFERENCES:

Publication of Bureau of Indian Standards:

Special points applicable to University Examinations on Engineering Graphics:
1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day.

BS7161 BASIC SCIENCES LABORATORY
(Common to all branches of B.E. / B.Tech Programmes)

PHYSICS LABORATORY: (Any Seven Experiments)

OBJECTIVE:

- To inculcate experimental skills to test basic understanding of physics of materials including properties of matter, thermal and optical properties.
- To induce the students to familiarize with experimental determination of velocity of ultrasonic waves, band gap determination and viscosity of liquids.

1. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of disc
2. Non-uniform bending - Determination of young’s modulus
3. Uniform bending – Determination of young’s modulus
4. Lee’s disc Determination of thermal conductivity of a bad conductor
5. Potentiometer-Determination of thermo e.m.f of a thermocouple
6. Laser- Determination of the wave length of the laser using grating
7. Air wedge - Determination of thickness of a thin sheet/wire
8. a) Optical fibre - Determination of Numerical Aperture and acceptance angle
   b) Compact disc- Determination of width of the groove using laser.
10. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids
11. Post office box - Determination of Band gap of a semiconductor.
13. Viscosity of liquids - Determination of co-efficient of viscosity of a liquid by Poiseuille’s flow
OUTCOME:
Upon completion of the course, the students will be able
- To determine various moduli of elasticity and also various thermal and optical properties of materials.
- To determine the velocity of ultrasonic waves, band gap determination and viscosity of liquids.

CHEMISTRY LABORATORY:
(Minimum of 8 experiments to be conducted)
1. Estimation of HCl using Na₂CO₃ as primary standard and Determination of alkalinity in water sample.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Determination of DO content of water sample by Winkler’s method.
4. Determination of chloride content of water sample by argentometric method.
5. Estimation of copper content of the given solution by iodometry.
6. Determination of strength of given hydrochloric acid using pH meter.
7. Determination of strength of acids in a mixture of acids using conductivity meter.
8. Estimation of iron content of the given solution using potentiometer.
9. Estimation of iron content of the water sample using spectrophotometer (1, 10-Phenanthroline/thiocyanate method).
10. Estimation of sodium and potassium present in water using flame photometer.
12. Pseudo first order kinetics-ester hydrolysis.
14. Determination of CMC.
15. Phase change in a solid.

TOTAL: 60 PERIODS

TEXTBOOKS:

HS7251  TECHNICAL ENGLISH  L T P C
4 0 0 4

OBJECTIVES:
- To enable students acquire proficiency in technical communication.
- To enhance their reading and writing skills in a technical context.
- To teach various language learning strategies needed in a professional environment.

CONTENTS
UNIT I  ANALYTICAL READING  12
Listening- Listening to informal and formal conversations; Speaking – Conversation Skills(opening, turn taking, closing )-explaining how something works-describing technical functions and applications; Reading –Analytical reading, Deductive and inductive reasoning; Writing- vision statement–structuring paragraphs.

UNIT II  SUMMARISING  12
Listening- Listening to lectures/ talks on Science & Technology; Speaking –Summarizing/ Oral Reporting, Reading – Reading Scientific and Technical articles; Writing- Extended definition –Lab Reports – Summary writing.
UNIT III DESCRIPTING VISUAL MATERIAL
Listening- Listening to a panel discussion; Speaking – Speaking at formal situations; Reading – Reading journal articles - Speed reading; Writing- data commentary-describing visual material-writing problem-process- solution-the structure of problem-solution texts- writing critiques

UNIT IV WRITING/ E-MAILING THE JOB APPLICATION
Listening- Listening to/ Viewing model interviews; Speaking –Speaking at different types of interviews – Role play practice (mock interview); Reading – Reading job advertisements and profile of the company concerned; Writing- job application – cover letter – Résumé preparation.

UNIT V REPORT WRITING
Listening- Viewing a model group discussion; Speaking –Participating in a discussion - Presentation; Reading – Case study - analyse - evaluate – arrive at a solution; Writing– Recommendations- Types of reports (feasibility report)- designing and reporting surveys– Report format- writing discursive essays.

TEACHING METHODS:
Practice writing
Conduct model and mock interview and group discussion.
Use of audio – visual aids to facilitate understanding of various forms of technical communication. Interactive sessions.

EVALUATION PATTERN:
Internals – 50%
End Semester – 50%
TOTAL: 60 PERIODS

OUTCOMES:
• Students will learn the structure and organization of various forms of technical communication.
• Students will be able to listen and respond to technical content.
• Students will be able to use different forms of communication in their respective fields.

TEXTBOOK:

REFERENCES:
OBJECTIVES:

- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To acquaint the student with the concepts of vector calculus, needed for problems in all engineering disciplines.
- To develop an understanding of the standard techniques of complex variable theory so as to enable the student to apply them with confidence, in application areas such as heat conduction, elasticity, fluid dynamics and flow of the electric current.
- To make the student appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated.

UNIT I MATRICES 12

UNIT II VECTOR CALCULUS 12
Gradient and directional derivative – Divergence and Curl – Irrotational and Solenoidal vector fields – Line integral over a plane curve – Surface integral - Area of a curved surface - Volume integral - Green’s, Gauss divergence and Stoke’s theorems – Verification and application in evaluating line, surface and volume integrals.

UNIT III ANALYTIC FUNCTION 12
Analytic functions – Necessary and sufficient conditions for analyticity - Properties – Harmonic conjugates – Construction of analytic function - Conformal mapping – Mapping by functions

UNIT IV COMPLEX INTEGRATION 12

UNIT V LAPLACE TRANSFORMS 12

TOTAL : 60 PERIODS

OUTCOMES:

Upon successful completion of the course, students should be able to:

- Evaluate real and complex integrals using the Cauchy integral formula and the residue theorem
- Appreciate how complex methods can be used to prove some important theoretical results.
- Evaluate line, surface and volume integrals in simple coordinate systems
- Calculate grad, div and curl in Cartesian and other simple coordinate systems, and establish identities connecting these quantities
- Use Gauss, Stokes and Greens theorems to simplify calculations of integrals and prove simple results.

TEXTBOOKS:

REFERENCES:

PH7256 PHYSICS FOR GEOPHYSICS ENGINEERING

OBJECTIVE:
- To understand the fundamentals of electromagnetic radiation, measurement of radiation and physical laws.
- To introduce the concepts of atmosphere and scattering principles. To understand the interaction of EMR with atmosphere and to introduce the concept of imaging and non-imaging sensors for atmospheric probing.
- To gain knowledge about basic optical principles in remote sensing and to introduce the concept of photography and its development.
- To understand the basics of gravitation and the physics behind it, and to introduce satellites and its effectiveness in earth monitoring.
- To understand the different types of electro-optic sensors and its detection mechanism

UNIT I ELECTROMAGNETIC RADIATION

UNIT II INTERACTION OF EMR WITH ATMOSPHERE AND EARTH’S SURFACE

UNIT III OPTICS FOR REMOTE SENSING
photography - sensitivity - speed - characteristic curve - developing and printing - basic colour photography - construction of colour films - film type - types of filter - and its uses.

UNIT IV  GRAVITATION AND SATELLITES  9
Newton’s law of gravitation - Gravitational field and potential - Determination of gravity, variation of acceleration due to gravity of the earth with depth and with altitude - Variation of acceleration due to gravity due to rotation of the earth – Refraction. Diffraction - Fresnel theory, Circular diffraction gravity, Polarisation double ditraction - Escape velocity - Kepler’s law of planetary motion - Doppler effect - Satellites - Types of satellites - Earth observation satellites, Communications satellites, Navigation satellites, Weather satellites, Military satellites and Scientific satellites.

UNIT V  ELECTRO-OPTIC SENSORS  9
Photomultipliers, photo resistors, photodiodes, nonselective detectors - Optical receivers, PIN and APD, optical preamplifiers, Detectors: Basic detector mechanisms, noise in detectors. Thermal and photo emissive detectors, Photoconductive and photovoltaic detectors, performance limits, Photographic, - Sensitivity, time and frequency response - hybrid photo detectors - Imaging detectors - eye and vision, photographic film. Camera tubes, solid-state arrays, video, Detector electronics, detector interfacing - Different CCD cameras. Orbital Mechanics, Concept of orbits-propulsion, aero dynamics, navigation guidance and control.

OUTCOME:
- The students will gain knowledge about electromagnetic radiation and its principles.
- The students will be able to understand the physics of atmosphere and the use of imaging and non-imaging sensor in atmospheric probing.
- The students will gain knowledge about remote sensing and photography.
- The students will be encouraged to learn the development of satellite technology in geo-informatics.
- The students will gain knowledge about different electro optic sensors.

REFERENCES:

GE7151  COMPUTING TECHNIQUES  L T P C
(Common to all branches of Engineering and Technology)  3 0 0 3
OBJECTIVE:
• To learn programming using a structured programming language.
• To provide C programming exposure.
• To introduce foundational concepts of computer programming to students of different branches of Engineering and Technology.

