## B. E. GEOINFORMATICS ENGINEERING

### I TO VIII SEMESTERS CURRICULUM & SYLLABUS

#### SEMESTER I

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* Industrial Training to be conducted for a period of 4 weeks during VI Semester Summer Vacation

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OBJECTIVES:
- To enable learners of Engineering and Technology develop their basic communication skills in English.
- To emphasize specially the development of speaking skills amongst learners of Engineering and Technology.
- To ensure that learners use the electronic media such as internet and supplement the learning materials used in the classroom.
- To inculcate the habit of reading and writing leading to effective and efficient communication.

UNIT I
9+3
Listening - Introducing learners to GIE - Types of listening - Listening to audio (verbal & sounds); Speaking - Speaking about one’s place, important festivals etc. – Introducing oneself, one’s family / friend; Reading - Skimming a reading passage – Scanning for specific information - Note-making; Writing - Free writing on any given topic (My favourite place / Hobbies / School life, etc.) - Sentence completion - Autobiographical writing (writing about one’s leisure time activities, hometown, etc.); Grammar - Prepositions - Reference words - Wh-questions - Tenses (Simple); Vocabulary - Word formation - Word expansion (root words / etymology); E-materials - Interactive exercises for Grammar & Vocabulary - Reading comprehension exercises - Listening to audio files and answering questions.

UNIT II
9+3
Listening - Listening and responding to video lectures / talks; Speaking - Describing a simple process (filling a form, etc.) - Asking and answering questions - Telephone skills – Telephone etiquette; Reading – Critical reading - Finding key information in a given text - Sifting facts from opinions; Writing - Biographical writing (place, people) - Process descriptions (general/specific) - Definitions - Recommendations – Instructions; Grammar - Use of imperatives - Subject-verb agreement; Vocabulary - Compound words - Word Association (connotation); E-materials - Interactive exercises for Grammar and Vocabulary - Reading exercises with sample telephone conversations / lectures – Picture-based activities.

UNIT III
9+3
Listening - Listening to specific task - focused audio tracks; Speaking - Role-play – Simulation - Group interaction - Speaking in formal situations (teachers, officials, foreigners); Reading - Reading and interpreting visual material; Writing - Jumbled sentences - Coherence and cohesion in writing - Channel conversion (flowchart into process) - Types of paragraph (cause and effect / compare and contrast / narrative / analytical) - Informal writing (letter/e-mail/blogs) - Paraphrasing; Grammar - Tenses (Past) - Use of sequence words - Adjectives; Vocabulary - Different forms and uses of words, Cause and effect words; E-materials - Interactive exercises for Grammar and Vocabulary - Excerpts from films related to the theme and follow up exercises - Pictures of flow charts and tables for interpretations.

UNIT IV
9+3
Listening - Watching videos / documentaries and responding to questions based on them; Speaking - Responding to questions - Different forms of interviews - Speaking at different types of interviews; Reading - Making inference from the reading passage - Predicting the content of a reading passage; Writing - Interpreting visual materials (line graphs, pie charts etc.) - Essay writing – Different types of essays; Grammar - Adverbs – Tenses – future time reference; Vocabulary - Single word substitutes - Use of abbreviations and acronyms; E-materials - Interactive exercises for Grammar and Vocabulary - Sample interviews - film scenes - dialogue writing.
UNIT V

Listening - Listening to different accents, Listening to Speeches/Presentations, Listening to broadcast and telecast from Radio and TV; Speaking - Giving impromptu talks, Making presentations on given topics; Reading - Email communication - Reading the attachment files having a poem/joke/proverb - Sending their responses through email; Writing - Creative writing, Poster making; Grammar - Direct and indirect speech; Vocabulary - Lexical items (fixed / semi fixed expressions); E-materials - Interactive exercises for Grammar and Vocabulary - Sending emails with attachment – Audio / video excerpts of different accents - Interpreting posters.

OUTCOMES:
Learners should be able to
- speak clearly, confidently, comprehensibly, and communicate with one or many listeners using appropriate communicative strategies.
- write cohesively and coherently and flawlessly avoiding grammatical errors, using a wide vocabulary range, organizing their ideas logically on a topic.
- read different genres of texts adopting various reading strategies.
- listen/view and comprehend different spoken discourses/excerpts in different accents.

TEXTBOOKS:

REFERENCES:

EXTENSIVE Reading (Not for Examination)

WEBSITES:

TEACHING METHODS:
- Lectures
- Activities conducted individually, in pairs and in groups like self introduction, peer introduction, group poster making, grammar and vocabulary games, etc.
- Discussions
- Role play activities
- Short presentations
- Listening and viewing activities with follow up activities like discussion, filling up worksheets, writing exercises (using language lab wherever necessary/possible) etc.
EVALUATION PATTERN:

Internal assessment: 20%
3 tests of which two are pen and paper tests and the other is a combination of different modes of assessment like

- Project
- Assignment
- Reviews
- Creative writing
- Poster making, etc.

All the four skills are to be tested with equal weightage given to each.

- Speaking assessment: Individual speaking activities, Pair work activities like role play, Interview, Group discussions
- Reading assessment: Reading passages with comprehension questions graded from simple to complex, from direct to inferential
- Writing assessment: Writing paragraphs, essays etc. Writing should include grammar and vocabulary.
- Listening/Viewing assessment: Lectures, dialogues, film clippings with questions on verbal as well as audio/visual content.

End Semester Examination: 80%

MA6151 MATHEMATICS – I

OBJECTIVES:

- To develop the use of matrix algebra techniques this is needed by engineers for practical applications.
- To make the student knowledgeable in the area of infinite series and their convergence so that he/she will be familiar with limitations of using infinite series approximations for solutions arising in mathematical modeling.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To introduce the concepts of improper integrals, Gamma, Beta and Error functions which are needed in engineering applications.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.

UNIT I MATRICES

9+3

UNIT II SEQUENCES AND SERIES

9+3

UNIT III APPLICATIONS OF DIFFERENTIAL CALCULUS

9+3
Curvature in Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature – Evolutes – Envelopes - Evolute as envelope of normals.
UNIT IV  DIFFERENTIAL CALCULUS OF SEVERAL VARIABLES  9+3

UNIT V   MULTIPLE INTEGRALS  9+3

TOTAL (L:45+T:15): 60 PERIODS

OUTCOMES:
• This course equips students to have basic knowledge and understanding in one fields of materials, integral and differential calculus.

TEXTBOOKS:

REFERENCES:

PH6151  ENGINEERING PHYSICS – I  L T P C 3 0 0 3

OBJECTIVES:
• To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

UNIT I  CRYSTAL PHYSICS  9
Lattice – Unit cell – Bravais lattice – Lattice planes – Miller indices – d spacing in cubic lattice – Calculation of number of atoms per unit cell – Atomic radius – Coordination number – Packing factor for SC, BCC, FCC and HCP structures – Diamond and graphite structures (qualitative treatment)- Crystal growth techniques –solution, melt (Bridgman and Czochralski) and vapour growth techniques (qualitative)

UNIT II  PROPERTIES OF MATTER AND THERMAL PHYSICS  9
Elasticity- Hooke’s law - Relationship between three modulii of elasticity (qualitative) – stress - strain diagram – Poisson’s ratio –Factors affecting elasticity –Bending moment – Depression of a cantilever –Young’s modulus by uniform bending- I-shaped girders
UNIT III QUANTUM PHYSICS


UNIT IV ACOUSTICS AND ULTRASONICS

Production of ultrasonics by magnetostriction and piezoelectric methods - acoustic grating -Non Destructive Testing – pulse echo system through transmission and reflection modes - A,B and C – scan displays, Medical applications - Sonogram

UNIT V PHOTONICS AND FIBRE OPTICS

Principle and propagation of light in optical fibres – Numerical aperture and Acceptance angle - Types of optical fibres (material, refractive index, mode) – attenuation, dispersion, bending - Fibre Optical Communication system (Block diagram) - Active and passive fibre sensors- Endoscope.

TOTAL: 45 PERIODS

OUTCOMES:

- The students will have knowledge on the basics of physics related to properties of matter, optics, acoustics etc., and they will apply these fundamental principles to solve practical problems related to materials used for engineering applications.

TEXTBOOKS:

1. Arumugam M. Engineering Physics. Anuradha publishers, 2010

REFERENCES:

1. Searls and Zemansky. University Physics, 2009
5. Rajagopal K. Engineering Physics. PHI, New Delhi, 2011

CY6151 ENGINEERING CHEMISTRY - I

OBJECTIVES:

- To make the students conversant with basics of polymer chemistry.
- To make the student acquire sound knowledge of second law of thermodynamics and second law based derivations of importance in engineering applications in all disciplines.
- To acquaint the student with concepts of important photophysical and photochemical processes and spectroscopy.
- To develop an understanding of the basic concepts of phase rule and its applications to single and two component systems and appreciate the purpose and significance of alloys.
- To acquaint the students with the basics of nano materials, their properties and applications.
UNIT I POLYMER CHEMISTRY
Introduction: Classification of polymers – Natural and synthetic; Thermoplastic and Thermosetting. Functionality – Degree of polymerization. Types and mechanism of polymerization: Addition (Free Radical, cationic and anionic); 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. Preparation, properties and uses of Nylon 6,6, and Epoxy resin.

UNIT II CHEMICAL THERMODYNAMICS
Terminology of thermodynamics - Second law: Entropy - entropy change for an ideal gas, reversible and irreversible processes; entropy of phase transitions; Clausius inequality. Free energy and work function: Helmholtz and Gibbs free energy functions (problems); Criteria of spontaneity; Gibbs-Helmholtz equation (problems); Clausius-Clapeyron equation; Maxwell relations – Van't Hoff isotherm and isochore (problems).

UNIT III PHOTOCHEMISTRY AND SPECTROSCOPY

UNIT IV PHASE RULE AND ALLOYS

UNIT V NANO CHEMISTRY
Basics - distinction between molecules, nanoparticles and bulk materials; size-dependent properties. nanoparticles: nano cluster, nano rod, nanotube(CNT) and nanowire. Synthesis: precipitation, thermolysis, hydrothermal, solvothermal, electrodeposition, chemical vapour deposition, laser ablation; Properties and applications.

TOTAL :45 PERIODS

OUTCOMES:
- The knowledge gained on polymer chemistry, thermodynamics, spectroscopy, phase rule and nano materials will provide a strong platform to understand the concepts on these subjects for further learning.

TEXTBOOKS:

REFERENCES:
OBJECTIVES:
The students should be made to:
- Learn the organization of a digital computer.
- Be exposed to the number systems.
- Learn to think logically and write pseudo code or draw flow charts for problems.
- Be exposed to the syntax of C.
- Be familiar with programming in C.
- Learn to use arrays, strings, functions, pointers, structures and unions in C.

UNIT I INTRODUCTION 8

UNIT II C PROGRAMMING BASICS 10

UNIT III ARRAYS AND STRINGS 9

UNIT IV FUNCTIONS AND Pointers 9

UNIT V STRUCTURES AND UNIONS 9
Introduction – need for structure data type – structure definition – Structure declaration – Structure within a structure - Union - Programs using structures and Unions – Storage classes, Pre- processor directives.

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course, the student should be able to:
- Design C Programs for problems.
- Write and execute C programs for simple applications

TEXTBOOKS:

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

CONCEPTS AND CONVENTIONS (Not for Examination) 1
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 HAND SKETCHING 5+9
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 5+9
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 traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III  PROJECTION OF SOLIDS 5+9
Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes by rotating object method and auxiliary plane method.

UNIT IV  PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 5+9
Sectioning of above 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 cylinders and cones. Development of lateral surfaces of solids with cut-outs and holes

UNIT V  ISOMETRIC AND PERSPECTIVE PROJECTIONS 6+9
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.

COMPUTER AIDED DRAFTING (Demonstration Only) 3
Introduction to drafting packages and demonstration of their use.

TOTAL : 75 PERIODS

OUTCOMES:
On completion of the course, the student will be able to
- perform free hand sketching of basic geometrical constructions and multiple views of objects.
- do orthographic projection of lines and plane surfaces.
- draw projections and solids and development of surfaces.
- prepare isometric and perspective sections of simple solids.
- demonstrate computer aided drafting.
TEXTBOOK:

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.

GE6161  COMPUTER PRACTICES LABORATORY

OBJECTIVES:
The student should be made to:
- Be familiar with the use of Office software.
- Be exposed to presentation and visualization tools.
- Be exposed to problem solving techniques and flow charts.
- Be familiar with programming in C.
- Learn to use Arrays, strings, functions, structures and unions.

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 – Includes Parameter Passing
9. Program using Recursive Function and conversion from given program to flow chart.
10. Program using structures and unions.

TOTAL : 45 PERIODS
OUTCOMES:
At the end of the course, the student should be able to:

- Apply good programming design methods for program development.
- Design and implement C programs for simple applications.
- Develop recursive programs.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:
Standalone desktops with C compiler 30 Nos.
(or)
Server with C compiler supporting 30 terminals or more.