UNIT I INTRODUCTION
Introduction to Computers – Computer Software – Computer Networks and Internet - Need for logical thinking – Problem formulation and development of simple programs - Pseudo code - Flow Chart and Algorithms.

UNIT II C PROGRAMMING BASICS

UNIT III ARRAYS AND STRINGS

UNIT IV POINTERS
Macros - Storage classes –Basic concepts of Pointers– Pointer arithmetic - Example Problems - Basic file operations

UNIT V FUNCTIONS AND USER DEFINED DATA TYPES

TOTAL : 45 PERIODS

OUTCOME:
At the end of the course, the student should be able to:
• Write C program for simple applications
• Formulate algorithm for simple problems
• Analyze different data types and arrays
• Perform simple search and sort.
Use programming language to solve problems

TEXTBOOKS:

REFERENCES:
OBJECTIVES:
- To study the nature and facts about environment.
- To finding and implementing scientific, technological, economic and political solutions to environmental problems.
- To study the interrelationship between living organism and environment.
- To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.
- To study the dynamic processes and understand the features of the earth’s interior and surface.
- To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

UNIT I  ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY  14
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 – biogeographical 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  8
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 – Urban / Rural / Industrial / Agricultural.

UNIT III  NATURAL RESOURCES  10
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
From unsustainable to sustainable development – urban problems related to energy

UNIT V HUMAN POPULATION AND THE ENVIRONMENT


TOTAL : 45 PERIODS

OUTCOMES:
- Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.
- Public awareness of environmental is at infant stage.
- Ignorance and incomplete knowledge has lead to misconceptions
- Development and improvement in std. of living has lead to serious environmental disasters

TEXTBOOKS :

REFERENCES :

GE7161 COMPUTER PRACTICES LABORATORY

OBJECTIVES:
- To understand the basic programming constructs and articulate how they are used to develop a program with a desired runtime execution flow.
- To articulate where computer programs fit in the provision of computer-based solutions to real world problems.
- To learn to use user defined data structures.

LIST OF EXPERIMENTS
1. Search, generate, manipulate data using MS office/ Open Office
2. Presentation and Visualization – graphs, charts, 2D, 3D
3. Problem formulation, Problem Solving and Flowcharts
4. C Programming using Simple statements and expressions
5. Scientific problem solving using decision making and looping.
6. Simple programming for one dimensional and two dimensional arrays.
7. Solving problems using String functions
8. Programs with user defined functions
9. Program using Recursive Function
10. Program using structures and unions.

TOTAL : 60 PERIODS

OUTCOME:
At the end of the course, the student should be able to:
- Write and compile programs using C programs.
- Write program with the concept of Structured Programming
- Identify suitable data structure for solving a problem
Demonstrate the use of conditional statement.

LABORATORY REQUIREMENTS FOR BATCH OF 30 STUDENTS
30 Systems with C compiler

GE7162 ENGINEERING PRACTICES LABORATORY
(Common to all Branches of B.E. / B.Tech. Programmes) 0 0 4 2

OBJECTIVE:
- To provide exposure to the students with hands-on experience on various Basic Engineering Practices in Civil, Mechanical, Electrical and Electronics Engineering.

GROUP – A (CIVIL & ELECTRICAL)

1. CIVIL ENGINEERING PRACTICES 15

PLUMBING
Basic pipe connections involving the fittings like valves, taps, coupling, unions, reducers, elbows and other components used in household fittings. Preparation of plumbing line sketches.
- Laying pipe connection to the suction side of a pump.
- Laying pipe connection to the delivery side of a pump.
- Practice in connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances.

WOOD WORK
- Sawing, planing and making joints like T-Joint, Mortise and Tenon joint and Dovetail joint.

STUDY
- Study of joints in door panels and wooden furniture
- Study of common industrial trusses using models.

2. ELECTRICAL ENGINEERING PRACTICES 15
- Basic household wiring using Switches, Fuse, Indicator and Lamp etc.,
- Stair case light wiring
- Tube – light wiring
- Preparation of wiring diagrams for a given situation.
- Study of Iron-Box, Fan Regulator and Emergency Lamp

GROUP – B (MECHANICAL AND ELECTRONICS)

3. MECHANICAL ENGINEERING PRACTICES WELDING 30
• Arc welding of Butt Joints, Lap Joints, and Tee Joints
• Gas welding Practice.
• Basic Machining - Simple turning, drilling and tapping operations.
• Study and assembling of the following:
  a. Centrifugal pump
  b. Mixie
  c. Air Conditioner.

DEMONSTRATION ON FOUNDRY OPERATIONS.

4. ELECTRONIC ENGINEERING PRACTICES

• Soldering simple electronic circuits and checking continuity.
• Assembling electronic components on a small PCB and Testing.
• Study of Telephone, FM radio and Low Voltage Power supplies.

TOTAL : 60 PERIODS

OUTCOME:
• Ability to fabricate carpentry components and to lay pipe connections including plumbing works.
• Ability to use welding equipments to join the structures
• Ability to do wiring for electrical connections and to fabricate electronics circuits.

EC7351 COMMUNICATION THEORY

OBJECTIVES:
• To introduce the relevance of this course to the existing technology through demonstrations, case studies, simulations, contributions of scientist, national / international policies with a futuristic vision along with socio-economic impact and issues
• To introduce the concepts of various modulations and their spectral analysis
• To introduce random processes and their characteristics
• To understand noise impact on modulations and
• To introduce some of the essential baseband signal processing techniques

UNIT I AMPLITUDE MODULATION


UNIT II ANGLE MODULATION


UNIT III RANDOM PROCESS


UNIT IV NOISE PERFORMANCE


UNIT V BASEBAND TECHNIQUES

Quantization – Uniform and non-uniform quantization – Quantization noise – Companding laws of
speech signals – PCM, DPCM, ADPCM, DM, ADM, and Subband Coding. Multiplexing– TDM (E and T lines), FDM

**TOTAL: 45 PERIODS**

**OUTCOMES:**
- Ability to comprehend and appreciate the significance and role of this course in the present contemporary world
- Students will have acquired the knowledge on different modulation techniques
- Students will get information about signals broadcasted with different modulation techniques
- Students will understand the role of random process in communication systems.

**TEXTBOOKS:**

**REFERENCES:**
2. H P Hsu, Schaum Outline Series- “Analog and Digital Communications” TMH 2006

**GI7301 CARTOGRAPHY AND GIS CONCEPTS L T P C 3 0 0 3**

**OBJECTIVES:**
- To introduce concepts of Cartography and GIS
- To expose the process of map making and production
- To introduce GIS data structures, data input and data presentation

**UNIT I ELEMENTS OF CARTOGRAPHY 9**
Definition of Cartography - Maps - functions - uses — Types of Maps – Map Scales and Contents – Map projections – shape, distance, area and direction properties – perspective and mathematical projections – Indian maps and projections – Map co-ordinate systems – UTM and UPS references

**UNIT II MAP DESIGN AND PRODUCTION 9**
Elements of a map - Map Layout principles – Map Design fundamentals – symbols and conventional signs - graded and ungraded symbols - color theory - colours and patterns in symbolism – map lettering - map production – map printing- colours and visualization – map reproduction - Map generalization - geometric transformations – bilinear and affine transformations

**UNIT III FUNDAMENTALS OF GIS 9**

**UNIT IV DATA INPUT AND TOPOLOGY 9**

UNIT V    DATA QUALITY AND OUTPUT

OUTCOMES:
At the end of the course, the student shall
- Be familiar with appropriate map projection and co-ordinate system for production of Maps and shall be able to compile and design maps for the required purpose.
- Be familiar with co-ordinate and datum transformations
- Understand the basic concepts and components of GIS, the techniques used for storage of spatial data and data compression
- Understand the concepts of spatial data quality and data standard

TEXTBOOKS:

REFERENCES:
Destructors - Type Conversions - Inheritance - Base class - Derived Class - Visibility modes - Single Inheritance - Multilevel Inheritance - Multiple Inheritance - Nesting - Polymorphism- File - Opening and Closing - Exercises

UNIT IV JAVA PROGRAMMING

UNIT V SCRIPTS AND OOP

TOTAL : 45 PERIODS

OUTCOMES:
- At the end of the course the student will be able to understand
- Concepts of Object Oriented programming techniques
- the tools and procedure involved in programming with C++, Java
- concepts of various scripting languages and their use in GIS customization

TEXTBOOKS:

REFERENCES:
6. wwwcplusplus.com/doc/tutorial/

GI7303 FUNDAMENTALS OF REMOTE SENSING

OBJECTIVES:
- To introduce the concepts of remote sensing processes and its components.
- To expose the various remote sensing platforms and sensors and to introduce the elements of data interpretation

UNIT I REMOTE SENSING AND ELECTROMAGNETIC RADIATION

UNIT II EMR INTERACTION WITH ATMOSPHERE
Standard atmospheric profile – main atmospheric regions and its characteristics – interaction of
radiation with atmosphere - Scattering (Rayleigh, Mie, non-selective scattering) absorption and refraction – Atmospheric effects on visible, infrared, thermal and microwave spectrum – Atmospheric windows.