GE6162 ENGINEERING PRACTICES LABORATORY

OBJECTIVES:
- 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 & MECHANICAL)

I CIVIL ENGINEERING PRACTICE

Buildings:
(a) Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

Plumbing Works:
(a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.
(b) Study of pipe connections requirements for pumps and turbines.
(c) Preparation of plumbing line sketches for water supply and sewage works.
(d) Hands-on-exercise:
   Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.
(e) Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Power Tools only:
(a) Study of the joints in roofs, doors, windows and furniture.
(b) Hands-on-exercise:
   Wood work, joints by sawing, planing and cutting.

II MECHANICAL ENGINEERING PRACTICE

Welding:
(a) Preparation of arc welding of butt joints, lap joints and tee joints.
(b) Gas welding practice

Basic Machining:
(a) Simple Turning and Taper turning
(b) Drilling Practice

Sheet Metal Work:
(a) Forming & Bending:
(b) Model making – Trays, funnels, etc.
(c) Different type of joints.
Machine assembly practice:
(a) Study of centrifugal pump
(b) Study of air conditioner

Demonstration on:
(a) Smithy operations, upsetting, swaging, setting down and bending. Example – Exercise – Production of hexagonal headed bolt.
(b) Foundry operations like mould preparation for gear and step cone pulley.
(c) Fitting – Exercises – Preparation of square fitting and vee – fitting models.

GROUP B (ELECTRICAL & ELECTRONICS)

III ELECTRICAL ENGINEERING PRACTICE
1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2. Fluorescent lamp wiring.
3. Stair case wiring
5. Measurement of energy using single phase energy meter.

IV ELECTRONICS ENGINEERING PRACTICE
1. Study of Electronic components and equipments – Resistor, colour coding measurement of AC signal parameter (peak-peak, rms period, frequency) using CR.
2. Study of logic gates AND, OR, EOR and NOT.
5. Measurement of ripple factor of HWR and FWR.

TOTAL: 45 PERIODS

OUTCOMES:
- ability to fabricate plumbing and carbending components
- ability to use welding equipments to join the structures
- ability to fabricate electrical and electronics circuits

REFERENCES:

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

CIVIL
1. Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings. 15 Sets.
2. Carpentry vice (fitted to work bench) 15 Nos.
4. Models of industrial trusses, door joints, furniture joints 5 each
5. Power Tools: (a) Rotary Hammer 2 Nos
   (b) Demolition Hammer 2 Nos
   (c) Circular Saw 2 Nos
   (d) Planer 2 Nos
   (e) Hand Drilling Machine 2 Nos
   (f) Jigsaw 2 Nos
MECHANICAL
1. Arc welding transformer with cables and holders 5 Nos.
2. Welding booth with exhaust facility 5 Nos.
3. Welding accessories like welding shield, chipping hammer, wire brush, etc. 5 Sets.
4. Oxygen and acetylene gas cylinders, blow pipe and other welding outfit. 2 Nos.
5. Centre lathe 2 Nos.
6. Hearth furnace, anvil and smithy tools 2 Sets.
7. Moulding table, foundry tools 2 Sets.
9. Study-purpose items: centrifugal pump, air-conditioner One each.

ELECTRICAL
1. Assorted electrical components for house wiring 15 Sets
2. Electrical measuring instruments 10 Sets
3. Study purpose items: Iron box, fan and regulator, emergency lamp 1 each
4. Megger (250V/500V) 1 No.
5. Power Tools: (a) Range Finder 2 Nos
   (b) Digital Live-wire detector 2 Nos

ELECTRONICS
1. Soldering guns 10 Nos.
2. Assorted electronic components for making circuits 50 Nos.
3. Small PCBs 10 Nos.
5. Study purpose items: Telephone, FM radio, low-voltage power supply

GE6163 PHYSICS AND CHEMISTRY LABORATORY – I

PHYSICS LABORATORY – I

OBJECTIVES:
- To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics and properties of matter.

LIST OF EXPERIMENTS
(Any FIVE Experiments)
1. (a) Determination of Wavelength, and particle size using Laser
   (b) Determination of acceptance angle in an optical fiber.
2. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer.
3. Determination of wavelength of mercury spectrum – spectrometer grating
5. Determination of Young’s modulus by Non uniform bending method
6. Determination of specific resistance of a given coil of wire – Carey Foster’s Bridge

OUTCOMES:
- The hands on exercises undergone by the students will help them to apply physics principles of optics and thermal physics to evaluate engineering properties of materials.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:
1. Diode laser, lycopodium powder, glass plate, optical fiber.
2. Ultrasonic interferometer
3. Spectrometer, mercury lamp, grating
4. Lee’s Disc experimental set up
5. Traveling microscope, meter scale, knife edge, weights
6. Carey foster's bridge setup

(vernier Caliper, Screw gauge, reading lens are required for most of the experiments)

CHEMISTRY LABORATORY- I

OBJECTIVES:
- To make the student to acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis.
- To acquaint the students with the determination of molecular weight of a polymer by vacometry.

LIST OF EXPERIMENTS
(Any FIVE Experiments)
1. Determination of DO content of water sample by Winkler’s method.
2. Determination of chloride content of water sample by argentometric method.
3. Determination of strength of given hydrochloric acid using pH meter.
4. Determination of strength of acids in a mixture using conductivity meter.
5. Estimation of iron content of the water sample using spectrophotometer.
   (1,10- phenanthroline / thiocyanate method).
7. Conductometric titration of strong acid vs strong base.

TOTAL: 30 PERIODS

OUTCOMES:
- The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters.

REFERENCES:

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:
1. Iodine flask  -  30 Nos
2. pH meter  -  5 Nos
3. Conductivity meter  -  5 Nos
4. Spectrophotometer  -  5 Nos
5. Ostwald Viscometer  -  10 Nos

Common Apparatus : Pipette, Burette, conical flask, porcelain tile, dropper (each 30 Nos.)

HS6251 TECHNICAL ENGLISH II

OBJECTIVES:
- To make learners acquire listening and speaking skills in both formal and informal contexts.
- To help them develop their reading skills by familiarizing them with different types of reading strategies.
• To equip them with writing skills needed for academic as well as workplace contexts.
• To make them acquire language skills at their own pace by using e-materials and language lab components.

UNIT I  
Listening - Listening to informal conversations and participating; Speaking - Opening a conversation (greetings, comments on topics like weather) - Turn taking - Closing a conversation (excuses, general wish, positive comment, thanks); Reading - Developing analytical skills, Deductive and inductive reasoning - Extensive reading; Writing - Effective use of SMS for sending short notes and messages - Using ‘emoticons’ as symbols in email messages; Grammar - Regular and irregular verbs - Active and passive voice; Vocabulary - Homonyms (e.g. ‘can’) - Homophones (e.g. ‘some’, ‘sum’); E-materials - Interactive exercise on Grammar and vocabulary – blogging; Language Lab - Listening to different types of conversation and answering questions.

UNIT II  
Listening - Listening to situation based dialogues; Speaking - Conversation practice in real life situations, asking for directions (using polite expressions), giving directions (using imperative sentences), Purchasing goods from a shop, Discussing various aspects of a film (they have already seen) or a book (they have already read); Reading - Reading a short story or an article from newspaper, Critical reading, Comprehension skills; Writing - Writing a review / summary of a story / article, Personal letter (Inviting your friend to a function, congratulating someone for his / her success, thanking one’s friends / relatives); Grammar - modal verbs, Purpose expressions; Vocabulary - Phrasal verbs and their meanings, Using phrasal verbs in sentences; E-materials - Interactive exercises on Grammar and vocabulary, Extensive reading activity (reading stories / novels), Posting reviews in blogs - Language Lab - Dialogues (Fill up exercises), Recording students' dialogues.

UNIT III  
Listening - Listening to the conversation - Understanding the structure of conversations; Speaking - Conversation skills with a sense of stress, intonation, pronunciation and meaning - Seeking information – expressing feelings (affection, anger, regret, etc.); Reading - Speed reading – reading passages with time limit - Skimming; Writing - Minutes of meeting – format and practice in the preparation of minutes - Writing summary after reading articles from journals - Format for journal articles – elements of technical articles (abstract, introduction, methodology, results, discussion, conclusion, appendices, references) - Writing strategies; Grammar - Conditional clauses - Cause and effect expressions; Vocabulary - Words used as nouns and verbs without any change in the spelling (e.g. ‘rock’, ‘train’, ‘ring’); E-materials - Interactive exercise on Grammar and vocabulary - Speed Reading practice exercises; Language Lab - Intonation practice using EFLU and RIE materials – Attending a meeting and writing minutes.

UNIT IV  
Listening - Listening to a telephone conversation, Viewing model interviews (face-to-face, telephonic and video conferencing); Speaking - Role play practice in telephone skills - listening and responding, -asking questions, -note taking – passing on messages, Role play and mock interview for grasping interview skills; Reading - Reading the job advertisements and the profile of the company concerned – scanning; Writing - Applying for a job – cover letter - résumé preparation – vision, mission and goals of the candidate; Grammar - Numerical expressions - Connectives (discourse markers); Vocabulary - Idioms and their meanings – using idioms in sentences; E-materials - Interactive exercises on Grammar and Vocabulary - Different forms of résumés- Filling up a résumé / cover letter; Language Lab - Telephonic interview – recording the responses - e-résumé writing.

UNIT V  
Listening - Viewing a model group discussion and reviewing the performance of each participant - Identifying the characteristics of a good listener; Speaking - Group discussion skills – initiating the discussion – exchanging suggestions and proposals – expressing dissent/agreement – assertiveness in expressing opinions – mind mapping technique; Reading - Note making skills –
making notes from books, or any form of written materials - Intensive reading; Writing – Checklist
- Types of reports – Feasibility / Project report – report format – recommendations / suggestions –
interpretation of data (using charts for effective presentation); Grammar - Use of clauses;
Vocabulary – Collocation; E-materials - Interactive grammar and vocabulary exercises - Sample
GD - Pictures for discussion, Interactive grammar and vocabulary exercises; Language Lab -
Different models of group discussion.

TOTAL (L:45+T:15): 60 PERIODS

OUTCOMES:
Learners should be able to
- speak convincingly, express their opinions clearly, initiate a discussion, negotiate, argue
using appropriate communicative strategies.
- write effectively and persuasively and produce different types of writing such as narration,
description, exposition and argument as well as creative, critical, analytical and evaluative
writing.
- read different genres of texts, infer implied meanings and critically analyse and evaluate
them for ideas as well as for method of presentation.
- listen/view and comprehend different spoken excerpts critically and infer unspoken and
implied meanings.

TEXTBOOKS:
1. Department of English, Anna University. Mindscapes: English for Technologists and
Engineers. Orient Blackswan, Chennai. 2012
2. Dhanavel, S.P. English and Communication Skills for Students of Science and
Engineering. Orient Blackswan, Chennai. 2011

REFERENCES:
New Delhi. 2008
2011
PHI Learning, New Delhi. 2009
5. Smith-Worthington, Darlene & Sue Jefferson. Technical Writing for Success. Cengage,
Mason USA. 2007

EXTENSIVE Reading (Not for Examination)

Websites
2. http://owl.english.purdue.edu

TEACHING METHODS:
- Lectures
- Activities conducted individually, in pairs and in groups like individual writing and
presentations, group discussions, interviews, reporting, etc
- Long presentations using visual aids
- Listening and viewing activities with follow up activities like discussions, filling up
worksheets, writing exercises (using language lab wherever necessary/possible) etc
- Projects like group reports, mock interviews etc using a combination of two or more of the
language skills

EVALUATION PATTERN:
Internal assessment: 20%
3 tests of which two are pen and paper tests and the other is a combination of different
modes of assessment like
- Project
All the four skills are to be tested with equal weightage given to each.

- Speaking assessment: Individual presentations, Group discussions
- Reading assessment: Reading passages with comprehension questions graded following Bloom’s taxonomy
- Writing assessment: Writing essays, CVs, reports etc. Writing should include grammar and vocabulary.
- Listening/Viewing assessment: Lectures, dialogues, film clippings with questions on verbal as well as audio/visual content graded following Bloom’s taxonomy.

End Semester Examination: 80%

MA6251 MATHEMATICS – II

L T P C
3 1 0 4

OBJECTIVES:

- To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.
- 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 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 VECTOR CALCULUS

9+3
Gradient, divergence and curl – Directional derivative – Irrotational and solenoidal vector fields – Vector integration – Green’s theorem in a plane, Gauss divergence theorem and Stokes’ theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelopipeds.

UNIT II ORDINARY DIFFERENTIAL EQUATIONS

9+3
Higher order linear differential equations with constant coefficients – Method of variation of parameters – Cauchy’s and Legendre’s linear equations – Simultaneous first order linear equations with constant coefficients.

UNIT III LAPLACE TRANSFORM

9+3

UNIT IV ANALYTIC FUNCTIONS

9+3
Functions of a complex variable – Analytic functions: Necessary conditions – Cauchy-Riemann equations and sufficient conditions (excluding proofs) – Harmonic and orthogonal properties of analytic function – Harmonic conjugate – Construction of analytic functions – Conformal mapping: w = z+k, kz, 1/z, z², e² and bilinear transformation.
UNIT V COMPLEX INTEGRATION 9+3
Complex integration – Statement and applications of Cauchy’s integral theorem and Cauchy’s integral formula – Taylor’s and Laurent’s series expansions – Singular points – Residues – Cauchy’s residue theorem – Evaluation of real definite integrals as contour integrals around unit circle and semi-circle (excluding poles on the real axis).

TOTAL (L:45+T:15): 60 PERIODS

OUTCOMES:
- The subject helps the students to develop the fundamentals and basic concepts in vector calculus, ODE, Laplace transform and complex functions. Students will be able to solve problems related to engineering applications by using these techniques.

TEXTBOOKS:

REFERENCES:

PH6251 ENGINEERING PHYSICS – II L T P C
3 0 0 3

OBJECTIVES:
- To enrich the understanding of various types of materials and their applications in engineering and technology.

UNIT I CONDUCTING MATERIALS 9

UNIT II SEMICONDUCTING MATERIALS 9

UNIT III MAGNETIC AND SUPERCONDUCTING MATERIALS 9
Superconductivity : properties – Type I and Type II superconductors – BCS theory of superconductivity(Qualitative) - High Tc superconductors – Applications of superconductors – SQUID, cryotron, magnetic levitation.
UNIT IV  DIELECTRIC MATERIALS  

UNIT V  ADVANCED ENGINEERING MATERIALS  

TOTAL: 45 PERIODS

OUTCOMES:
- The students will have the knowledge on physics of materials and that knowledge will be used by them in different engineering and technology applications.

TEXTBOOKS:

REFERENCES:

CY6251  ENGINEERING CHEMISTRY – II  
OBJECTIVES:
- To make the students conversant with boiler feed water requirements, related problems and water treatment techniques.
- Principles of electrochemical reactions, redox reactions in corrosion of materials and methods for corrosion prevention and protection of materials.
- Principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells.
- Preparation, properties and applications of engineering materials.
- Types of fuels, calorific value calculations, manufacture of solid, liquid and gaseous fuels.

UNIT I  WATER TECHNOLOGY  
Introduction to boiler feed water-requirements-formation of deposits in steam boilers and heat exchangers- disadvantages (wastage of fuels, decrease in efficiency, boiler explosion) prevention of scale formation -softening of hard water -external treatment zeolite and demineralization - internal treatment- boiler compounds (phosphate, calgon, carbonate, colloidal) - caustic embrittlement-boiler corrosion-priming and foaming- desalination of brackish water –reverse osmosis.

UNIT II  ELECTROCHEMISTRY AND CORROSION  
UNIT III          ENERGY SOURCES  
Introduction- nuclear energy- nuclear fission- controlled nuclear fission- nuclear fusion- differences between nuclear fission and fusion- nuclear chain reactions- nuclear reactor power generator- classification of nuclear reactor- light water reactor- breeder reactor- solar energy conversion- solar cells- wind energy. Batteries and fuel cells: Types of batteries- alkaline battery- lead storage battery- nickel-cadmium battery- lithium battery- fuel cell H₂-O₂ fuel cell- applications.

UNIT IV          ENGINEERING MATERIALS  
Abrasives: definition, classification or types, grinding wheel, abrasive paper and cloth. Refractories: definition, characteristics, classification, properties – refactoriness and RUL, dimensional stability, thermal spalling, thermal expansion, porosity; Manufacture of alumina, magnesite and silicon carbide, Portland cement- manufacture and properties - setting and hardening of cement, special cement- waterproof and white cement—properties and uses. Glass - manufacture, types, properties and uses.

UNIT V           FUELS AND COMBUSTION  

TOTAL: 45 PERIODS

OUTCOMES:
- The knowledge gained on engineering materials, fuels, energy sources and water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.

TEXTBOOKS:

REFERENCES:

GE6252                 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING                  L T P C  
4 0 0 4

OBJECTIVES:
- To explain the basic theorems used in Electrical circuits and the different components and function of electrical machines.
- To explain the fundamentals of semiconductor and applications.
- To explain the principles of digital electronics
- To impart knowledge of communication.
UNIT I ELECTRICAL CIRCUITS & MEASUREMENTS 12
Operating Principles of Moving Coil and Moving Iron Instruments (Ammeters and Voltmeters), Dynamometer type Watt meters and Energy meters.

UNIT II ELECTRICAL MECHANICS 12

UNIT III SEMICONDUCTOR DEVICES AND APPLICATIONS 12

UNIT IV DIGITAL ELECTRONICS 12
Binary Number System – Logic Gates – Boolean Algebra – Half and Full Adders – Flip-Flops – Registers and Counters – A/D and D/A Conversion (single concepts)

UNIT V FUNDAMENTALS OF COMMUNICATION ENGINEERING 12
Communication Systems: Radio, TV, Fax, Microwave, Satellite and Optical Fibre (Block Diagram Approach only).

TOTAL: 60 PERIODS

OUTCOMES:
- ability to identify the electrical components explain the characteristics of electrical machines.
- ability to identify electronics components and use of them to design circuits.

TEXTBOOKS:

REFERENCES:

GE6253 ENGINEERING MECHANICS

L T P C
3 1 0 4

OBJECTIVES:
- To develop capacity to predict the effect of force and motion in the course of carrying out the design functions of engineering

UNIT I BASIC AND STATICS OF PARTICLES 12

UNIT II  EQUILIBRIUM OF RIGID BODIES  12
Free body diagram – Types of supports – Action and reaction forces – stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis – Vectorial representation of moments and couples – Scalar components of a moment – Varignon’s theorem – Single equivalent force -Equilibrium of Rigid bodies in two dimensions – Equilibrium of Rigid bodies in three dimensions

UNIT III  PROPERTIES OF SURFACES AND SOLIDS  12

UNIT IV  DYNAMICS OF PARTICLES  12

UNIT V  FRICTION AND ELEMENTS OF RIGID BODY DYNAMICS  12
Friction force – Laws of sliding friction – equilibrium analysis of simple systems with sliding friction –wedge friction-. Rolling resistance -Translation and Rotation of Rigid Bodies – Velocity and acceleration – General Plane motion of simple rigid bodies such as cylinder, disc/wheel and sphere.

OUTCOMES:
• ability to explain the differential principles applies to solve engineering problems dealing with force, displacement, velocity and acceleration.
• ability to analyse the forces in any structures.
• ability to solve dynamics related problems

TEXTBOOKS:

REFERENCES:
OBJECTIVES:
- To develop skill to use software to create 2D and 3D models.

LIST OF EXERCISES USING SOFTWARE CAPABLE OF DRAFTING AND MODELING
1. Study of capabilities of software for Drafting and Modeling – Coordinate systems (absolute, relative, polar, etc.) – Creation of simple figures like polygon and general multi-line figures.
2. Drawing of a Title Block with necessary text and projection symbol.
3. Drawing of curves like parabola, spiral, involute using Bspline or cubic spline.
4. Drawing of front view and top view of simple solids like prism, pyramid, cylinder, cone, etc., and dimensioning.
5. Drawing front view, top view and side view of objects from the given pictorial views (eg. V-block, Base of a mixie, Simple stool, Objects with hole and curves).
6. Drawing of a plan of residential building (Two bed rooms, kitchen, hall, etc.)
7. Drawing of a simple steel truss.
8. Drawing sectional views of prism, pyramid, cylinder, cone, etc.
10. Creation of 3-D models of simple objects and obtaining 2-D multi-view drawings from 3-D model.

Note: Plotting of drawings must be made for each exercise and attached to the records written by students.

TOTAL: 45 PERIODS

OUTCOMES:
- ability to use the software packers for drafting and modeling
- ability to create 2D and 3D models of Engineering Components

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Description of Equipment</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Pentium IV computer or better hardware, with suitable graphics facility</td>
<td>30 No.</td>
</tr>
<tr>
<td>2.</td>
<td>Licensed software for Drafting and Modeling.</td>
<td>30 Licenses</td>
</tr>
<tr>
<td>3.</td>
<td>Laser Printer or Plotter to print / plot drawings</td>
<td>2 No.</td>
</tr>
</tbody>
</table>

GE6262 PHYSICS AND CHEMISTRY LABORATORY – II

OBJECTIVES:
- To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics and properties of matter.

LIST OF EXPERIMENTS
(Any FIVE Experiments)
1. Determination of Young’s modulus by uniform bending method
2. Determination of band gap of a semiconductor
3. Determination of Coefficient of viscosity of a liquid –Poiseuille’s method
4. Determination of Dispersive power of a prism - Spectrometer
5. Determination of thickness of a thin wire – Air wedge method
6. Determination of Rigidity modulus – Torsion pendulum

OUTCOMES:
- The students will have the ability to test materials by using their knowledge of applied physics principles in optics and properties of matter.
LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

1. Traveling microscope, meter scale, Knife edge, weights
2. Band gap experimental set up
3. Burette, Capillary tube, rubber tube, stop clock, beaker and weighing balance
4. Spectrometer, prism, sodium vapour lamp.
5. Air-wedge experimental set up.
6. Torsion pendulum set up.

(vernier Caliper, Screw gauge, reading lens are required for most of the experiments)

CHEMISTRY LABORATORY - II

OBJECTIVES:
- To make the student acquire practical skills in the wet chemical and instrumental methods for quantitative estimation of hardness, alkalinity, metal ion content, corrosion in metals and cement analysis.

LIST OF EXPERIMENTS
(Any FIVE Experiments)
1. Determination of alkalinity in water sample
2. Determination of total, temporary & permanent hardness of water by EDTA method
3. Estimation of copper content of the given solution by EDTA method
4. Estimation of iron content of the given solution using potentiometer
5. Estimation of sodium present in water using flame photometer
6. Corrosion experiment – weight loss method
7. Conductometric precipitation titration using BaCl_2 and Na_2SO_4

TOTAL: 30 PERIODS

OUTCOMES:
- The students will be conversant with hands-on knowledge in the quantitative chemical analysis of water quality related parameters, corrosion measurement and cement analysis.

REFERENCES:

• Laboratory classes on alternate weeks for Physics and Chemistry.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

1. Potentiometer - 5 Nos
2. Flame photo meter - 5 Nos
3. Weighing Balance - 5 Nos
4. Conductivity meter - 5 Nos

Common Apparatus : Pipette, Burette, conical flask, percelain tile, dropper (30 Nos each)
OBJECTIVES:

- To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems.
- To acquaint the student with Fourier transform techniques used in wide variety of situations.
- To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems.

UNIT I  PARTIAL DIFFERENTIAL EQUATIONS  9+3
Formation of partial differential equations – Singular integrals -- Solutions of standard types of first order partial differential equations - Lagrange’s linear equation -- Linear partial differential equations of second and higher order with constant coefficients of both homogeneous and non-homogeneous types.

UNIT II  FOURIER SERIES  9+3

UNIT III  APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS  9+3
Classification of PDE – Method of separation of variables - Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two dimensional equation of heat conduction (excluding insulated edges).

UNIT IV  FOURIER TRANSFORMS  9+3

UNIT V  Z- TRANSFORMS AND DIFFERENCE EQUATIONS  9+3

TOTAL (L:45+T:15): 60 PERIODS

OUTCOMES:

- The understanding of the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.

TEXTBOOKS:


REFERENCES:


GI6301 **CARTOGRAPHY**

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<thead>
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<tr>
<td>3</td>
<td>0</td>
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<td>3</td>
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**OBJECTIVES:**
- To introduce Cartography as science and technology of Map Making.
- The course also introduces its connection with Communication Science, Computer technology and IT.
- To outline the Cartography as a creative art.

**UNIT I** **MAP – A SPECIAL GRAPHIC COMMUNICATOR**


**UNIT II** **ABSTRACTION OF EARTH AND MAP PROJECTION**


**UNIT III** **MAP COMPILATION AND DESIGN**

Base map concepts – scanning and digitization – planimetric, topographic and thematic information – sample and census surveys – attribute data tables – Elements of a map - Map Layout principles – Map Design fundamentals – symbols and conventional signs - graded and ungraded symbols - color theory - colours and patterns in symbolization – map lettering

**UNIT IV** **MAP MAKING**


**UNIT V** **MAP TRANSFORMATIONS**


**TOTAL: 45 PERIODS**

**OUTCOMES:**
At the end of the course the student will be able to Understand
- the concepts of cartography like scale, projection, geoid and role IT in mapping science
- various coordinate systems and projections and their applications
- the map compilation, design and map production processes
- the concepts of map transformation and web based mapping

**TEXTBOOKS:**
OBJECTIVES:
- To introduce the rudiments of surveying principles.
- To learn the various methods of surveying to solve the real world problems.

UNIT I  FUNDAMENTALS AND CHAIN SURVEYING  6+6
Definition- Classifications - Basic principles – Mistakes, errors and accuracy. Equipment and accessories for ranging and chaining – Methods of ranging - well conditioned triangles – Errors in linear measurement and their corrections - Obstacles - Traversing – Plotting - applications.

UNIT II  COMPASS SURVEYING AND PLANE TABLE SURVEYING  6+6

UNIT III  THEODOLITE SURVEYING  6+6
Theodolite - Types - Description - Horizontal and vertical angles - Temporary and permanent adjustments – Heights and distances– Tangential and Stadia Tacheometry – Subtense method - Stadia constants - Anallactic lens.