UNIT III  EMR INTERACTION WITH EARTH MATERIAL  9

UNIT IV  PLATFORMS AND SENSORS  9

UNIT V  DATA PRODUCTS AND VISUAL INTERPRETATION  9

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course the student will be able to understand
- The characteristics of electromagnetic radiation and its interaction with earth features
- The types and configuration of various satellites and sensors
- The elements of data interpretation

TEXTBOOKS:

REFERENCES:

GI7304  PLANE AND GEODETIC SURVEYING FOR GEOINFORMATICS  L T P C
4 0 0 4

OBJECTIVES:
- To introduce the rudiments of plane surveying and geodetic principles to Geoinformatics Engineers.
- To learn the various methods of plane and geodetic surveying to solve the real world problems.
- To introduce the concepts of Control Surveying
- To introduce the basics of Astronomical Surveying

UNIT I  FUNDAMENTALS OF CONVENTIONAL SURVEYING
Definition - Classifications - Basic principles – Equipment and accessories for ranging and chaining – Methods of ranging - well conditioned triangles – Chain traversing - Compass – Basic principles - Types - Bearing - System and conversions- Sources of errors and Local attraction - Magnetic declination-Dip-compass traversing - Plane table and its accessories - Merits and demerits - Radiation – Intersection - Resection – Plane table traversing.

UNIT II  LEVELLING  12

UNIT III  THEODOLITE SURVEYING  12
Horizontal and vertical angle measurements - Temporary and permanent adjustments – Heights and distances–Tacheometric surveying – Trigonometric levelling – Horizontal curves in route surveying – classification, functions and requirements - methods of setting out simple curves - setting out transition curves by offsets and angles

UNIT IV  CONTROL SURVEYING AND ADJUSTMENT  12

UNIT V  ASTRONOMICAL SURVEYING  12
Astronomical terms and definitions - Motion of sun and stars - Celestial coordinate systems – different time systems - Nautical Almanac - Apparent altitude and corrections - Field observations and determination of time, longitude, latitude and azimuth by altitude and hour angle method

TOTAL : 60 PERIODS

OUTCOMES:
At the end of the course the student will be able to understand
- The use of various surveying instruments in mapping
- The error and adjustments procedures associated with surveying and mapping
- The methods used for establishment of horizontal and vertical control
- Concepts of astronomical surveying and methods to determine time, longitude, latitude and azimuth

TEXTBOOKS :

REFERENCES:

MA7303  TRANSFORMS AND STATISTICS  L T P C
OBJECTIVES:
- To acquaint the student with Fourier Series and Fourier transform techniques used in wide variety of situations in which the functions used are not periodic and to solve boundary value problems;
- To introduce the concept of Probability and Statistics which is central to many geomatic applications.

UNIT I   FOURIER SERIES  12
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  12

UNIT III RANDOM VARIABLES  12
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 IV TWO-DIMENSIONAL RANDOM VARIABLES  12
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 V   TESTS OF SIGNIFICANCE  12

TOTAL : 60 PERIODS

OUTCOMES:
- The students can able to solve the problems in Fourier series and Fourier transforms by using these techniques.
- Students will be able characterize probability models using probability mass (density) functions & cumulative distribution functions.
- The students can independently participate in the processes of analysis, planning, formulating strategies of development, decision-making, governing and management and independent making of tactical and strategic decisions related to the statistics.

TEXTBOOKS:

REFERENCES:
2. Walpole, R.E., Myers, R.H., Myers, S.L. and Ye, K., “Probability and Statistics for

CE7313 PLANE AND GEODETIC SURVEYING LABORATORY FOR GEOINFORMATICS

OBJECTIVE:
- To familiarize with the various surveying instruments and methods.

EXCERCISES:
1. Chain traversing
2. Compass traversing
3. Plane table surveying – Method of intersection
4. Plane table surveying – Three point problem (any one method)
5. Plane table surveying – Two point problem
6. Plane table traversing
7. Fly leveling using dumpy/tilting level
8. Check leveling using dumpy/tilting level
10. Determination of tacheometric constants using horizontal and inclined line of sight.
11. To determine the elevation of an object using single plane method when base is accessible and inaccessible
12. To determine the distance and difference in elevation between two inaccessible points using double plane method.
13. Heights and distances by stadia and tangential tacheometry
14. Theodolite traversing
15. Extra meridian observation to determine azimuth (Demonstration only).

TOTAL : 60 PERIODS

OUTCOMES:
- At the end of the course the student will be able to use various surveying instruments like chain, compass, plane table, level and theodolite for mapping.

REFERENCES:
OBJECTIVES:
- To implement different concepts of Object Oriented Programming using C++
- Hands on exercise on various OOPs concepts using C++
- To implement GIS customization using JAVA and AJAX

EXERCISES:
1. Arithmetic operations
2. Control structures
3. Graphic Libraries
4. Matrix manipulation and functions
5. Operator Overloading – binary and unary operators as friend and member functions
6. Unary operator - Prefix and Postfix form
7. Nesting of member functions
8. Constructors, Destructors
9. Constructor Overloading
10. Inheritance and its forms
11. Visibility mode – public, private and protected
12. Runtime Polymorphism – Virtual functions
13. File opening and file closing
14. GIS customization using JAVA
15. GIS customization using AJAX

OUTCOMES:
At the end of the course the student will be able to develop
- Programs using C++ language
- Codes implementing various Object oriented concepts
- Scripts using Java and AJAX

REFERENCE:
UNIT II MINERALOGY AND PETROLOGY 9
Important rock forming minerals – physical properties and uses. Classification and description of rocks – Forms and mode of occurrence of rocks. Important ore forming minerals – physical properties and uses – Distribution of economic minerals in India. Geology of coal and Hydrocarbons.

UNIT III GEOMORPHOLOGY 9
Geomorphic processes and Landforms – Classification and Description. Weathering; Drainage pattern and morphometry. Significance of Geomorphology in geo-resources exploration and natural hazard studies.

UNIT IV GEOLOGIC HAZARDS 9

UNIT V GEOPHYSICS AND REMOTE SENSING FOR GEOLOGY 9

OUTCOMES:
By the end of the course the student will be able to understand the structure of earth and geological structures with following

- The importance of minerals, ores and rocks will be understood.
- The concepts of geomorphology and natural hazards will also be understood.
- The role of geophysics and remote sensing for natural resources inventory and to study and understand the planetary geology

TEXTBOOKS:

REFERENCES:
OBJECTIVE:
- To introduce basics and concepts of optics, Aerial photography acquisition and mapping from Aerial photographs.

UNIT I PRINCIPLES AND PROPERTIES OF PHOTOGRAPHY 12
History - Definition, Applications - Types of Photographs, Classification - Photographic overlaps – Film-based Aerial Cameras – Construction - Camera accessories - Camera calibration - Digital Aerial cameras – Multiple frame and Line cameras - Linear array scanner - Flight Planning - Crab & Drift - Computation of flight plan - Basic horizontal and vertical control - Pre pointing and Post pointing.

UNIT II GEOMETRIC PROPERTIES OF AERIAL PHOTOGRAPHS 12
Photo coordinate measurement - Refinement of photo coordinates - Vertical photographs - geometry, scale – Stereoscopes - Stereoscopic parallax - parallax equations - Tilted photograph - Geometry, Scale, Coordinate system – Relief displacement — Photo Interpretation.

UNIT III STEREO PLOTTERS & ORIENTATION 12
Projection system, Viewing, Measuring and Tracing system - parallelogram - Stereo plotters – Classification – Analog, semi analytical, Analytical and Digital; Analog Stereo Plotters - Interior orientation- Relative orientation- Absolute orientation; Analytical plotters- Interior Orientation: Two dimensional coordinate transformations – Collinearity condition and Coplanarity condition - Relative orientation - Three dimensional conformal coordinate transformation -

UNIT IV AEROTRIANGULATION, TERRAIN MODELING, ORTHOPHOTO 12
Absolute orientation – Aerotriangulation: –Bundle Adjustment– DTM, DEM and DSM, Rectified photo, Orthophoto and True Orthophoto.

UNIT V DIGITAL PHOTOGRAMMETRY 12

TOTAL: 60 PERIODS

OUTCOMES:
- At the end of the course the student will be able to understand
- Photographic process and characteristics of tools used in photogrammetry
- Concepts of stereoscopy and geometry of various types of photographs
- The process of Planning photogrammetric operations
- The use of stereoplotters in map preparation and orthophoto generation

TEXTBOOKS:

REFERENCES:

GI7402 GEO DATABASE SYSTEM L T P C 3 0 3
OBJECTIVE:
- To introduce the students to the concepts of DBMS, Spatial Database Management System (SDBMS), Spatial Database design, basic application program development and user interfaces.

UNIT I  INTRODUCTION

UNIT II  SPATIAL CONCEPTS AND DATA MODELS
Field based model – object based model – spatial data types – operations on spatial objects - Entity Relationship Model (ER Model) – Relational Model – Constraints and Normal forms of Relational Model - mapping ER model to Relational model – ER model with spatial concepts – Object-oriented data modeling with Unified Modeling Language (UML)

UNIT III  QUERY LANGUAGE
SQL – Data Definition – Data Manipulation - Basic structure of SQL – Set operations – Aggregate Functions –Simple queries –spatial Vs non spatial- Nested sub queries – Complex queries – Views – Trigger - OGIS standard for extending SQL - example spatial SQL queries – Object relational SQL.