UNIT IV  ROUTE SURVEYING  6+6
Reconnaissance - Route surveys for highways, railways and waterways - Simple curves – Compound and reverse curves - Setting out Methods – Transition curves - Functions and requirements - Setting out by offsets and angles - Vertical curves - Sight distances.

UNIT V  HYDROGRAPHIC AND MINE SURVEYING  6+6

TOTAL (L:30+T:30): 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 applications of surveying in Route, Mine and Hydrography

TEXTBOOKS:

REFERENCES:

GI6303 PRINCIPLES OF REMOTE SENSING

OBJECTIVES:
- To understand the principles of radiation mechanism, and energy interactions with atmosphere and earth features.
- To gain knowledge about the gravitational fields and its variations on earth.
- To introduce imaging and non-imaging sensors in measuring and recording energy variations.

UNIT I ELECTROMAGNETIC RADIATION

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

UNIT III OPTICS FOR REMOTE SENSING

UNIT IV GRAVITATION AND SATELLITES
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.Dilraction - fresnel theory, Circular diffraction - gravity, Polarisation double diffraction - 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 NON-IMAGING AND IMAGING SENSORS

TOTAL: 45 PERIODS
OUTCOMES:
At the end of the course the student will be able to understand
- The characteristics of Electromagnetic Radiation and its propagation
- The mechanism involved in interaction of EMR with atmosphere and earth surface
- The concepts of optics and photographic processes used in remote sensing
- The influence of gravity on satellite motion and various types of satellites
- Different types of sensors and their characteristics used for Remote Sensing

TEXTBOOKS:

REFERENCES:
LIST OF EXPERIMENTS

1. Testing Stereovision with test card
2. Finding stereoscopic acuity
3. Determination of photo scale
4. Mirror Stereoscope - Base lining and Orientation of Aerial Photographs
5. Use of parallax bar to find the height of point
6. Determination slope using parallax point
7. Aerial photograph i) direct tracing of features for Urban planning and Highway planning ii) Radial line triangulation
8. Interior Orientation, Relative Orientation, Absolute Orientation and Mapping using Analog Stereo Plotter

(L:45+P:30)TOTAL: 75 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:

REFERENCE:

GI6305 GEOLOGY FOR GEOINFORMATICS L T P C 3 0 0 3

OBJECTIVES:
- To familiarize the students about the various geological and Geomorphological methods and the exploration techniques of various minerals, rocks, ores and natural hazards.

UNIT I INTRODUCTION
Geology for natural resources inventory – Branches of geology – Scope. Interior of the Earth, Stratigraphic sequence, weathering, Introduction to geological structures, Plate Tectonics – Earth quake and volcanic belts in India.

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

UNIT III PETROLOGY
Classification and description of rocks – Forms and mode of occurrence of rocks – Physical properties of important rocks and ore forming minerals –distribution of economic minerals in India.
UNIT IV  GEOPHYSICAL METHODS AND GEO-EXPLORATION


UNIT V  NATURAL HAZARDS


OUTCOMES:
At the end of the course the student will be able to understand
- The structure of earth and geological structures
- The concepts of various geomorphic units and rock types
- The use of geophysical and remote sensing methods for natural resources inventory
- Various natural hazards and application of remote sensing

TEXTBOOKS:

REFERENCES:

GI6311 CARTOGRAPHY LABORATORY

OBJECTIVES:
- Hands on experience of basics of map drawing.
- Designing the map.

LIST OF EXPERIMENTS
1. Appreciating the map: marginal and extra marginal information; map scale; map content
2. Scales and map errors / accuracy.
3. Derivations of latitudes and longitudes with reference to ellipsoid.
4. Derivation of UTM for small scale and large scale Indian maps.
5. Simple conical, cylindrical and planner projection for a reduced earth (2 to 4cm reduced earth) – aspect and secant demo.
6. Map layouts for square and elogated maps
7. Attribute data and class interval selection
8. Graded symbolization and isopleth / choropleth map
9. Selection of line or dot shades
10. Color, combinations and brightness scales
11. Select symbols for terrain, economic and demographic features
12. Located qualitative symbol map
13. Map digitizing and compilation
14. Large scale and small scale compilation
15. Affine transformation.

TOTAL: 60 PERIODS

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

- To design and produce thematic maps with suitable projection, symbols and color codes
- To compile and develop digital maps

REFERENCE:

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description of Equipment</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Light table</td>
<td>1 for 4 students</td>
</tr>
<tr>
<td>2.</td>
<td>Computer</td>
<td>1 system for 2 students</td>
</tr>
<tr>
<td>3.</td>
<td>GIS related software</td>
<td>minimum 5 user license</td>
</tr>
</tbody>
</table>

GI6312 SURVEYING LABORATORY L T P C 0 0 4 2

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

LIST OF EXPERIMENTS

I CHAIN SURVEYING 8
- Ranging, chaining and pacing
- Chain traversing

II COMPASS SURVEYING 8
- Triangulation problem
- Compass traversing

III PLANE TABLE SURVEYING 20
- Radiation and Intersection: Resection - Three point problem
- Mechanical and Graphical solution
- Trial and error method
- Resection - Two Point problem
- Plane table traversing

IV THEODOLITE SURVEYING 16
- Measurement of horizontal angles and vertical angles
- Heights and Distances by
- Triangulation problem
- Single plane method
- Stadia and Tangential method

V SETTING OUT WORKS 8
- Simple curve using chain and tape only
- Simple curve by Rankine’s method

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, theodolite for mapping
- Set the curves for highway or railway projects

REFERENCES:

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description of Equipment</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Chain and its accessories</td>
<td>1 set for 4 students</td>
</tr>
<tr>
<td>2.</td>
<td>Compass with tripod</td>
<td>1 set for 4 students</td>
</tr>
<tr>
<td>3.</td>
<td>Plane table and its accessories</td>
<td>1 set for 4 students</td>
</tr>
<tr>
<td>4.</td>
<td>Dumpy level and its accessories</td>
<td>1 set for 4 students</td>
</tr>
<tr>
<td>5.</td>
<td>Theodolite and its accessories</td>
<td>1 set for 4 students</td>
</tr>
</tbody>
</table>

MA6459 NUMERICAL METHODS LT P C 3 1 0 4

OBJECTIVES:
- This course aims at providing the necessary basic concepts of a few numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology

UNIT I SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 10+3

UNIT II INTERPOLATION AND APPROXIMATION 8+3
Interpolation with unequal intervals - Lagrange's interpolation – Newton's divided difference interpolation – Cubic Splines - Interpolation with equal intervals - Newton's forward and backward difference formulae.

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION 9+3

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 9+3
UNIT V  BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS  
9+3  
Finite difference methods for solving two-point linear boundary value problems - Finite difference 
techniques for the solution of two dimensional Laplace’s and Poisson’s equations on rectangular 
domain – One dimensional heat flow equation by explicit and implicit (Crank Nicholson) methods – 
One dimensional wave equation by explicit method.  
TOTAL (L:45+T:15): 60 PERIODS  
OUTCOMES:  
• The students will have a clear perception of the power of numerical techniques, ideas and 
would be able to demonstrate the applications of these techniques to problems drawn from 
industry, management and other engineering fields.  
TEXTBOOKS:  
REFERENCES:  
Delhi, 2007.  
GI6401  GEODETIC SURVEYING  
L T P C  
2 2 0 4  
OBJECTIVES:  
• This subject deals with geodetic measurements and Control Survey methodology.  
• To introduce the basics of Astronomical Surveying and  
• Practical Astronomy and its applications.  
UNIT I  LEVELLING  
6+6  
Level line - Horizontal line - Datum - Bench marks -Levels and staves - temporary and permanent 
adjustments – Methods of levelling - Fly levelling - Check levelling - Procedure in levelling - 
Booking -Reduction - Curvature and refraction - Reciprocal levelling - Precise levelling - Types of 
instruments - Adjustments - Field procedure- sources of errors.  
UNIT II  CONTOURING, AREA AND VOLUME COMPUTATION  
6+6  
Longitudinal and Cross-section-Plotting - Contouring - Methods - Characteristics and uses of 
contours – Plotting – Methods of interpolating contours The Planimeter - Areas enclosed by 
straight lines - Irregular figures - Volumes - Earthwork calculations - Capacity of reservoirs - Mass 
haul diagrams.  
UNIT III  CONTROL SURVEYING  
6+6  
Horizontal and vertical control- Methods- specifications - Triangulation- Base line - Instruments and 
accessories – Corrections - Satellite station - Reduction to centre – Trigonometric levelling- Single 
and reciprocal observations - Traversing - Gale’s table.  
UNIT IV  ASTRONOMICAL SURVEYING  
6+6  
Celestial sphere - Astronomical terms and definitions - Motion of sun - horizon, hour angle, right 
ascension and ecliptic Celestial coordinate systems – Sidereal, universal, zone and atomic 
time systems - Nautical Almanac.
UNIT V  PRACTICAL ASTRONOMY  
Apparent altitude and corrections - Field observations and determination of time, longitude, Latitude and azimuth by altitude and hour angle method  
TOTAL (L:30+T:30): 60 PERIODS

OUTCOMES:
At the end of the course the student will be able to understand
- Concept of leveling and various methods used determination of level
- The procedures involved in computation of area, volume and interpolation of contour
- The methods used for establishment of horizontal and vertical control networks
- Concepts of astronomical surveying and methods to determine time, longitude, latitude and azimuth

TEXTBOOKS:

REFERENCES:

GI6402  OBJECT ORIENTED PROGRAMMING FOR GEOINFORMATICS ENGINEERS  
OBJECTIVES :  
- To facilitate the student to develop Object Oriented Programming  
- To Familiarize GIS customisation programming using Java and AJAX.

UNIT I  CONCEPTS OF OBJECT ORIENTED PROGRAMMING  

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

UNIT III  CLASSES AND OBJECTS  
Classes and Objects - Member Functions - Nesting of Member Functions Constructors - 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:

Web Resources
2. www.cplusplus.com/doc/tutorial/

GI6403 ADVANCED PHOTOGRAMMETRY L T P C
3 0 0 3

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

UNIT I AERIAL TRIANGULATION PRINCIPLES AND ADJUSTMENTS 9
Basic concepts of strips and blocks photographic aerial triangulation - Analog triangulation-Independent Model Triangulation - Strip formation, graphical strip adjustment-polynomial strip adjustment - Analytical aerial triangulation, adjustment of blocks of aerial photographs- Three-dimensional coordinate transformation.

UNIT II NON TOPOGRAPHIC PHOTOGRAMMETRY 9
Applications - terrestrial cameras - stereometric cameras - horizontal and vertical angles from terrestrial photographs - Camera azimuth - analytical determination of horizontal position of a point from Photographic measurement - graphical method– use of plotting equipments - control consideration for terrestrial Photogrammetry - X-ray Photogrammetry.

UNIT III DIGITAL CAMERAS, SCANNERS & WORKSTATIONS 9

UNIT IV DIGITAL IMAGE HANDLING 9
UNIT V  PHOTOGRAMMETRIC PRODUCTS AND APPLICATIONS 9

OUTCOMES:
At the end of the course the student will be able to understand
- The concepts and procedure involved in aerial triangulation
- The methods and applications of terrestrial photogrammetry
- The components and characteristics of digital cameras, scanners
- The techniques used for handling digital data and generation of DEM, DTM, orthophoto

TEXTBOOKS:
1. Alex Alvarez, Reg Downing, “Image Based Modeling : Advanced 3D Modelling from Panoramas, 2005

REFERENCES:

GI6404 OPTICAL AND THERMAL REMOTE SENSING L T P C
3 0 0 3

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  REMOTE SENSING AND ELECTROMAGNETIC RADIATION (EMR) 9

UNIT II  PLATFORMS AND SENSORS AND DATA PRODUCTS 9

UNIT III  THERMAL REMOTE SENSING 9
UNIT IV HYPERSPECTRAL REMOTE SENSING
Diffraction principles - field spectrum – BDRF and spectral reflectance & imaging spectrometry - sensors - virtual dimensionality – Data reduction, Calibration and normalization – Huge's phenomenon - Data Characteristics Binary encoding- thresholding - library matching.

UNIT V LIDAR

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:

GE6351 ENVIRONMENTAL SCIENCE AND ENGINEERING

OBJECTIVES:
To the study of nature and the 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
Definition, scope and importance of Risk and hazards; Chemical hazards, Physical hazards, Biological hazards in the environment – concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers-Oxygen cycle and Nitrogen cycle – energy flow in the ecosystem – ecological succession processes – 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-
Field study of common plants, insects, birds
Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II ENVIRONMENTAL POLLUTION
Definition – causes, effects and control measures of: (a) Air pollution (Atmospheric chemistry- Chemical composition of the atmosphere; Chemical and photochemical reactions in the atmosphere - formation of smog, PAN, acid rain, oxygen and ozone chemistry; - Mitigation procedures- Control of particulate and gaseous emission, Control of SO₂, NOₓ, CO and HC) (b) Water pollution : Physical and chemical properties of terrestrial and marine water and their environmental significance; Water quality parameters – physical, chemical and biological; absorption of heavy metals - Water treatment processes. (c) Soil pollution - soil waste management: causes, effects and control measures of municipal solid wastes – (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards–role of an individual in prevention of pollution – pollution case studies – Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III NATURAL RESOURCES
Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and overutilization of surface and ground 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. Energy Conversion processes – Biogas – production and uses, anaerobic digestion; 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. Introduction to Environmental Biochemistry: Proteins – Biochemical degradation of pollutants, Bioconversion of pollutants.
Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT

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:

GI6411 OBJECT ORIENTED PROGRAMMING LABORATORY L T P C 0 0 4 2

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 scripting language

LIST OF EXPERIMENTS:
- Arithmetic operations
- Control structures
- Graphic Libraries
- Matrix manipulation and functions
- Operator Overloading – binary and unary operators as friend and member functions
- Unary operator - Prefix and Postfix form
- Nesting of member functions
- Constructors, Destructors
- Constructor Overloading
- Inheritance and its forms
- Visibility mode – public, private and protected
- Runtime Polymorphism – Virtual functions
- File opening and file closing
- GIS customization using Scripting language
- GIS customization using Scripting language

TOTAL: 60 PERIODS

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:

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description of Equipment</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Computer</td>
<td>1 for 2 students</td>
</tr>
<tr>
<td>2.</td>
<td>License software required to teach C++ and GIS</td>
<td>minimum 5 licenses each</td>
</tr>
</tbody>
</table>

GI6412 ADVANCED PHOTOGRAMMETRY LABORATORY

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

LIST OF EXPERIMENTS:
1. Digital Photogrammetric Workstation - Data input and Creation of Project
2. Image import - Image Enhancement
3. Control point editing
5. Orientation Management - Camera Calibration - Editing the Scheme point file
6. Imagery import - Relative Orientation - Absolute Orientation
7. ATM Adjustment - Automatic Point Measurement
8. DEM, DTM generation - Correction and Analysis, Mosaic & Feature extraction, Automatic Terrain Extraction
9. Editing the DTM
10. DTM Terrain analysis
11. Mosaic - Generating Orthophoto - Mosaic sheet cutting
12. Planimetric Mapping

TOTAL: 60 PERIODS

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:

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description of Equipment</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Digital photogrammetric workstation</td>
<td>2 nos</td>
</tr>
<tr>
<td>2.</td>
<td>License software</td>
<td>minimum 2 user license</td>
</tr>
</tbody>
</table>
OBJECTIVES:
- The objective of this course is to train the students to acquire skills in making precise measurements and obtaining accurate results.

LIST OF EXPERIMENTS:

I. LEVELLING 32
- Taking spot levels
- Fly levelling using Dumpy level
- Fly levelling using Tilting level
- Check levelling
- Permanent adjustment of levels
- Contouring
- LS and CS
- Computation of volume of earth work from contours

II. FIELD ASTRONOMY 20
- Study of motion of the Sun
- Determination of azimuth using known latitude
- Determination of azimuth using hour angle
- Determination of watch error
- Determination of latitude

III. ESTABLISHMENT OF BASELINE 4

IV. THEODOLITE TRAVERSING 4
TOTAL: 60 PERIODS

OUTCOMES:
At the end of the course the student will be able to
- Observe level differences between stations using different types of leveling techniques
- Compute area, volume of earthwork from levels
- Determine azimuth, latitude and time from astronomical observations

REFERENCE:

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description of Equipment</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Dumpy Level with accessories</td>
<td>1 set for 4 students</td>
</tr>
<tr>
<td>2.</td>
<td>Theodolite with accessories</td>
<td>1 set for 4 students</td>
</tr>
<tr>
<td>3.</td>
<td>Tilting level with accessories</td>
<td>1 set for 4 students</td>
</tr>
</tbody>
</table>

GI6501  GEO DATABASE SYSTEM  L T P C  3 0 0 3

OBJECTIVES:
- 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 9

UNIT II SPATIAL CONCEPTS AND DATAMODELS 10
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 9
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 9

UNIT V SPATIAL DATABASE SYSTEMS AND APPLICATION DESIGN AND DEVELOPMENTS 8
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

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:

GI6502 GEODESY L T P C
2 2 0 4

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

UNIT I FUNDAMENTALS OF GEODESY 6
UNIT II GEOMETRIC GEODESY 6

UNIT III CO-ORDINATE SYSTEMS 6

UNIT IV PHYSICAL GEODESY 6

UNIT V GEODETIC ASTRONOMY 6
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.

OUTCOMES:
At the end of the course the student will be able to understand
- Various fundamentals of Geodesy
- Concepts of geoid, ellipsoid and their interrelationship
- Various types of coordinate systems and relationship between them
- The methods for measurement of gravity and gravity network
- The concepts of astronomical observations for determination geodetic parameters

TEXTBOOKS:
2. Guy Bomford” Geodesy” Nabu Press, 2010,

REFERENCES:
2. Tom Herring, “Geodesy ’ Elsevier,2009,

GI6503 DIGITAL IMAGE PROCESSING FOR GEOINFORMATICS ENGINEERS LT P C 3 0 0 3

OBJECTIVES:
- To make the undergraduate Engineering Students understand the concepts, principles, processing of Satellite data in order to extract useful information from them.
UNIT I: FUNDAMENTALS OF IMAGE PROCESSING  
Information Systems - Encoding and decoding - acquisition, storage and retrieval –data products- Digital Image Processing Systems - Hardware and software design consideration Scanner, digitizer - photo write systems.

UNIT II: SENSOR MODELS AND PRE PROCESSING  

UNIT III: IMAGE ENHANCEMENT  

UNIT IV: IMAGE CLASSIFICATION  

UNIT V: OBJECT RECOGNITION  
Morphological operators - descriptors - representation schemes – Compressions- Image matching, template, correlation, texture based operators, Geometry operators- Artificial Neural nets - Expert system, types and examples - Knowledge systems- representation knowledge handling – decision making paradigms.

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:  
OBJECTIVES:
- To introduce the fundamentals and components of Geographic Information System
- To provide details of spatial data structures and input, management and output processes.

UNIT I  FUNDAMENTALS OF GIS
Introduction to GIS - Basic spatial concepts - Coordinate Systems - GIS and Information Systems – Definitions – History of GIS - Components of a GIS – Hardware, Software, Data, People, Methods – Proprietary and open source Software - Types of data – Spatial, Attribute data-
types of attributes – scales/ levels of measurements.

UNIT II  SPATIAL DATA MODELS
Database Structures – Relational, Object Oriented – Entities – ER diagram - data models-
conceptual, logical and physical models - spatial data models – Raster Data Structures – Raster
Data Compression - Vector Data Structures - Raster vs Vector Models- TIN and GRID data
models.

UNIT III  DATA INPUT AND TOPOLOGY
Scanner - Raster Data Input – Raster Data File Formats – Georeferencing – Vector Data Input
–Digitiser – Datum Projection and reprojection -Coordinate Transformation – Topology -
Adjacency, connectivity and containment – Topological Consistency – Non topological file
formats - Attribute Data linking – Linking External Databases – GPS Data Integration

UNIT IV  DATA QUALITY AND STANDARDS
Data quality - Basic aspects - completeness, logical consistency, positional accuracy, temporal
accuracy, thematic accuracy and lineage – Metadata – GIS Standards – Interoperability - OGC -
Spatial Data Infrastructure

UNIT V  DATA MANAGEMENT AND OUTPUT
Import / Export – Data Management functions - Raster to Vector and Vector to Raster Conversion -
Data Output - Map Compilation – Chart/Graphs – Multimedia – Enterprise Vs. Desktop GIS-
distributed GIS.

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course the student will be able to understand
- The basic concepts and components of GIS
- The techniques used for storage of spatial data and data compression
- The practices used for input, management and output of spatial data
- Concepts of spatial data quality and data standards

TEXTBOOKS:
2. Ian Heywood, Sarah Cornelius, Steve Carver, Srinivasa Raju, “An Introduction

REFERENCE:
1. Lo Albert C.P. Yeung K.W. Concepts and Techniques of Geographic Information

OBJECTIVES:
- To impart the knowledge in Microwave Remote Sensing and its application.
UNIT I  FUNDAMENTALS AND ACTIVE SYSTEM  

UNIT II  MEASUREMENT AND DISCRIMINATION  

UNIT III  SPECIAL TOPICS  

UNIT IV  SAR SENSORS & APPLICATIONS OF RADAR  

UNIT V  PASSIVE SYSTEM  

OUTCOMES:
At the end of the course the student will be able to understand
- The fundamentals of microwave remote sensing systems like SLAR, SAR and RAR
- The concepts of Interferometry, Polarimetry, Altimetry and Scatterometer
- Different satellite systems and sensors used in microwave remote sensing with their applications
- Concepts of passive microwave systems and applications

TEXTBOOKS:

REFERENCE:
OBJECTIVES:
- To impart skills in survey calculation and adjustment to suit field conditions

UNIT I  MEASUREMENT AND ERROR

UNIT II  GENERAL ADJUSTMENT METHODS
Introduction - simple adjustment methods - Least squares method - Examples of least squares problems, Level net, triangulation figure adjustment, traverse adjustment.

UNIT III  LEAST SQUARES ADJUSTMENT TECHNIQUES
Techniques of least squares- concept of weight - least squares adjustment of indirect Observations - least squared adjustment of observations only- adjustment of Trisection.

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

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

TOTAL: 45 PERIODS

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

TEXTBOOKS:

REFERENCE:

OBJECTIVES:
- 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.

LIST OF EXPERIMENTS:
1. Study of image file formats and organization
2. Enhancement of image
3. Filters & edge enhancement
4. Band rationing and NDVI
5. Principle Component Analysis (PCA)
6. Mosaic & subset
7. Geo-reference : Image to map & Image to Image
8. Training Set Generation & Analysis
9. Reprojection to different co-ordinate systems
10. Classification : Supervised & unsupervised
11. Accuracy Assessment
12. Classification improvement / Sub –pixel classification
13. Vector conversion and layer manipulation
14. Creation of cartographic elements and presentation
15. Map Layout preparation

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:

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description of Equipment</th>
<th>Quantity</th>
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<tbody>
<tr>
<td>1.</td>
<td>Computer</td>
<td>1 system for 2 students</td>
</tr>
<tr>
<td>2.</td>
<td>Licensed Digital Image Processing Software</td>
<td>minimum 5 user license</td>
</tr>
</tbody>
</table>

GI6512 GEOGRAPHIC INFORMATION SYSTEM LABORATORY L T P C 0 0 4 2

OBJECTIVES:
- To provide practical and hands on experience on Data Input, Data Management and Data Presentation capabilities of GIS

LIST OF EXPERIMENTS :
1. Data Input – Onscreen Digitisation – Creation of Point, Line and Polygon layers
2. Defining Projection, Datum and Coordinate System
3. Reprojection of Maps.
4. Attribute data input.
5. Measurement of Distance, Area
6. Coordinate Transformation
7. Tabular Data Analysis using SQL commands
8. Generating Charts from Tabular data
9. Linking External Database
10. Data Conversion – Vector to Raster
11. Data Conversion – Raster to Vector
12. Data Interchange – Conversion to interchange formats
13. Map Compilation for Point, Line and Polygon data
14. Map Joining and Edge Matching
15. Map Layout Design.

TOTAL: 60 PERIODS

OUTCOMES:
At the end of the course the student will be able to
- Create spatial database and nonspatial databases in GIS environment
- Analyse spatial database and generate reports, maps
REFERENCE:

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

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<tr>
<td>1.</td>
<td>Computer</td>
<td>1 system for 2 students</td>
</tr>
<tr>
<td>2.</td>
<td>GIS software</td>
<td>minimum 5 user license</td>
</tr>
<tr>
<td>3.</td>
<td>A4 / A3 size</td>
<td>Scanner – 1 no</td>
</tr>
<tr>
<td>4.</td>
<td>A4/A3 size</td>
<td>Printer / Plotter – 1 no</td>
</tr>
</tbody>
</table>

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

LIST OF EXPERIMENTS:
1. Server / client operations
   - Starting / Shutdown of server – Client user creation - client connection over network
2. Data Definition of Tables and Views
   - Creation, Deletion and Modification of definition
3. Data Manipulation
   - Insert, delete and modify rows
4. Queries on Tables and views
   - Simple, complex, nested queries
5. Data Control of Tables and Views
   - Defining different constraints
   - Handling different permissions on tables and views
   - Index, sequence functions
6. Database triggers
   - Defining triggers
7. Spatial Data Creation and viewing
   - Creation of simple geometries (point, Line Polygon)
   - Indexing spatial data
   - Viewing spatial data
8. Basic Geometrical functions
   - Area and Length
   - Buffering
   - Union
9. 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:
LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

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<tbody>
<tr>
<td>1.</td>
<td>Computer</td>
<td>1 system for 2 students</td>
</tr>
<tr>
<td>2.</td>
<td>License software</td>
<td>minimum 5 license each</td>
</tr>
<tr>
<td></td>
<td>MYSQL, ORACLE, VISUAL BASIC</td>
<td></td>
</tr>
</tbody>
</table>

GI6601 TOTAL STATION AND GPS SURVEYING L T P C
3 0 0 3

OBJECTIVES:
- To understand the working of Total Station equipment and solve the surveying problems.