UNIT IV  SPATIAL STORAGE AND INDEXING

UNIT V  DESIGN AND DEVELOPMENT OF SPATIAL DATA BASE SYSTEM
Exploring Spatial Geometry, Organizing spatial data, Spatial data relationships and functionalities of any one commercial and one FOSS DBMS each – Application program and user Interfaces.

(L:45) TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course the student will be able to understand
- Concepts and architecture of SDBMS
- Concepts of SQL and generation of queries
- Concepts of spatial data storage and design of SDBMS

TEXTBOOKS:

REFERENCES:

GI7403 MODERN SURVEYING
OBJECTIVE:
- To understand the working of Total Station equipment and solve the surveying problems.

UNIT I  FUNDAMENTALS OF TOTAL STATION AND ELECTROMAGNETIC WAVES  9
Methods of Measuring Distance, Basic Principles of Total Station, Historical Development, Classifications, applications and comparison with conventional surveying. 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 II  ELECTRO OPTICAL AND MICRO WAVE SYSTEM  9

UNIT III  SATELLITE SYSTEM  9
Basic concepts of GPS - Historical perspective and development - applications - Geoid and Ellipsoid- satellite orbital motion - Keplerian motion – Kepler’s Law - Perturbing forces - Geodetic satellite - Doppler effect - Positioning concept –GNSS, IRNSS and GAGAN - 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 IV  GPS DATA PROCESSING  9
GPS observables - code and carrier phase observation - linear combination and derived observables - concept of parameter estimation – downloading the data RINEX Format – Differential data processing – software modules -solutions of cycle slips, ambiguities, Concepts of rapid, static methods with GPS - semi Kinematic and pure Kinematic methods -satellite geometry & accuracy measures - applications- long baseline processing- use of different softwares available in the market.

UNIT V  MISCELLANEOUS  9

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course the student will be able to understand
- Working principles of total station and GPS instruments
- Propagation of EMR through atmosphere and corrections for its effects
- The functioning various types total station and GPS equipments and their applications
- Various techniques available for surveying and mapping with total station and GPS.

TEXTBOOKS:
REFERENCES:

OBJECTIVES:
- To impart knowledge to the students to understand role of Geoinformatics Technology for Urban planning and Management

UNIT I FUNDAMENTALS

UNIT II URBAN MAPPING

UNIT III URBAN PLANNING

UNIT IV URBAN ANALYSIS

UNIT V URBAN MODELLING
Urban Growth Modelling - Planning Support Systems - Urban Environmental Monitoring and Modelling - 3D city Modelling – Intelligent transportation systems - Case Studies

OUTCOMES:
At the end of the course the student will be able to understand
- The basics of Urban mapping and Plan preparation.
- The application of remote sensing in urban mapping.
- The role of remote sensing in preparation of urban plans.
- The modeling techniques for modeling and prediction of future land use scenarios

TEXTBOOKS:

REFERENCES:

MA7401 NUMERICAL METHODS AND GRAPH THEORY L T P C

4 0 0 4

OBJECTIVES:
- To provide the mathematical foundations of numerical techniques for solving linear system, eigenvalue problems, interpolation, numerical differentiation and integration and the errors associated with them;
- To demonstrate the utility of numerical techniques of ordinary and partial differential equations in solving engineering problems where analytical solutions are not readily available.

UNIT I SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 12

UNIT II INTERPOLATION AND APPROXIMATION 12
Interpolation with unequal intervals - Lagrange interpolation – Newton’s divided difference interpolation – Cubic Splines - Interpolation with equal intervals - Newton’s forward and backward difference formulae – Least square method - Linear curve fitting.

UNIT III EMPIRICAL LAWS AND CURVE-FITTING 12

UNIT IV INTRODUCTION TO GRAPH THEORY 12
Definition and examples of graphs - Subgraphs - Complement of a graph - Matrix representation of a graph - Graph isomorphism - Paths and cycles in graph - Euler trails and circuits - Hamilton paths and cycles - Definition and example of trees.

UNIT V GRAPH ALGORITHMS 12

TOTAL: 60 PERIODS

OUTCOMES:
• Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions.
• Apply numerical methods to obtain approximate solutions to mathematical problems.
• Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations.
• Analyse and evaluate the accuracy of common numerical methods.

TEXT BOOKS:

REFERENCES:

GI7411 CARTOGRAPHY AND GIS LABORATORY L T P C 0 0 4 2

OBJECTIVES:
• Hands on experience of basics of cartography and GIS.
• Designing the map
• Development of GIS database and populating attributes data

EXERCISES:
1. Simple conical, cylindrical and planner projection for a reduced earth (2 to 4cm reduced earth) – aspect and secant demo.
2. Graded symbolization and isopleth / choropleth map
3. Map compilation and Design
4. Data Input – Onscreen Digitisation – Creation of Point, Line and Polygon layers
5. Projection, Reprojection and Coordinate Transformation of Maps
6. Attribute data input and Measurement of Distance, Area
7. Linking External Database and Tabular Data Analysis using SQL commands
8. Generating Graphs, Charts and Diagrams from Tabular data
9. Data Conversion – Vector to Raster and Raster to Vector
10. Map Joining, Edge Matching and Layout Design

TOTAL: 60 PERIODS

OUTCOMES:
At the end of the course the student will be able to
• To design and produce thematic maps with suitable projection, symbols and color codes
• To compile and develop digital maps
• To create spatial database and nonspatial databases in GIS environment
• To analyse spatial database and generate reports, maps

REFERENCE:

GI7412 TOTAL STATION AND GPS SURVEYING LABORATORY

OBJECTIVE:
- To train the students to acquire skill in making precise measurements and obtaining accurate results with Total Station and GPS.

EXERCISES:
1. Study of Total Station
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 kinematics survey
13. Differential Positioning
14. Precise Positioning
15. GPS Traversing

TOTAL: 60 PERIODS

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 Total Station and GPS for alignment and setting out works

REFERENCE:

GI7501 ADVANCED REMOTE SENSING

OBJECTIVES:
- To introduce the concepts of remote sensing processes and its components.
- To expose the various remote sensing platform and sensors and to introduce the elements of data interpretation

UNIT I THERMAL REMOTE SENSING AND ANALYSIS
Thermal radiation principles – Thermal interaction sensors and characters – thermal image characters – image degradation sources & correction – Land surface temperature measurement – Application: LST, emissivity mapping, SST, ET distribution, Urban heat islands, existing models

UNIT II HYPERSPECTRAL REMOTE SENSING
Diffraction principles - field spectrum – BDRF and spectral reflectance & imaging spectrometry-sensors - virtual dimensionality – Hughé’s phenomenon - Data reduction, Calibration and normalization –Binary encoding- thresholding - library matching.

UNIT III HYPERSPECTRAL IMAGE ANALYSIS 9

UNIT IV MICROWAVE REMOTE SENSING 9

UNIT V LIDAR 9
LIDAR – Principles and Properties- different LiDAR System- Space Borne and airborne LiDAR missions – Typical parameters of LiDAR system. Data Processing – geometric correction-data quality enhancement – filtering LiDAR mapping applications – hydrology, Disaster mitigation and management

OUTCOMES:
At the end of the course the student will be able to understand
- The characteristics of electromagnetic radiation and its interaction with earth features
- The types and configuration of various satellites and sensors
- The concepts of thermal and hyperspectral remote sensing and their applications
- The concept, processing of LIDAR and its applications

TEXTBOOKS

REFERENCES
Information Systems - Encoding and decoding - acquisition, storage and retrieval –data products - satellite data formats - Digital Image Processing Systems - Hardware and software design consideration Scanner, digitizer - photo write systems.

UNIT II SENSORS MODEL AND PRE PROCESSING  9

UNIT III IMAGE ENHANCEMENT  9

UNIT IV IMAGE CLASSIFICATION  9

UNIT V ADVANCED CLASSIFIERS  9
Fuzzy set classification – sub-pixel classifier – hybrid classifiers, Texture based classification – Object based classifiers - Artificial Neural nets - Hebbian leaning - Expert system, types and examples - Knowledge systems.

(L:45) TOTAL : 45 PERIODS

OUTCOMES:
At the end of the course the student will be able to understand
- Various components and characteristics of image processing systems
- The concepts of image geometry and radiometry and corrections
- Various types of image enhancement techniques used for satellite image processing
- The concepts of Image classification and use of various classifiers
- Various object recognition techniques available for extraction of features

TEXTBOOKS :

REFERENCES:
OBJECTIVE:
- To understand the geometry of the earth and its relationship with nature.