UNIT I FUNDAMENTALS OF TOTAL STATION AND GPS 9
Methods of Measuring Distance, Basic Principles of Total Station, Historical Development, Classifications, applications and comparison with conventional surveying. 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

UNIT II ELECTROMAGNETIC WAVES 9
Classification - applications of Electromagnetic waves, Propagation properties, wave propagation at lower and higher frequencies- Refractive index (RI) - factors affecting RI- Computation of group for light and near infrared waves at standard and ambient conditions- Computation of RI for microwaves at ambient condition - Reference refractive index- Real time application of first velocity correction. Measurement of atmospheric parameters- Mean refractive index- Second velocity correction -Total atmospheric correction- Use of temperature - pressure transducers.

UNIT III ELECTRO OPTICAL AND MICRO WAVE SYSTEM 9

UNIT IV SATELLITE SYSTEM 9
GPS - Different segments - space, control and user segments - satellite configuration - GPS signal structure - Orbit determination and representation - Anti Spoofing and Selective Availability - Task of control segment - GPS receivers.

UNIT V GPS DATA PROCESSING 9
GPS observables - code and carrier phase observation - linear combination and derived observables - concept of parameter estimation – downloading the data - data processing – software modules - solutions of cycle slips, ambiguities, RINEX format. Concepts of rapid, static methods with GPS - semi Kinematic and pure Kinematic methods - basic constellation of satellite geometry & accuracy measures - applications- long baseline processing- use of different softwares available in the market.

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

TOTAL : 45 PERIODS
TEXTBOOKS:

REFERENCES:

OBJECTIVES:
- 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 9

UNIT II OPEN SOURCE DEVELOPMENT ENVIRONMENT 9

UNIT III DESKTOP GIS WITH OPEN SOURCE GIS 9

UNIT IV DATA BASE MANAGEMENT AND USER INTERFACE 9
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 9

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:
1. Mitchell T 'Web mapping illustrated', O'Reilly Media Inc., Sebastopol, Canada, 2005

55
REFERENCE:

MG6851 PRINCIPLES OF MANAGEMENT LT P C 3 0 0 3

OBJECTIVES:
   • To enable the students to study the evolution of Management, to study the functions and principles of management and to learn the application of the principles in an organization.

UNIT I INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS 9

UNIT II PLANNING 9

UNIT III ORGANISING 9

UNIT IV DIRECTING 9

UNIT V CONTROLLING 9
System and process of controlling – budgetary and non-budgetary control techniques – use of computers and IT in Management control – Productivity problems and management – control and performance – direct and preventive control – reporting.

TOTAL: 45 PERIODS

OUTCOMES:
   • Upon completion of the course, students will be able to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling and have same basic knowledge on international aspect of management

TEXTBOOKS:

REFERENCES:

56
GI6603 SPATIAL AND NETWORK ANALYSIS L T P C
3 0 0 3

OBJECTIVES:
- 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 WebGIS 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

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

LIST OF EXPERIMENTS:
- Study of Total Station
- Distance and Coordinate Measurement
- Missing Line Measurement
- Remote Elevation Measurement
- Resection
- Setting out: Point and Line
- Taking Offsets
- Area Measurement
- Total Station Traversing
- Study of Hand held GPS
- Study of Geodetic GPS
- Static and semi kinematics survey
- Differential Positioning
- Precise Positioning
- 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:

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description of Equipment</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Total Station</td>
<td>1 for 10 students</td>
</tr>
<tr>
<td>2.</td>
<td>Geodetic GPS</td>
<td>1 for 10 students</td>
</tr>
</tbody>
</table>

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

LIST OF EXPERIMENTS:
I. Raster Analysis
- Classification and Reclassification
- Surface analysis
- Slope, Aspect, Hill Shade, Viewshed, Cut and Fill
- Distance
- Straight-line, cost weighted, shortest path
• Map Algebra- Local, Neighbourhood and zonal functions.
• Raster Statistics

II. Vector Analysis
• Data Extraction
• Split, Clip, Attribute Selection, Dissolve
• Overlay
• Union, Intersection, Erase, Identity
• Proximity
• Buffering
• Basic Statistics
• Frequency and summary statistics- attribute analysis

III. Network Analysis
• Geocoding
• Data preparation
• Indexing
• Address location searching
• Address matching
• Networking
• Data preparation
• Short route analysis
• Complex short route with turn data
• Service area analysis
• Closest facility

IV. Interpolation
• IDW, Spline, Kriging
• Watershed Deliniation

V. Customization
• Scripting/ embedded scripts
• Batch Processing
• Process Modeling

VI. Web GIS
• Demo on Mapserver / WMS, WFS, WCS and WEB server with spatial data viewing at the client in a network environment

TOTAL: 60 PERIODS

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

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description of Equipment</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Computer</td>
<td>1 system for 2 students</td>
</tr>
<tr>
<td>2.</td>
<td>GIS software</td>
<td>minimum 5 user license</td>
</tr>
</tbody>
</table>
GI6613                      SURVEY CAMP
(During V Semester Winter) (2 Weeks)          L T P C
                                                                                    - - -  1

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

1. Triangulation
2. Trilateration and
3. Rectangulation

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.

GE6674                      COMMUNICATION AND SOFT SKILLS- LABORATORY BASED          L T P C
                                                                                    0 0 4 2

OBJECTIVES:
To enable learners to,
- Develop their communicative competence in English with specific reference to
speaking and listening
- Enhance their ability to communicate effectively in interviews.
- Strengthen their prospects of success in competitive examinations.

UNIT I LISTENING AND SPEAKING SKILLS 12
Conversational skills (formal and informal)- group discussion- making effective presentations using
computers, listening/watching interviews conversations, documentaries. Listening to lectures,
discussions from TV/ Radio/ Podcast.

UNIT II READING AND WRITING SKILLS 12
Reading different genres of tests ranging from newspapers to creative writing. Writing job
applications- cover letter- resume- emails- letters- memos- reports. Writing abstracts- summaries-
interpreting visual texts.

UNIT III ENGLISH FOR NATIONAL AND INTERNATIONAL EXAMINATIONS AND
PLACEMENTS 12
International English Language Testing System (IELTS) - Test of English as a Foreign Language
(TOEFL) - Civil Service(Language related) - Verbal Ability.

UNIT IV INTERVIEW SKILLS 12
Different types of Interview format- answering questions- offering information- mock interviews-
body language( paralinguistic features)- articulation of sounds- intonation.

UNIT V SOFT SKILLS 12
Motivation- emotional intelligence-Multiple intelligences- emotional intelligence- managing
changes-time management-stress management-leadership straits-team work- career planning -
intercultural communication- creative and critical thinking

TOTAL: 60 PERIODS

Teaching Methods:
1. To be totally learner-centric with minimum teacher intervention as the course revolves
around practice.
2. Suitable audio/video samples from Podcast/YouTube to be used for illustrative purposes.
3. Portfolio approach for writing to be followed. Learners are to be encouraged to blog, tweet, text and email employing appropriate language.

4. GD/Interview/Role Play/Debate could be conducted off the laboratory (in a regular classroom) but learners are to be exposed to telephonic interview and video conferencing.

5. Learners are to be assigned to read/write/listen/view materials outside the classroom as well for graining proficiency and better participation in the class.

### Lab Infrastructure:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Description of Equipment (minimum configuration)</th>
<th>Qty Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Server</strong></td>
<td>1 No.</td>
</tr>
<tr>
<td></td>
<td>- PIV System</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- 1 GB RAM / 40 GB HDD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- OS: Win 2000 server</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Audio card with headphones</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- JRE 1.3</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td><strong>Client Systems</strong>                                            60 Nos.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- PIII or above</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- 256 or 512 MB RAM / 40 GB HDD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- OS: Win 2000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Audio card with headphones</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- JRE 1.3</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td><strong>Handicam</strong></td>
<td>1 No.</td>
</tr>
<tr>
<td>4</td>
<td><strong>Television 46”</strong></td>
<td>1 No.</td>
</tr>
<tr>
<td>5</td>
<td><strong>Collar mike</strong></td>
<td>1 No.</td>
</tr>
<tr>
<td>6</td>
<td><strong>Cordless mike</strong></td>
<td>1 No.</td>
</tr>
<tr>
<td>7</td>
<td><strong>Audio Mixer</strong></td>
<td>1 No.</td>
</tr>
<tr>
<td>8</td>
<td><strong>DVD recorder/player</strong></td>
<td>1 No.</td>
</tr>
<tr>
<td>9</td>
<td><strong>LCD Projector with MP3/CD/DVD provision for Audio/video facility</strong></td>
<td>1 No.</td>
</tr>
</tbody>
</table>

### Evaluation:

**Internal: 20 marks**

Record maintenance: Students should write a report on a regular basis on the activities conducted, focusing on the details such as the description of the activity, ideas emerged, learning outcomes and so on. At the end of the semester records can be evaluated out of 20 marks.

**External: 80 marks**

- **Online Test** - 35 marks
- **Interview** - 15 marks
- **Presentation** - 15 marks
- **Group Discussion** - 15 marks

**Note on Internal and External Evaluation:**

1. Interview – mock interview can be conducted on one-on-one basis.
2. Speaking – example for role play:
   a. Marketing engineer convincing a customer to buy his product.
   b. Telephonic conversation- fixing an official appointment / placing an order / enquiring and so on.
3. Presentation – should be extempore on simple topics.
4. Discussion – topics of different kinds; general topics, and case studies.
OUTCOMES:
At the end of the course, learners should be able to
- Take international examination such as IELTS and TOEFL
- Make presentations and Participate in Group Discussions.
- Successfully answer questions in interviews.

REFERENCES:
2. **Graded Examinations in Spoken English and Spoken English for Work** downloadable materials from Trinity College, London.
4. Interactive Multimedia Programs on **Managing Time and Stress**.
5. **Personality Development** (CD-ROM), Times Multimedia, Mumbai.

Web Sources:
- [http://www.slideshare.net/rohitjsh/presentation-on-group-discussion](http://www.slideshare.net/rohitjsh/presentation-on-group-discussion)
- [http://www.washington.edu/doit/TeamN/present_tips.html](http://www.washington.edu/doit/TeamN/present_tips.html)
- [http://www.oxforddictionaries.com/words/writing-job-applications](http://www.oxforddictionaries.com/words/writing-job-applications)
- [http://www.kent.ac.uk/careers/cv/coveringletters.htm](http://www.kent.ac.uk/careers/cv/coveringletters.htm)
- [http://www.mindtools.com/pages/article/newCDV_34.htm](http://www.mindtools.com/pages/article/newCDV_34.htm)

GI6701 DECISION SUPPORT SYSTEM FOR RESOURCE MANAGEMENT L T P C 3 0 0 3

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

UNIT I STRUCTURE 9

UNIT II KNOWLEDGE ACQUISITION 9
Knowledge Acquisition stages – Representation schemes, Rule, Semantic network, frames and logic – Inference Techniques – Types of Reasoning deductive, inductive, adductive, analogical and non-monotonic – conflict resolution - types of inference: forward and backward chaining - search techniques

UNIT III RULE BASED EXPERT SYSTEMS 9
Evolution – Architecture – Examples – backward and forward chaining - rules and meta rules – rule based systems – Case studies: MYCIN, PROSPECTOR

UNIT IV INEXACT REASONING 9
UNIT V OPERATION RESEARCH


TOTAL: 45 PERIODS

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

- The structure of knowledge based system and its implementation
- The concepts of rule based expert system and fuzzy based systems
- The scope and applications of operation research techniques in geoinformatics

TEXTBOOKS:

REFERENCES:

GI6702 DISASTER MITIGATION AND MANAGEMENT FOR GEOINFORMATICS ENGINEERING

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

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

UNIT II LONG TERM MITIGATION MEASURES

UNIT III SAFETY RATING OF STRUCTURES
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:

GI6703 GEOINFORMATICS PROJECT DESIGN AND MANAGEMENT L T P C 3 0 0 3

OBJECTIVES:
- To provide insights into the design aspects of geomatic Engineering projects. The candidate shall be exposed to geomatic project formulation, selection of design tools, input of assessment methods and critical information and management. The candidate also familiarize with styles of reporting.