UNIT I  FUNDAMENTALS  12

UNIT II  GEOMETRIC GEODESY  12

UNIT III  PHYSICAL GEODESY  12

UNIT IV  GEODETiC AstronomY  12
Celestial Sphere – Astronomical triangle – celestial coordinates systems and its relationship with Cartesian Co-ordinates and Transformation between them -Special star positions, Major constellations- time systems (sidereal, Universal , atomic and standard ) rising and setting of Stars with respect to Declination, hour angle and Azimuth, Culmination, Prime Vertical Crossing and Elongation. Determination of Astronomical Azimuth- stars altitude and hour angle methods, astronomical latitude and longitude determination

UNIT V  GEODETiC ComputAtions  12
Rectangular and Polar Co - ordinates - First and Second geodetic problem – Similarity and Helmert’s transformation- methods of point determinations – problems on intersection, resection, arc section and also with over determinations, polar method and its extension.

OUTCOMES:
At the end of the course the student will be able to understand
- Fundamentals of Geodesy, Techniques involved in establishment of geodetic control
- Concepts of geoid, ellipsoid and their interrelationship
- Various types of coordinate systems and relationship between them
- Methods required for computation of geodetic and astronomical parameters
- The methods for measurement of gravity and gravity network

TEXTBOOKS:

REFERENCES:

GI7504 SATELLITE METEOROLOGY L T P C 3 0 0 3

OBJECTIVES:

- To introduce the basic concepts of Remote Sensing of atmosphere and satellite meteorology.
- To gain the knowledge on meteorological applications in weather forecasting aviation and trade applications.
- To familiarize the Indian Meteorological satellites and sensors.

UNIT I BASICS 9

UNIT II WEATHER SATELLITES AND SENSING SYSTEMS 9
Weather Satellites and Sensing Systems — Orbit Types and Altitudes — View Angle and Implications — INSAT and KALPANA — TRMM and GPM and others — American and European Missions, availability of data and derived data sets.

UNIT III DATA RECORDS AND APPLICATIONS 9
Data Records and Applications — Active and Passive Sensor Data — Microwave Sensors and Applications — Altitude. Wind., Temperature and Wave Measurements and Sensors — AWS Global Network in Measurements

UNIT IV METEOROLOGICAL APPLICATIONS 9
Meteorological Applications — Oceanographic Applications — Weather Forecasting — Aviation Meteorology — Agriculture and Irrigation Management — Meteorology in Transportation Industry — Business and Trade Application

UNIT V MANAGEMENT AND MONITORING 9

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course the student will be able to understand

- Concepts of satellite meteorology and satellite sensors useful for the same
- The applications of meteorological studies in resource management, disaster management

TEXTBOOKS:
   Diego, CA, 1995
2. Cracknell, —The Advanced Very High Resolution Radiometer (AVHRR)||, Taylor and
   Francis Int. Ltd., Great Britain, 1997

REFERENCES:
2. Doviak and Zrnic, — Doppler Radar and Weather observations||, Academic press,
4. S.R.Kalsi, —Use of Satellite Image in Tropical Cyclone Intensity Analysis and
   Forecasting||, India Meteorological Department, New Delhi, Meteorological Monograph,
   Cyclone warning Division No.1/2002.

GI7511 GEO DATABASE LABORATORY

OBJECTIVE :

• To get practical experience on the server – client setup on the database Management
  system and extending it to spatial data handling

EXERCISES:
1. Basics of Database
   • Field, Record, table and relationships concepts on file type database
2. Server / client operations
   • Starting / Shutdown of server
   • Client user creation
   • client connection over network
3. Data Definition of Tables
   • Creation, Deletion and Modification of definition
4. Data Manipulation
   • Insert, delete and modify table data
5. Simple Queries
   • On single table
   • Linking with multiple tables
   • With simple conditions
6. Views
   • Creation of views
   • Querying on views
7. Queries on Tables and views
   • Simple, Complex, nested queries using the tables and views
8. Data Control of Tables and Views
   • Defining different constraints
   • Handling different permissions on tables and views
9. Index on tables
10. Database triggers
11. Spatial data creation
    • Creation of simple geometries (point, line and polygon) on database
12. Indexing and viewing spatial data
13. Topological querying on spatial data
14. Geometrical functions and analysis
    • Area and length, Buffer, Union and intersection
15. Front end tool applications
   - Designing of database application with any front end tool

OUTCOMES:
At the end of the course the student will be able to
   - Create database structure and populate database
   - Apply geometric functions to derive spatial parameters
   - Apply simple overlay and buffering tools on spatial database

REFERENCE:

GI7512 PHOTOGRAVMETRY LABORATORY

OBJECTIVE:
   - To acquire knowledge about Interior, Relative and Absolute Orientation using Analog and Analytical Stereo plotters

1. Preparation of Stereogram card
2. Determining the aerial photograph scale based on an aerial photograph and the measured ground size of objects
3. Determining the ground coverage and flight altitude of an aerial photograph and the spatial resolution of a scanned image of aerial photograph
4. Determining the height of selected objects using the relief displacement method and shadow method on a single aerial photograph
5. Determining the height of selected objects using the Mirror Stereoscope and Parallax bar on an aerial photograph stereo pair
6. Determining the height of selected objects using the parallax method on scanned aerial photograph stereo pair
7. Interior orientation in Analog Stereo Plotter
8. Relative Orientation in Analog Stereo Plotter
9. Absolute Orientation in Analog Stereo Plotter
10. Interior Orientation, Relative Orientation, Absolute Orientation in Semi Analytical Stereo Plotter
11. Interior Orientation and Exterior Orientation in Digital Photogrammetry
12. Aerial Triangulation in Digital Photogrammetry
13. DTM production in Digital Photogrammetry
14. Feature Extraction in Digital Photogrammetry
15. Orthophoto production in Digital Photogrammetry

OUTCOMES:
At the end of the course the student will be able to
   - Produce Orthophoto, DTM from digital photographs using DPW
   - Produce planimetric maps from stereomodels using DPW

REFERENCE:
OBJECTIVE:
- To impart knowledge in various applications of hydrology and water resources using Geomatic technology.

UNIT I HYDROLOGIC COMPONENTS

UNIT II SURFACE WATER MODELLING

UNIT III RISK AND DAMAGE ASSESSMENT

UNIT IV GROUND WATER MODELLING

UNIT V IRRIGATION AND WATERSHED MANAGEMENT

OUTCOMES:
At the end of the course the student will be able to understand
- The components of hydrologic system and their measurement through remote sensing systems
- The techniques useful for assessment of Risk and Damage due to water related disasters using remote sensing and GIS
- The modeling tools for ground water flow modeling .Assess the irrigation water requirement and watershed management through intervention of remote sensing and GIS tools

Text Books

REFERENCES:
2. Dorota Swiatek, Stefan Ignar, Modelling of Hydrological Processes in the Narew Catchment, Springer Berlin Heidelberg - 2011
4. Prof. Dawei Han, Concise Hydrology, Createspace Independent Pub - 2010

GI7602 OPEN SOURCE GIS L T P C 3 0 0 3

OBJECTIVE:
- The open source options are for research and development. It helps the candidate to think creatively and independently in Geoinformatics project implementation. It also gives complete freedom to modify the software to suit the needs. The course exposes to major avenues of open source opportunities.

UNIT I BASICS FOR OPEN SOURCE IMPLEMENTATION

UNIT II OPEN SOURCE DEVELOPMENT ENVIRONMENT

UNIT III DESKTOP GIS WITH OPEN SOURCE GIS

UNIT IV DATA BASE MANAGEMENT AND USER INTERFACE
Files vs Database - Distributed operations and Architecture – ODBC - Open source Database management tools- Database: Spatial and Attribute queries Spatial functions and Analysis – Map Server, Application Server and Data Base server concepts.

UNIT V OPEN SOFTWARE AND WEB MAPPING

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course the student will be able to understand.
- Concepts and protocols used in Open Source GIS.
- Functionalities of Open Source GIS software in Desktop and Web based environments.
- The availability of various Open Source GIS software and their architecture.

TEXTBOOKS:
OBJECTIVE:

- The objective of the course is to make the students understand the concepts of Artificial Neural Network, Fuzzy logic, and Genetic algorithms and also their application in Geomatics.

UNIT I SOFT COMPUTING AND ARTIFICIAL NEURAL NETWORKS


UNIT II FUZZY SYSTEMS


UNIT III NEURO-FUZZY MODELLING


UNIT IV GENETIC ALGORITHM


UNIT V APPLICATIONS OF SOFT COMPUTING IN GEOMATICS

image registration - Object recognition - Automated feature extraction - navigation – Integration of soft computing and GIS for flood forecasting and monitoring, Landslide susceptibility, Highway alignment, smart city planning, agriculture, solid waste disposal

TOTAL: 45 PERIODS

OUTCOMES:

- At the end of the course, students will be able to understand the concepts of Artificial Neural Network, Fuzzy logic, Genetic algorithms and also their application in Geomatic.

TEXTBOOKS:

REFERENCES:

GI7604  SPATIAL ANALYSIS AND APPLICATIONS  L  T  P  C
3  0  0  3

OBJECTIVE:
- To provide exposure to Raster, Vector, Network and Geo-statistical Analysis Capabilities of GIS.

UNIT I  RASTER ANALYSIS  9

UNIT II  VECTOR ANALYSIS  9

UNIT III  NETWORK ANALYSIS  9

UNIT IV  SURFACE AND GEOSTATISTICAL ANALYSIS  9

UNIT V  CUSTOMISATION, WEB GIS, MOBILE MAPPING  9

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course the student will be able to understand
- Different tools available in GIS for analysis Raster and Vector data
- GIS functionalities to analysis network and surface data set
- The possibilities of customization of GIS
- The architecture of Web GIS and its applications
- Concept of recent techniques like mobile mapping and LBS
TEXTBOOKS:

REFERENCES:
2. John Peter Wilson, The handbook of geographic information science, Blackwell Pub.,2008

GI7611 DIGITAL IMAGE PROCESSING LABORATORY L T P C 0 0 4 2

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 data.

EXERCISES:
1. Use of available tools for
   - Study of image file formats and organization
   - Preprocessing techniques : radiometric correction & alterations
   - Preprocessing techniques : Ground control and rectification
2. Implementation of
   - Image reading and writing
   - Enhancements – histogram, filters
   - Band ratioing and normalization – NDVI,SAVI & NDWI
   - Data reduction
   - Image fusion
   - Classification – supervised & unsupervised
   - PCA
   - Accuracy assessment – correlation, RMSE & kappa
   - Image transformations
3. Use of available tools for
   - MLC classification using available tools
   - Sub pixel classification
   - noise removal, Vectorisation, & map compilation

TOTAL : 60 PERIODS

OUTCOMES:
At the end of the course the student will be able to
- Enhance satellite imagery through filtering, band ratioing, PCA etc
- Georeference and project satellite imagery
- Classify and assess accuracy of classification.

REFERENCE:
OBJECTIVE

- To experience the students in various Spatial and Network analysis of Spatial Data and develop problem-solving skills using GIS

EXERCISES:

1. **Raster Analysis**
   - Data exploration-statistics & query analysis
   - Map algebra, Reclassification, arithmetic & logical overlay
   - Focal and zonal operations
   - Distance and shortest path analysis

2. **Vector Analysis**
   - Attribute analysis & Data extraction
   - Overlay and Cost weighted overlay
   - Proximity – Buffer analysis

3. **Network Analysis**
   - Network Conflation, Geocoding
   - Short route analysis
   - Service area, Closest facility analysis

4. **Surface Analysis**
   - Slope and Aspect calculation
   - Interpolation techniques
   - Viewshed analysis & Watershed Delineation

5. **Customization**
   - Scripting/ embedded scripts
   - Batch Processing and WebGIS demo

TOTAL: 60 PERIODS

OUTCOMES:

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

- Analysis Raster and Vector data using various tools available in GIS
- Customize GIS environment writing simple scripts
- Appreciate use of WEB GIS in dissemination of spatial data sets.

REFERENCE:


GI7613  
SURVEY CAMP  
(2 WEEKS DURING V SEMESTER WINTER) 

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

1. Triangulation
2. Trilateration
OUTCOMES:
- At the end of the course the student will be able to apply the surveying techniques in field to establish horizontal and vertical control network using modern surveying equipments.
- Students will also be exposed to modern mapping techniques.

GI7701 AGRICULTURE AND FORESTRY FOR GEOINFORMATICS L T P C 3 0 0 3

OBJECTIVE:
- 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 CROP INVENTORY AND REMOTE SENSING 9

UNIT II REMOTE SENSING FOR SOIL 9

UNIT III LAND EVALUATION AND MANAGEMENT 9
Introduction - land use / land cover definition - land use / land cover classification - concepts and approaches of land evaluation - Change dynamics - Land capability assessments - decision support system for land use planning - optimum land use planning for sustainable agriculture.

UNIT IV DAMAGE ASSESSMENT 9
Introduction - damage by pests and diseases - crop loss assessment by floods - flood hazard zone mapping - remote sensing capabilities and contributions for drought management - land degradation due to water logging and salinity - crop stress - reflectance properties of stressed crops - identification of crop stress - Agricultural insurance in India – CCIS, ECIS, FIIS and NAIS

UNIT V FOREST MANAGEMENT 9
Introduction - forest taxonomy - inventory of forests - forest type and density mapping - biomass assessment - timber volume estimation - factors for forest degradation - mapping degraded forests - deforestation and afforestation - forest fire mapping and damage assessment - species mapping - sustainable development of forests.

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course the student will be able to understand
- Characterization of crops using Remote Sensing tools
- The concepts of soil mapping through remote sensing
- The evaluation of land capability for better land use planning

TEXTBOOKS:
REFERENCES:

GI7702 DECISION SUPPORT SYSTEM FOR RESOURCE MANAGEMENT

OBJECTIVE:
- To impart the knowledge of Expert Systems, fuzzy logic and operation research techniques for Geoinformatics Engineering.

UNIT I STRUCTURE OF EXPERT SYSTEMS

UNIT II RULE BASED EXPERT SYSTEMS

UNIT III INEXACT REASONING

UNIT IV OPERATION RESEARCH

UNIT V NETWORK AND INVENTORY MODELS
Shortest route - minimal spanning tree - maximum flow models - project network- CPM and PERT network-critical path scheduling - Types of Inventory- The classical EOQ model -Deterministic inventory problems - Price breaks - Stochastic inventory problems- selective inventory control techniques

OUTCOMES:
- At the end of the course, the student will be able to understand the concept of the Expert Systems, fuzzy logic and operation research techniques and their application in Geoinformatics Engineering.
TEXTBOOKS:

REFERENCES:

GI7703 OCEANOGRAPHY AND COASTAL PROCESSES L T P C 3 0 0 3

OBJECTIVE:
- To familiarize the students about the basics and Geomatics applications in the field of Oceanography and coastal processes

UNIT I FUNDAMENTAL OCEANOGRAPY 9

UNIT II OCEAN CIRCULATIONS AND INSTRUMENTS 9

UNIT III OCEAN COLOR REMOTE SENSING 9
Ocean color radiometers – Radiative transfer theory - atmospheric correction -SST measurement -Cloud detection algorithms, single channel and McSST approach, Bayesian approach -Ocean primary productivity estimation–Bio-optical algorithms -- Coastal Land Use/ Landcover -- Ocean color Sensors & data products

UNIT IV COASTAL HAZARD REMOTE SENSING 9
Shoreline change mapping - Erosion and accretion estimation - Transect based and polygon based shoreline change analysis –Oil spill studies - Use of MSS and SAR images,statistical and Neural network approaches- Sea level rise - Sea surface variability from Altimeters and Scatterometers.

UNIT V DISASTER MANAGEMENT 9
Cyclones- Radars, Synthetic procedures, Dvorak Intensity and forecasting technique - Tsunami propagation and run up - Flood and storm surges –Total water level elevation measurement, HIROBM-BOOS model -mitigation strategies- Early warning systems.

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course the student will be able to understand
- The basics of Ocean processes and characteristics of Ocean parameters
- The concepts of ocean dynamics and design of appropriate structures
- The use of remote sensing sensors for mapping and modeling oceanic processes and Coastal Zone management
TEXTBOOKS:

REFERENCES:

HS7551  EMPLOYABILITY SKILLS  L T P C

3 0 0 3

COURSE DESCRIPTION
This course aims to help the students acquire the employability skills necessary for the workplace situations. It also attempts to meet the expectations of the employers by giving special attention to language skills, presentation skills, group discussion skills and soft skills. This will be achieved through expert guidance and teaching activities focusing on employability skills.

COURSE OBJECTIVES
• To enhance the employability skills of students with a special focus on presentation skills, group discussion skills and interview skills
• To help them improve their reading skills, writing skills, and soft skills necessary for the workplace situations
• To make them employable graduates

CONTENTS
UNIT I  READING AND WRITING SKILLS
Reading: skimming & scanning strategies – note making skills – interpreting visual material (charts & tables) – critical reading – fast reading necessary for reading letters & files - preparing job applications - writing covering letter and résumé - applying for jobs online - email etiquette – writing official letters (placing an order, letters to consumers, etc.) writing reports – collecting, analyzing and interpreting data

UNIT II  SOFT SKILLS
Hard skills & soft skills: self-management skills & people skills - training in soft skills - persuasive skills – sociability skills – interpersonal skills – team building skills – leadership skills – problem solving skills – adaptability - stress management – motivation techniques – life skills -

UNIT III  PRESENTATION SKILLS
Preparing slides with animation related to the topic – organizing the material - Introducing oneself to the audience – introducing the topic – answering questions – individual presentation practice—presenting the visuals effectively – 5 minute presentation

UNIT IV  GROUP DISCUSSION SKILLS
Participating in group discussions – understanding group dynamics - brainstorming the topic — questioning and clarifying —GD strategies (expressing opinions, accepting or refusing others opinions, turn taking) – activities to improve GD skills – viewing recorded GD - mock GD

UNIT V  INTERVIEW SKILLS
Interview etiquette – dress code – body language – mock interview —attending job interviews – answering questions confidently – technical interview – telephone/Skype interview - practice in
different types of questions – one to one interview & panel interview – FAQs related to job interview- Emotional and cultural intelligence.