UNIT II GRAPHICAL DESIGN TOOLS Flowcharts - Data Flow Diagrams (DFD) - ER Diagrams - Hierarchical Input, Output Charts - CPM and PERT Charts - Gnatt Charts - UML Coding and CASE Tools


UNIT IV GEOMATIC INFORMATION MANAGEMENT General Principles of Information Management (INFOSYS) - Information System Types – MIS, TPS, DSS - Geomatic Information Structure - Transaction Management - DSS in Geoinformatics

UNIT V DESIGNING REPORTS Formats and Content of Geomatic Reports - Standards in Reporting - Picture File Formats and Standards - Compression Standards and Files - Web Reporting Standards - WFS and WCS - Functions and Standards - Scripts in Web Reporting (PHP, Jscript, Python, AJAX, Ruby RAIL etc...) TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course the student will be able to understand
- Methods used for geomatics project formulation and implementation
- Principles associated with assessment of geomatics projects and information management
- Different ways to design and present geomatics project reports
TEXTBOOKS:
2. Barry F. Kavanagh, Geoinformatics, Prentice Hall, 2002

REFERENCES:

GI6711 MINI PROJECT (Activity based) (Subject related) L T P C 0 0 3 2

OBJECTIVES:
- To acquire knowledge about the various tasks involved in a real time project and to train the students to complete the project in comprehensive manner in the area of Geoinformatics Engineering.
- To familiarize the graduate with project design principles so as to inculcate confidence and to provide skills in undertaking Geomatic projects.

The students shall be divided into groups with not more than 4 persons in each group. All the groups will be monitored by the assigned guide. The students in consultation with the assigned guide will identify a project related to Geoinformatics Engineering and will divide the project into 12 to 15 tasks. In each class of 4 hours duration, students shall have to complete one task in the laboratory itself under the supervision of the guide/instructor. The students will prepare and submit a consolidated report on completion of all the tasks.

For continuous assessment, 75% weightage may be given (i.e., for report submission and model oral test) and 25% weightage may be given for the end semester evaluation. The end semester evaluation by presentation only and done by a panel of three faculty members nominated by the Head of the Institution including the course co-ordinator and guide.

OUTCOMES:
At the end of the course the student will be able to understand
- The process of designing and implementation of geomatics project
- The principles of project design, reporting and progress monitoring

TOTAL: 45 PERIODS

GI6712 INDUSTRIAL TRAINING L T P C - - - 2
(During VI Semester Summer) (4 Weeks)

OBJECTIVES:
- To train the Geoinformatics Students for the Industry so as tt.-e 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.

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) Diary 2) Training Report 3) Viva-Voce Examination.
The evaluation committee consists of (1) Coordinator (2) Staff Member (3) Expert Member appointed by the Head of the Institution.

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 TRAINING 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

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

- The intricacies of implementation textbook knowledge into practice
- The concepts of developments and implementation of new techniques in geomatics

GI6801 DIGITAL CADASTRE L T P C
3 0 0 3

OBJECTIVES:
- To introduce the students to the cadastral survey Methods and its applications in generation of Land information system. Cadastral surveys are those classes of land surveys which are executed for the purpose of systematically recording the land rights, producing register of land holdings or an inventory of land areas, land use and determine land tax.


UNIT II METHODS OF SURVEYING Cadastral Survey Methods - Steps in survey of a village - Instruments used for cadastral survey & mapping - Orthogonal, Polar survey methods - Boundary survey - Rectangulation - Calculation of area of Land- GPS and Total Station in Cadastral survey.


UNIT IV PHOTOMGRAMMETRIC METHODS Photogrammetry for cadastral surveying and mapping - Orthophoto map – Quality control measures - Organisation of cadastral offices – international scenario.


TOTAL: 45 PERIODS

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

- The principles of Cadastral system, records and taxation
• Various methods used for surveying, mapping and maintenance of cadastral records
• Developments in the field of digital cadastre, LIS

TEXTBOOKS:

REFERENCES:
1. Alias Abdul Rahman, Siyka Zlatanova, Volker Coors, Innovations in 3D geo information systems, 2006

GI6802  2D AND 3D SURFACE MODELLING  L T P C
                                                 3 0 0 3

OBJECTIVES:
• To provide exposure to Surface Data in 2D and 3D and the analytical capabilities.

UNIT I  TOPOGRAPHIC SURFACE DATA FORMAT AND SOURCES  9
Sources of Topographic Data - X.Y.Z data - Ground Survey Methods, Airborne Laser Scanner Data. GPS Data, Photogrammetry, Stereo Satellite Images, Space based Altimeters: Radar and LiDAR, Interferrometric Sources, SRTM, Topographic Maps - Comparison of various sources of Topographic Data - Methods of Representing Topographic Data - Digital Elevation Models, TIN Model, Contours.

UNIT II  2D - LAND SURFACE MODELLING  9

UNIT III  APPLICATIONS OF 2D LAND SURFACES  9

UNIT IV  3D SURFACE ANALYSIS  9
3D Array - Octree and 3D TIN - constructive solid geometry (CSG) - 3d TIN tessellations - 3D distance transformation and voronoi tessellation - 3D visualization and editing - 3D web GIS - 3D application in Flood modeling, urban engineering and climatic system analysis - shading and illumination - 3D and animation.

UNIT V  VISUALISATION OF 2D AND 3D SURFACES  9
Visualisation of 2D and 3D surfaces - Software used for Visualisation: Proprietary GIS s/w, SAGA, Landserf, MicroDEM, VRML and Java for interactive 3D visualization - 3D City Models WEB 3D GIS

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course the student will be able to understand
• The intricacies of implementation textbook knowledge into practice
• The concepts of developments and implementation of new techniques in geomatics
TEXTBOOKS:

GI6811 PROJECT WORK L T P C 0 0 1 2 6

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.

The group project may be on (i) one problem and segments of results or (ii) one problem solution (methodology) and different applications. 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.

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 prescribed by the University. Evaluation shall be done as prescribed in the Regulation.

TOTAL : 180 PERIODS

OUTCOMES:
At the end of the course the student will be able to
- Implement the knowledge and exposure gained in the previous semester for solving real time problems
- Develop systems that improve capabilities of existing instruments, techniques and methods.

GI6001 ADVANCED SURVEY ADJUSTMENT L T P C 3 0 0 3

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

UNIT I PRE ANALYSIS OF SURVEY MEASUREMENTS 9
Pre analysis procedure- Horizontal angle measurement with theodolite- Distance measurement by EDM - elevation difference by Direct leveling - Survey tolerances.

UNIT II STATISTICAL ANALYSIS OF SURVEY MEASUREMENTS 9
Samples and statistics - The Chi-square distribution - the t-student distribution - common sample statistics - estimation of mean and variance - Confident interval for the mean and variance - statistical testing-Test or the mean of probability distribution - Test of the variance of a probability distribution. Bivariate normal distribution.
UNIT III       GENERAL LEAST SQUARES ADJUSTMENT        9
Introduction - Derivation - Precision estimation of special cases - Application of least squares
adjustment in GIS and GPS.

UNIT IV       APPLICATION IN PLANE COORDINATE SURVEYS        9
Introduction - the distance condition and its linearization - azimuth condition and its linearization -
angle condition and its linearization - position fixing by Distance - Two parameter similarity
transformation - Four parameter similarity Transformation.

UNIT V        SPECIAL SUBJECTS OF STATISTICS        9
Theory of prediction and filtering - sequential adjustment (static and Kinematic Kalman-filter)
Application of Kalman-filter in Geodesy; Goodness of fit - Test of any distribution.

TOTAL: 45 PERIODS

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

• Advancements in adjustments survey measurements using statistics analysis and least
  square adjustment procedure
• Concepts for adjustment and prediction of geodetic variables

TEXTBOOKS :
1. Mikhail, E.M. and Gracie G., Analysis and adjustment of Survey measurements, Van
   Nostrand Reinhold, New York, 2005

REFERENCE:
   squares in surveying and GIS, John Wiley and sons inc., 1996.

GI6002       AIRBORNE LASER TERRAIN MAPPING L T P C
                          3 0 0 3

OBJECTIVES:
• 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        9
Principle and Properties of LASER- 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 – Space Borne Laser Altimeter and Applications

UNIT II      AIRBORNE LASER SCANNERS        9
Airborne Topographic Laser Scanner – Ranging Principle – Pulse Laser and Continuous Wave
Laser – First Return and Last Return – Ellipsoidal and Geoidal Height - Typical parameters of a
Airborne Laser Scanner (ALS) – Specifications of Commercial ALS – Various Application Domains
of ALS - Merits of ALS in comparison to Levelling, GPS leveling, Photogrammetry and
Interferrometry - Components of ALS - GPS, IMU, LASER Scanner, Imaging Device, Hardware
and Software

UNIT III     DATA ACQUISITION AND PRE PROCESSING        9
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 - LiDAR data
formats.
UNIT I POST PROCESSING AND APPLICATIONS
Post Processing – Geo location of Laser Foot Prints – Various Co-ordinate Transformations involved - Strip Adjustment - Filtering - Ground Point filtering – Digital Elevation Model - Error Sources - Overview of LIDAR Applications in various domains - 3D city models – Corridor Mapping Applications – Forestry Applications - Feature extraction, Ortho images.

UNIT V TERRESTRIAL AND BATHYMETRIC LASER SCANNERS

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:

REFERENCES:
1. Zhilin Li, Qing Zhu, Chris Gold, Digital terrain modeling: principles and methodology, CRC Press, 2005

GI6003 CLOSE RANGE PHOTOGRAMMETRY

OBJECTIVES:
- To focuss how the terrestrial objects can be mapped by taking photographs.
- To study not only in engineering aspects but also in the Medicine, Forensic applications.

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

UNIT II STRUCTURAL STUDIES
Structural research: Deformation studies of deflection, buckling, - Advantages and disadvantages, Dam deformation, structural movement, Pavement yield. Hydraulic studies: Pipe surface roughness, shifting sand-bank, shoreline feature and coastal currents, experimental fluid mechanics.
UNIT III  MEDICINE  9
Monocular and binocular health studies, X-ray Photogrammetry, surface area and volume patients by Photogrammetry - merits over usual methods. Postural analysis - historical use of Photogrammetric methods - Study of body alignment and rate of body mechanics, remedial measures, advantages - Bio stereo metrics.

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

UNIT V  CRIMINOLOGY  9
Single and stereo photographs for forensic studies, investigation of criminal cases by black & white, ultra-violet, infrared and colour Photogrammetry, examples. Use of stereometric camera for crime detection, accident investigations. Mono or stereo camera for investigation. Anthropometry - Under water Photogrammetry - Electron microscopy, Hologrammetry - Moire topography - systems and applications - emerging trend.

OUTCOMES:
At the end of the course the student will be able to understand
- The principles of terrestrial and close range photogrammetry
- The possible application of terrestrial and close range photogrammetry in medicine, structural analysis, criminology and industries

TEXTBOOKS:

REFERENCE:

GI6004  DIGITAL CARTOGRAPHY  L T P C
3 0 0 3

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  9

UNIT II  DATA CAPTURE AND REPRESENTATION  9
UNIT III DIGITAL MAP DESIGN

UNIT IV GEOVISUALIZATION

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

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:

REFERENCES:

OBJECTIVES :
- To provide knowledge of uncertainty in handling geospatial data. Uncertainty exists in terms of data capture, positional accuracy, surface modeling and spatial modeling.
- To familiarize errors due to uncertainty and also mathematical foundations of errors including quality control

UNIT I UNCERTAINTY
Concept of uncertainty – concept of error – dimension of global data- Spatial data quality- Measurement of uncertainty – Spatial data capture uncertainty- uncertainty in Spatial Analysis

UNIT II MATHEMATICAL FOUNDATIONS
Geo Statistical Data and Lattice – Probability and Distribution function- shafer themes of evidence for spatial data – fuzzy logic – rough sets- information theory and entrophy

UNIT III POSITIONAL AND ATTRIBUTE UNCERTAINTY
UNIT IV Uncertainties n Spatial modelling and Spatial Analysis

UNIT V Quality Control and Security

OUTCOMES:
At the end of the course the student will be able to understand
• The concepts of error, uncertainty and their measurement
• Mathematics basics required for quantification of uncertainty in mapping and modeling
• Concept of quality control procedures for spatial data quality and security

TEXTBOOKS:

REFERENCES:

GI6006 Environmental Geoinformatics

OBJECTIVES:
• 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 ater 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

UNIT III Ecology and Ecosystem
UNIT IV SENSORS AND DATA FOR ENVIRONMENTAL MONITORING
Sensors for environmental monitoring - sensors - LIDARS- LASER Remote Sensing -visible and outside visible wave length -absorption spectrometers - selection of ground truthsites-sea truth observation - Radar techniques for sensing ocean surface - thermal measurements- application of remote sensing for oil slicks mapping - Chlorophyll detection - Fisheries resources - Coastal marine studies - determination of temperature and sea state.

UNIT V AIR POLLUTION AND GLOBAL CLIMATOLOGY

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:

GI6007 GEOINFORMATICS FOR HYDROLOGY AND WATER RESOURCES ENGINEERING

OBJECTIVES:
- 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
Origin – classification and properties of aquifer – ground water potential identification – surface indicators – aquifer parameters – hydrologic budgeting – different types of ground water models – mathematical modelling of ground water system - seawater intrusion – interfacing GIS with ground water model - artificial recharge of ground water

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

TEXTBOOKS:

REFERENCES:

GI6008  GEOINFORMATICS FOR OCEAN ENGINEERING AND COASTAL ZONE MANAGEMENT
L T P C  3 0 0 3

OBJECTIVES:
• To familiarize the students about the basics and Geomatic applications in the field of ocean Engineering and Coastal Management

UNIT I  OCEAN ENGINEERING

UNIT II  OCEANOGRAPHY AND NUMERICAL MODELLING
UNIT III  COASTAL DYNAMICS  9
Coastal Hydrodynamics - Estuarian dynamics – Hydrodynamics of pollution dispersion – Modelling of suspended sediments – Coastal erosion – Shore line change dynamics – Coastal protection works – Design of Breakwater

UNIT IV  GEOMATIC OCEANOGRAPHY  9

UNIT V  COSTAL ZONE MANAGEMENT  9

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:

GI6009  GEOINFORMATICS FOR AGRICULTURE AND FORESTRY  L T P C
3 0 0 3

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

UNIT I  CROPS  9
UNIT II  SOILS  

UNIT III  LAND EVALUATION AND MANAGEMENT 
Introduction - land use / land cover definition - land use / land cover classification - concepts and approaches of land evaluation - parametric methods - change detection in land uses - decision support system for land use planning - optimum land use planning for sustainable agriculture.

UNIT IV  DAMAGE ASSESSMENT  

UNIT V  FORESTRY 
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 a forestation - forest fire mapping and damage assessment - 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
- The methods to assess damage to crop by floods, droughts, pests using remote sensing techniques
- Characterization of forest entities for analysis of deforestation, forest fire damages

TEXTBOOKS:

REFERENCES:
UNIT I  BASICS OF CLIMATIC CHANGE

UNIT II  THROPOGENIC IMPACTS
Anthropogenic impacts - agriculture and impacts - industries and pollutions – urbanization – vehicles, transport and fossil fuels - chemicals, synthetics, solid wastes and gas outputs – municipal wastes

UNIT III  CHANGE ASSESSMENT

UNIT IV  CHANGE HAZARDS

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

TOTAL: 45 PERIODS

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:
1. William James Burroughs , Climate change : A multidisciplinary Approach 2007
2. Jane McAdam ,"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, 2010
3. Stephen H Schneider, “Science as a contact sport inside the battle to save earth’s climate, 2009
4. James Hoggan Climate cover up; the crusade to Deny global warming, 2009

GI 6011  GEOINFORMATICS FOR LAND RESOURCES MANAGEMENT  L T P C 3 0 0 3

OBJECTIVES:
- To familiarize the students in Land Resource Analysis and planning for sustainable development. Policy issues and legal aspects or consider equally important for Land Resource Development.

UNIT I  LAND RESOURCE SYSTEMS
UNIT II LAND RESOURCE POTENTIALS

UNIT III POLICIES AND ISSUES
Land Holdings – Reserved and Restricted Lands – Hazard and Disaster Prone Areas – Land Acquisition - Land Use Policies – Land and Noxious Facilities – Legality and Community Participation – Conflicts of Interests

UNIT IV LAND USE MANAGEMENT

UNIT V SUSTAINABLE DEVELOPMENT

OUTCOMES:
At the end of the course the student will be able to understand
- The concepts involved assessment of land resources
- The policies and issues involved in management of land resources
- The concept of sustainability and its implementation in land resources management

TEXTBOOKS:

REFERENCES:
2. The A to Z of careers in South Africa, 2008

GI6012 ADVANCED GEODESY

OBJECTIVES:
- To impart advanced knowledge in the field of Geodesy

UNIT I GEODETIC CONTROL

UNIT II GEODETIC COMPUTATIONS
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.
UNIT III  ASTRONOMICAL COMPUTATIONS
Variation in celestial co-ordinates, Determination of Astronomical Azimuth- stars altitude and hour angle methods, astronomical latitude and longitude determination – sources of errors and its eliminations-problems

UNIT IV  HEIGHT SYSTEMS

UNIT V  MISCELLANEOUS TOPICS

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course the student will be able to understand
- Techniques and tools involved in establishment of geodetic control
- Methods required for computation of geodetic and astronomical parameters
- Concepts of monitoring crustal movement, tide measurement and applications

TEXTBOOKS:
2. Guy Bomford “Geodesy” Nabu Press, 2010

REFERENCES:

GI6013 SATELLITE METEOROLOGY

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

UNIT II  WEATHER SATELLITES AND SENSING SYSTEMS
Weather Satellites and Sensing Systems - Orbit Types and Altitudes - View Angle and Implications - INSAT and KALPANA - TRMM and GPM - American and European Missions

UNIT III  DATA RECORDS AND APPLICATIONS
UNIT IV  METEOROLOGICAL APPLICATIONS
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

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:

REFERENCES:
4. Kalsi S.R. “Use of Satellite Image in Tropical Cyclone Intensity Analysis and Forecasting”, India Meteorological Department, Meteorological Monograph, Cyclone warning, New Delhi, 2002

GI6014  TRANSPORTATION GEOINFORMATICS  L T P C
3 0 0 3

OBJECTIVES:
- To develop an understanding of the issues and challenges in the field of transportation engineering.
- To understand the utility of Remote sensing and GIS for solving transportation engineering problems.

UNIT I  ENGINEERING SURVEYS AND GEOMETRIC DESIGN
Road ways and railways – development - necessity for planning – classification of roads and railways – Alignment surveys and investigations using conventional and remote sensing techniques (preliminary, reconnaissance and final location surveys) – Design principles of highway geometric elements

UNIT II  URBAN TRANSPORTATION SYSTEMS AND PLANNING
Urban transportation: policy alternatives - Transportation and the environment -Urban transport planning processes - Socio-demographic data and travel surveys - Transportation modeling- Traffic congestion - Plan evaluation and implementation - Planning and financing - Critiques of transportation modeling and forecasting

UNIT III  REMOTE SENSING IN TRANSPORTATION
Study of geographic pattern of urban development using remote sensing data products – urban sprawl – parking studies using aerial photos – traffic analysis - accident analysis - site suitability analysis for transport infrastructure – population distribution studies – improvisation of
rural road network – regional road network connectivity - vehicle tracking – incident identification and management.

UNIT IV GIS AND TRANSPORTATION ANALYSIS 9
Transportation analysis in GIS: Introduction - network flows - shortest path algorithms - transportation databases: creation and maintenance - facility location - vehicle routing – highway and railway alignment – highway maintenance

UNIT V MODELLING AND INTELLIGENT TRANSPORTATION SYSTEMS (ITS) 9

TOTAL : 45 PERIODS

OUTCOMES:
At the end of the course the student will be able to understand
- Applications of remote sensing in alignment planning and geometric analysis
- The applications of remote sensing in transportation systems analysis and planning
- Tools for modeling of landuse transport interaction, ITS architecture

TEXTBOOKS:

REFERENCES:

GI6015 HEALTH GIS

OBJECTIVES:
- The course is on geospatial analysis methods in health and to the kinds of problems for which these methods are appropriate. The course is appropriate as an elective for those who may have no background in human sciences but who have fair knowledge in RS and GIS and interested in questions of the health of populations in geographic context.

UNIT I MAPPING DISEASE ECOLOGY 9

UNIT II GEOSPATIAL DATA FRAMEWORK 9
Disease records and georeferencing - birth, movements and permanency - individuals, families and communities - problems of address coding and digitization - the privacy of records - risk and vulnerability - short term and long term trends - resurgence - historical records and reliability.

UNIT III DISEASE MAPPING 9
Spatial patterns of disease - mapping causal factors - endemic and epidemic zonation - tests for spatial clustering and fragmentation - applications of RS and GIS in disease mapping - deterministic stochastic and uncertainty models - vulnerability and comforts.
UNIT IV LOCATION AND ALLOCATION STRATEGIES 9
Location of health centres and service areas - P-median scenarios - Network analysis and services - emergency services and alternative locations - the allocation of health resources allocation of service areas and optimality - services and marginal people - improving access to socioeconomic and geographical contexts.

UNIT V HEALTH AND WEB-GIS 9
Sharing disease data and web - ontology requirements and applications - open source service environments - methods of XML aid OGC services - web map context, services and processing (WMS, WMC and VVPS) - web service quality and SDI

OUTCOMES:
At the end of the course the student will be able to understand
- Techniques used for disease ecology mapping and disease mapping
- The usefulness of GIS for location allocation of health resources
- The tools for development of Health GIS systems

TEXTBOOKS:

REFERENCES:
1. Ravi Maheswaran and Massimo Craglia, GIS in Public Health Practice, Boca Raton, CRC Press, 2004

GI6016 URBAN GEOINFORMATICS L T P C
3 0 0 3

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

UNIT I FUNDAMENTALS 9

UNIT II URBAN MAPPING 9

UNIT III URBAN PLANNING 9

UNIT IV URBAN ANALYSIS 9
UNIT V  URBAN MODELLING  9
Urban Growth Modelling - Planning Support Systems - Urban Environmental Monitoring and Modelling - 3D city Modelling – Case Studies

TOTAL : 45 PERIODS

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

GE6084  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

TOTAL : 45 PERIODS
OUTCOME:
- Engineering students will acquire the basic knowledge of human rights.

REFERENCES:

GI6017  GEOINFORMATICS FOR RISK MANAGEMENT  L T P C  3 0 0 3

OBJECTIVES:
- To introduce the concept of Risk Management and to analyse the role of Geoinformatics in risk management.

UNIT I  NATURAL HAZARDS

UNIT II  GEOMATIC DATA SOURCES
Need for Geographic Information – Multi-Scale Requirements for hazard analysis - Temporal data: Temporal Resolution Requirement – Off-nadir capability of various sensors – Spatial Resolution Requirement: Optical and Microwave spectrum suitability for various hazards – Global Mapping Agencies of hazards

UNIT III  HAZARD MODELLING

UNIT IV  RISK ANALYSIS

UNIT V  RISK MANAGEMENT

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course the student will be able to understand
- Concepts of Risk, Hazard and various types of hazards
- Characteristics of remote sensing tools for hazard mapping and modeling
- Applications of remote sensing in Risk Analysis and Management

TEXTBOOKS:
OBJECTIVES:
- To impart knowledge to design and develop next generation Location based information systems involving mobile devices

UNIT I  INTRODUCTION  9
Introduction - Evolution of Location Based Services - Application Areas of Location Based Services (LBS) - Application Taxonomy – LBS Privacy – LBS Markets and Customer Segments

UNIT II  PLATFORM AND ARCHITECTURE  9
LBS Components - Data Capture and Collection – LBS Middleware Standards (Open GML,KML) – Mobile Platform Technologies for LBS

UNIT III  DATA AND VISUALIZATION TOOLS  9
LBS Data – Crowd Sourcing and Openstreet Maps ,Google Earth, Google Maps, Bing Maps – Content Distribution formats – GeoJSON, GeoRSS, KML - Generating KML’s Dynamically

UNIT IV  LBS APPLICATIONS  8

UNIT V  CASE STUDY  10
Develop a real time case study on Location Based Services using the above concepts learned and submit a working application along with the presentation

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course the student will be able to understand
- The concepts of Location Based Services and their architecture
- The tools available for data and visualization of LBS
- The methodology involved in developing a LBS in real time case study.

TEXTBOOKS:
1. Jochen Schiller & Agnes Voisard “Location - Based Services” Morgan Kaufmann Publishers, 2004

REFERENCE:
OBJECTIVES:

- To enable the students to create an awareness on Engineering Ethics and Human Values, to instill Moral and Social Values and Loyalty and to appreciate the rights of others.

UNIT I HUMAN VALUES

UNIT II ENGINEERING ETHICS

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION
Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS

UNIT V GLOBAL ISSUES

TOTAL: 45 PERIODS

OUTCOMES:

- Upon completion of the course, the student should be able to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society

TEXTBOOKS:


REFERENCES:

OBJECTIVES:
- The course introduces concepts and basics of Information and Communication Technology (ICT) and its application in front line areas like education, agriculture, public health and disaster management.

UNIT I  OVERVIEW OF INFORMATION AND COMMUNICATION SYSTEMS

UNIT II  INFORMATION MANAGEMENT

UNIT III  INFORMATION PROCESS AND DOCUMENTATION
Scientific reasoning and data analysis – interpretation and structuring – Tools and techniques in Text, Tabular and Graphic documentation - Tools and techniques in Maps, pictures and images – Internet and web tools and standards for documentation – Compression and transfer management.

UNIT IV  VISUALIZATION AND OUTPUT
Videos and Computer visualization - WAP and Mobile tools and limits – Projection systems and visualization – output formats, printing, plotting and soft copies – constraints and limits of media

UNIT V  ICT IN PROBLEM SOLVING AND DECISION MAKING
Application in School and higher Education – Social Networking – Use of UML, ER and other charting methods in Problem analysis and process designs – ICT in Utility services, WEB GIS agriculture, public health and disaster management.

TOTAL : 45 PERIODS

OUTCOMES:
- The student will have adequate knowledge on various communication systems so as to apply the knowledge for various fields such as Education, Agriculture, Public health and disaster management for dissemination of information to the public for management and preparedness.

TEXTBOOKS:

REFERENCES:
2. Fabrice Papy, Information Sciences, John Wiley & Sons, 2010
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.
- To develop rudimentary ability to respond to their surroundings with potential 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 Processess 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.

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, Scenarious in the Indian context, Disaster damage assessment and management.
TEXTBOOKS:

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