TOTAL: 45 PERIODS

LEARNING OUTCOMES
- Students will be able to make presentations and participate in group discussions with high level of self-confidence.
- Students will be able to perform well in the interviews
- They will have adequate reading and writing skills needed for workplace situations

REFERENCES:

EXTENSIVE READING

WEB RESOURCES
1. www.humanresources.about.com
2. www.careerride.com

GI7711 INDUSTRIAL TRAINING L T P C
(4 WEEKS DURING VI SEMESTER - SUMMER) 0 0 0 2

OBJECTIVES:
- To train the Geoinformatics Students for the Industry so as the Students shall gain confidence in handling Practical Problems in Geoinformatics Engineering Task.
- The Student can gain skills in the related training institute both by observation and involving Practical work experience.

STRATEGY:
a) The Student individually contact the organizations involved in Geoinformatics Activities with the help of the Coordinator and fix the training period and Type of Training.
b) The Students shall be evaluated on the basis of 1) Dairy 2) Training Report 3) Viva-Voce Examination. The evaluation committee consists of (1) Coordinator (2) Staff Member (3) Expert Member
c) The Student maintain the day wise work diary while undergoing the training and get it endorsed by the supervising officer : it shall be submitted as part of evaluation

THE REPORT:
a) The Student prepares the document for the individual training following the principles of documentation standards with necessary flowcharts, diagrams, photographs and other
details as the case may be. The document will be part of evaluation

b) The Student shall enclose a certificate duly signed from the Supervising Officer of the Place of Training and Coordinating Faculty

c) The Viva-Voce Examination shall be part of evaluation

GI7712
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.

TOTAL: 30 PERIODS

STRATEGY:
The students will work for two 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.

GI7811
PROJECT WORK
LT P C
0 0 2 0 1 0

OBJECTIVES:
- The focus on project work is to enable the students to work individually or as a group of not more than four members on a project involving comprehension of their skills either on experimental or application studies related to Geoinformatics implementation. If more than one student is involved, the project shall be divided into part I, Part II etc, and each student has to concentrate in one of the parts. The group project may be on (i) one problem and segments of results or (ii) one problem solution (methodology) and different applications. 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. The student shall maintain a weekly progress chart and attach the same in the report along with the signature of the guide. Each student shall finally produce a comprehensive report covering background information, literature survey, problem statement, methodology, project work details, results and conclusions. This final report shall be typewritten form as specified in the guidelines. The report shall follow the guidelines for format, structure, text size, number of pages and other style manual standards prescribe by the University. The continuous assessment and semester evaluation may be carried out as specified in the guidelines to be issued from time to time.

TOTAL: 300 PERIODS
OBJECTIVES:

- To provide students an exposure to disasters, their significance and types.
- To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction.
- To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR).
- To enhance awareness of institutional processes in the country and
disaster response in areas where they live, with due sensitivity.

UNIT I  INTRODUCTION TO DISASTERS  9
Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don'ts during various types of Disasters.

UNIT II  APPROACHES TO DISASTER RISK REDUCTION (DRR)  9
Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stakeholders- Institutional Processes and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies.

UNIT III  INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT  9
Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources.

UNIT IV  DISASTER RISK MANAGEMENT IN INDIA  9
Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

UNIT V  DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS  9
Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

TOTAL: 45 PERIODS

OUTCOMES:
The students will be able to

- Differentiate the types of disasters, causes and their impact on environment and society.
- Assess vulnerability and various methods of risk reduction measures as well as mitigation.
- Draw the hazard and vulnerability profile of India, Scenarios in the Indian context, Disaster damage assessment and management.
TEXTBOOKS:

REFERENCES:
1. Govt. of India: Disaster Management Act, Government of India, New Delhi, 2005

GE7074 HUMAN RIGHTS L T P C
3 0 0 3

OBJECTIVES:
- To sensitize the Engineering students to various aspects of Human Rights.

UNIT I

UNIT II

UNIT III
Theories and perspectives of UN Laws – UN Agencies to monitor and compliance.

UNIT IV
Human Rights in India – Constitutional Provisions / Guarantees.

UNIT V

OUTCOME:
- Engineering students will acquire the basic knowledge of human rights.

REFERENCES:
OBJECTIVES

• To emphasise into awareness on Engineering Ethics and Human Values.
• To understand social responsibility of an engineer.
• To appreciate ethical dilemma while discharging duties in professional life.

UNIT I  HUMAN VALUES  

UNIT II  ENGINEERING ETHICS  

UNIT III  ENGINEERING AS SOCIAL EXPERIMENTATION  
Engineering as experimentation - engineers as responsible experimenters - codes of ethics – Importance of Industrial Standards - a balanced outlook on law – anticorruption- occupational crime -the challenger case study.

UNIT IV  ENGINEER’S RIGHTS AND RESPONSIBILITIES ON SAFETY  

UNIT V  GLOBAL ISSUES  
Multinational corporations - Environmental ethics - computer ethics - weapons development - engineers as managers-consulting engineers-engineers as expert witnesses and advisors -moral leadership-Sample code of conduct.

OUTCOMES

• Students will have the ability to perform with professionalism , understand their rights, legal ,ethical issues and their responsibilities as it pertains to engineering profession with engaging in life-long learning with knowledge of contemporary issues.

TEXTBOOKS


REFERENCES

OBJECTIVE:
- To impart skills in computational adjustment for Geomatics problems

UNIT I MEASUREMENT AND ERROR

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

UNIT III VARIANCE COVARIANCE PROPAGATION

UNIT IV PRE ANALYSIS OF SURVEY MEASUREMENTS
Pre analysis procedure- Horizontal angle and Distance measurement - elevation difference - Survey tolerances – Database creation using GIS: Modeling- Map layout.

UNIT V APPLICATION IN GEOMATIC ENGINEERING

OUTCOMES:
At the end of the course the student will be able to understand
- The concepts of error, error distribution and error adjustment procedures
- The procedure involved in error adjustment using least square adjustment, elementary Probability theory and variance covariance propagation
- To create GIS database by collecting quality datasets.

TEXTBOOKS:

REFERENCE:
OBJECTIVE:
- To provide exposure to Various Geospatial analysis tools available in GIS
- To introduce algorithms involved in analysis of geospatial data
- To expose variety of applications of geodata analysis for solving real world problems

UNIT I ANALYSIS OF SPATIAL DISTRIBUTIONS
Introduction spatial measurements and statistics - Geographic analysis with statistics
Understanding spatial data distributions - Measuring geographic distributions - Finding the center
Measuring the compactness of the distribution - Measuring orientation and direction - Testing statistical significance – Case Studies

UNIT II ANALYSIS OF SPATIAL PATTERNS
Identifying spatial patterns - Statistical parameters to characterize patterns - Measuring the pattern of feature locations - Measuring the spatial pattern of feature values - Defining spatial neighborhoods and weights - Identifying clusters - Parameters for identification of clusters - Analysis of features clusters - clusters of similar values – Case Studies

UNIT III UNDERSTANDING SPATIAL AND TEMPORAL RELATIONSHIPS

UNIT IV GIS MODELLING

UNIT V NETWORK MODELLING
Designing a Path Model – Modelling path in networks – Modelling overland path – Flow Modelling – Modelling accumulation over surface – Tracing Flow over Network – Designing Interaction Models – Allocation of Demand to facilities – Modelling Travel to facilities – Case Studies

TOTAL: 45 PERIODS

OUTCOMES:
- Students will gain thorough knowledge on the concepts of spatial data modeling
- Students will be able to model the real time flow networks and its implementation.

REFERENCES:
OBJECTIVE:
- To introduce the concepts of Space Borne, Air Borne, Terrestrial and Bathymetric LASER Scanners for Topographic and Bathymetric Mapping

UNIT I SPACE BORNE RADAR AND LIDAR ALTIMETER
Principle and Properties of LASER- Production of Laser – Components of LASER – LiDAR – Types of LiDAR :Range Finder, DIAL and Doppler LiDAR - Platforms: Terrestrial, Airborne and Space borne LiDAR – Space Borne LiDAR Missions – Space Borne Radar Altimeter for mapping Sea Surface Topography , Moon Topography - Merits of ALS in comparison to Levelling, echo sounding, GPS leveling, Photogrammetry and Interferometry

UNIT II AIRBORNE LASER SCANNERS

UNIT III DATA ACQUISITION AND PRE PROCESSING
Various Scanning Mechanism – Synchronization of GPS, IMU and ALS Data - Reflectivity of terrain objects – Laser Classification – Class I to Class IV Laser – Eye Safety - Flight Planning – Determination of various data acquisition parameters – Swath Width, Point Density, No. of Strips, Area Covered, Point Spacing - Data Processing – Determination of flight trajectory

UNIT IV POST PROCESSING AND APPLICATIONS

UNIT V TERRESTRIAL AND BATHYMETRIC LASER SCANNERS

TOTAL : 45 PERIODS

OUTCOMES: At the end of the course the student will be able to understand
- Concepts of ALTM and working principle
- Available types of ATLM sensors and components of ALTM system
- Process of data acquisition, data processing and possible applications
- The fundamentals of terrestrial and bathymetric scanners and their applications

TEXTBOOKS:
OBJECTIVES:
- To address the climate as dynamical systems is the main objective of the course.
- To focus both historical, archaeological and anthropogenic evidences of climatic change.
- Special emphasis is given for hazard assessment and climatic change models.

UNIT I  BASICS OF CLIMATIC CHANGE

UNIT II  ANTHROPOGENIC IMPACTS

UNIT III  CHANGE ASSESSMENT

UNIT IV  CLIMATE CHANGE HAZARDS

UNIT V  CLIMATE CHANGE MODELS
Climate change Models – RCM –GCM-Ozone depletion – greenhouse gas carbon-sequestration- IPCC and Indian scenario.

OUTCOMES:
At the end of the course the student will be able to understand
- The concepts of climate change and effects of anthropogenic impacts
- The methods for analysis of climate change and corresponding hazards
- The methods and models available for prediction of future scenarios.

TEXTBOOKS:
2. Jane Mc Adam, ‖ Climate change and Displacement Multi disciplinary Perspectives‖ 2010

REFERENCES:
2. Heidi cullen, The weather of the future; heat waves, extreme storms, and other scenes from a climate changed planet.
3. Stephen H Schneider, —Science as a contact sp
4. ort inside the battle to save earth's climate.
5. James Hoggan Climate cover up; the crusate to Deny global warming.
OBJECTIVES:
- To gain knowledge and practice the art, science and technology of digital cartography for
  designing, visualization and communication of Maps and other Cartographic products
  using computing and information technology.
- To gain skills in the use of cartographic and GIS software, algorithms and hardware.

UNIT I  INTRODUCTION
Cartographic Products and Map automation – logics in digital map design – infra-structures, tools
and functions in automated mapping – map layout, multiple maps, color and patterns in digital
mapping – human perception of static, multi-media and animated maps.

UNIT II  DATA CAPTURE AND REPRESENTATION
Spatial data capture in raster and vector formats – texture data capture / creation – non-
spatial data loggers and attributes – metadata design - data classes and graphics for
metadata – graphics and maps – storage, warehousing and mining for automated mapping –
graphic formats for visualization, communication and printing – 3D printing – compressions and
standards.

UNIT III  DIGITAL MAP DESIGN
Selection of point, line and pattern symbols – simple and multivariate maps – information
abstraction and maps – scientific and artistic design principles – designing dynamics – time
representation and animation – animated and multimedia maps – representing processes – 3D
graphical designs and maps.

UNIT IV  GEOVISUALIZATION
Flat maps and raised maps – terrain visualization – visualization of uncertainty – flow maps –
virtual maps – simulated maps – mobile information and mobile maps – web mapping –
widgets/dashboard

UNIT V  DIGITAL MAP MODELING
Map generalization – geo-statistics in generalization, and quantitative mapping – digital
classification – contiguity and hierarchy in mapping – map models

TOTAL : 45 PERIODS

OUTCOMES: At the end of the course the student will be able to understand
- The concept of digital mapping and automated mapping
- The principles involved in data collection and cartographic design of digital maps
- The concepts of geovisualisation and map modelling

TEXTBOOKS:
2. Word, Clifford H and C peter kerer (Edr) 1996 Cartigraphic Designs-theoretical and
   practical perspective, John wiley & sones, chichester.

REFERENCES:
1. Menno Jan Kraak & Ferjan Ormeling, Cartography Visualization of Geospatial Data, 2nd

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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
Sources and demands of water - Characteristics of water - Point and non-point sources of water pollution - Spectral responses of clear and contaminated water - chlorophyll - Remote Sensing of Water quality assessment - Classification of water quality for various purposes, Sampling procedure, quality analysis, Data base creation and quality modeling using GIS. Database Creation and designing water supply network, sewerage network using GIS. Runoff estimation-flood prediction modeling.

UNIT II SOIL CONSERVATION AND MANAGEMENT
Formation of Soils - classification - land forms - soil erosion-factors influencing soil erosion, soil contamination - distribution and accumulation of contaminants such as toxic metals, synthetic chemicals in soil - mining pollution - methods of conservation - afforestation - EMR responses with contaminated soil - modeling soil characteristics using satellite data-soil degradation assessment using Remote Sensing and GIS - Land reclamation.

UNIT III ECOLOGY AND ECOSYSTEM

UNIT IV AIR POLLUTION AND GLOBAL CLIMATOLOGY

UNIT V SENSORS AND DATA FOR ENVIRONMENTAL MONITORING

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course the student will be able to appreciate
- The possible applications of Remote Sensing and GIS in water quality, soil conservation and ecology
- The availability various remote sensing sensors for acquiring environmental datasets
- The use of satellite remote sensing in climatology and air pollution studies

TEXTBOOKS:
REFERENCE:

GI7007 GIS BASED DISASTER PREPAREDNESS AND MITIGATION L T P C 3 0 0 3

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

UNIT I INTRODUCTION TO DISASTERS
Disaster: Definition and Classification - 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
Slope stability of Ghat roads - Structural safety of Dams, Bridges, Hospitals, Industrial structures, - Disaster resistant structures - Low cost housing for disaster prone areas - Cyclone shelter projects and their implications - Reconstruction after disasters: Issues of practices.

UNIT IV SPACE SCIENCE INPUT IN DISASTER MANAGEMENT
Remote sensing in Hazard evaluation - Zonation - Risk assessment - Damage assessment - Land use planning and regulation for sustainable development – Communication satellite application - Network- Use of Internet - Warning system - Post disaster review - Case studies.

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 - Predisaster and post disaster planning for relief operations - Potential of GIS application in development planning - Disaster management plan - Case studies.

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course the student will be able to understand
- The concepts of disaster and disaster management
- Different techniques for analysis of disaster proneness and mitigation measures
- The use of spatial science in four folds of disaster management

TEXTBOOKS:
REFERENCES:

GI7008 PLANETARY REMOTE SENSING L T P C 3 0 0 3

OBJECTIVES:
- To provide an insight to the field of planetary science
- To enlighten the student on modern techniques available for remote sensing of planetary surfaces.

UNIT I UNIVERSE AND SOLAR SYSTEM 9
Origin of Universe - Big Bang and Steady state theories, Solar System - planets, satellites asteroids, meteorites and comets and internal differentiation of the planets.

UNIT II TERRESTRIAL PLANETS 9
Geology and geophysics of terrestrial planets: earth, mars, venus and mercury; physical properties, composition, mineralogy and petrology of the planets and the Moon.

UNIT III PLANETARY ATMOSPHERE 9
Exo- and Endogenic processes associated with origin and internal evolution of planets – planetary volcanism, craters, elemental composition; mineralogy and petrology; thermal, seismic and magnetic properties,

UNIT IV REMOTE SENSING FOR PLANETARY GEOLOGY 9
Approaches to Remote Sensing analysis of the planetary surfaces; applications derived from interaction of electromagnetic radiation (X-ray, gamma-ray, visible, near-IR, mid-IR, radar).

UNIT V PLANETARY EXPLORATION MISSIONS 9
Past, present and future missions - Analyses and Interpretation of data gathered through various missions: identification of morphological features.

TOTAL: 45 PERIODS

OUTCOMES:
At the end of course the students have
- Exposure to fundamentals of planetary surface and orbital mechanics.
- Understanding of principles and methods for planetary observations.
- Knowledge on Geology and Climate of various planets.
- Knowledge of remote sensing methods for mapping of planetary surfaces
TEXTBOOKS:
1. Lecture notes on the formation and early evolution of planetary systems by Philip J. Armitage - arXiv, 2010

REFERENCES:
1. Radar Remote sensing of Planetary surfaces Bruce A. Campbell, Cambridge University Press, Publisher Date: 19 May 2011

GE7072 FOUNDATION SKILLS IN INTEGRATED PRODUCT DEVELOPMENT 3 0 0 3

OBJECTIVES:
- To understand the global trends and development methodologies of various types of products and services
- To conceptualize, prototype and develop product management plan for a new product based on the type of the new product and development methodology integrating the hardware, software, controls, electronics and mechanical systems
- To understand requirement engineering and know how to collect, analyze and arrive at requirements for new product development and convert them into design specification
- To understand system modeling for system, sub-system and their interfaces and arrive at the optimum system specification and characteristics
- To develop documentation, test specifications and coordinate with various teams to validate and sustain up to the EoL (End of Life) support activities for engineering customer

UNIT I FUNDAMENTALS OF PRODUCT DEVELOPMENT 9

UNIT II REQUIREMENTS AND SYSTEM DESIGN 9

UNIT III DESIGN AND TESTING 9
UNIT IV  SUSTENANCE ENGINEERING AND END-OF-LIFE (EOL) SUPPORT  

UNIT V  BUSINESS DYNAMICS – ENGINEERING SERVICES INDUSTRY  
TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to:
- Define, formulate and analyze a problem
- Solve specific problems independently or as part of a team
- Gain knowledge of the Innovation & Product Development process in the Business Context
- Work independently as well as in teams
- Manage a project from start to finish

TEXTBOOKS:
1. Book specially prepared by NASSCOM as per the MoU.

REFERENCES: