B.Tech. GEO-INFORMATICS

I Year - I Semester

Course code	Category	Course Title	Hours per week L	T	Internal Marks	External Marks	Total Marks	Credits
GI 1101	BS	Mathematics–I	4	0	30	70	100	3
GI 1102	BS	Physics	4	0	30	70	100	3
GI 1103	ES	EngineeringGraphics	2	3	30	70	100	3
GI 1104	ES	Elements of Cartography	4	0	30	70	100	3
GI 1105	ES	Surveying	4	0	30	70	100	3
GI 1106	ES	Workshop	0	3	50	50	100	1.5
GI 1107	BS	PhysicsLab	0	3	50	50	100	1.5
GI 1108	ES	SurveyingFieldwork	0	3	50	50	100	1.5
		Total Credits						19.5

IYear-IISemester

GI 1201	BS	Mathematics–II	4	0	30	70	100	3
GI 1202	BS	Green Chemistry	4	0	30	70	100	3
GI 1203	HSS	English	4	0	30	70	100	3
GI 1204	ES	Computer Programming and Numerical Methods	4	0	30	70	100	3
GI 1205	ES	Fundamentals of Geology	4	0	30	70	100	3
GI 1206	HSS	EnglishLanguageLab	0	3	50	50	100	1.5
GI 1207	BS	Green ChemistryLab	0	3	50	50	100	1.5

GI 1208	ES	Computer Programming and Numerical Methods Lab	0	3	50	50	100	1.5
		Total Credits						19.5

IIYear-I Semester

GI 2101	BS	ProbabilityandStatistics	4	0	30	70	100	3
GI 2102	PC	Fundamentals of atmosphericsystems	4	0	30	70	100	3
GI 2103	PC	Geomorphology	4	0	30	70	100	3
GI 2104	PC	Object Oriented Programming through C++ andJAVA	4	0	30	70	100	3
GI 2105	HSS	ManagerialEconomics	4	0	30	70	100	3
GI 2106	PC	Geology Lab	0	3	50	50	100	1.5
GI 2107	PC	GeomorphologyLab	0	3	50	50	100	1.5
GI 2108	PC	Object Oriented Programming Lab	0	3	50	50	100	1.5
GI 2109	SC	Auto CAD	1	2	50	50	100	2
GI 2110	MC	Professional & Ethics and Universal Human values	0	0	00	100	100	0
GI 2111	MC	NCC/NSS	0	2	-	-	-	0
		Total Credits						21.5

II Year -II Semester

GI 2201	ES	Information Technology and Applications	4	0	30	70	100	3
GI 2202	BS/PC	Principles of Physical Oceanography	4	0	30	70	100	3
GI 2203	PC	Photogrammetry and Photo interpretation	4	0	30	70	100	3
GI 2204	PC	Remote Sensing-I	4	0	30	70	100	3
GI 2205	PC	Python Programming	4	0	30	70	100	3
GI 2206	PC	Remote Sensing & Image Interpretation Lab	0	3	50	50	100	1.5
GI 2207	PC	Photogrammetry and Photo Interpretation Lab	0	3	50	50	100	1.5
GI 2208	SC	Mobile App Design	1	2	50	50	100	2
GI 2209	MC	Environmental Science	0	0	00	100	100	0
		Total Credits						20

Internship-I

(FIRST YEAR) 1st SEMESTER

GI1101 MATHEMATICS-I

Course Objectives:

* To transmit the knowledge of Partial differentiation.

* To know of getting maxima and minima of function of two variables and finding errors and approximations.

* To evaluate double and triple integrals, volumes of solid sand area of curved surfaces.

* To expand a periodical function as Fourier series and half-range Fourier series.

Course Outcomes:

* Find the partial derivatives of functions of two or more variables.

* Evaluate maxima and minima, errors and approximations.

* Evaluate double and triple integrals, volumes of solids and area of curved surfaces.

* To expand a periodical function as Fourier series and half-range Fourier series.

* Have a fundamental understanding of Fourier series and be able to give Fourier expansions of a given function.

SYLLABUS

Partial Differentiation : Introduction - Functions of two or more variables - Partial derivatives – Homogeneous functions– Euler's theorem - Total derivative - Change of variables – Jacobins. Mean value Theorems (without proofs)

Applications of Partial Differentiation : Geometrical interpretation -Tangent plane and Normal to a surface –Taylo's theorem for functions of two variables - Errors and approximations -Total differential.Maxima and Minima of functions of two variables-Lagrange's method of undetermined multipliers-Differentiation under the integral Sign –Leibnitz's rule.

Multiple Integrals : Introduction - Double Integrals - Change of Order of Integration - Double Integrals in Polar Coordinates-Triple Integrals-Change of Variables.

Multiple Integrals-Applications : Area enclosed by plane curves - Volumes of solids - Area of a curved surface - Calculation of Mass - Center of gravity - Moment of inertia - product of inertia – principal axes- Beta Function Gamma Function - Relation between Beta and Gamma Functions. Error Function or Probability Integral.

Fourier Series : Introduction – Euler 's Formulae - Conditions for a Fourier Expansion - Functions having points of discontinuity-Change of Interval-Odd and Even Functions-Expansions of Odd or Even Periodic Functions, Half-Range Series – Parseva's Formula. Practical Harmonic analysis.

Text Book:

* Scope and Treatment as in "Higher Engineering Mathematics", by Dr. B.S. Grewal, 43rd Edition, Khanna publishers.

Reference Books:

* Graduate Engineering Mathematics by V B Kumar Vatti., I.K. International publishing house Pvt. Ltd.

* Advanced Engineering Mathematics by Erwin Kreyszig.

* A text book of Engineering Mathematics, by N.P. Bali and Dr. Manish Goyal, Lakshmi Publications.

* Advanced Engineering Mathematics by H.K.Dass. S.Chand Company.

* Higher Engineering Mathematics by B.V. Ramana, Tata McGraw Hill Company.

* Higher Engineering Mathematics by Dr. M.K. Venkataraman.

GI 1102 PHYSICS

Course Objectives:

* To impart knowledge in basic concept of physics of Thermodynamics relevant to engineering applications.

* To grasp the concepts of physics for electromagnetism and its application to engineering. Learn production of Ultra sonics and their applications in engineering.

* To Develop understanding of interference, diffraction and polarization: connect it to a few engineering applications.

* To Learn basics of lasers and optical fibers and their use in some applications.

* To understand concepts and principles in quantum mechanics and Nano phase Materials. Relate them to some applications.

Course Outcomes:

* Understand the fundamentals of Thermodynamics and Laws of thermodynamics. Understand the working of Carnot cycle and concept of entropy.

* Gain Knowledge on the basic concepts of electric and magnetic fields. Understand the concept of the nature of magnetic materials. Gain knowledge on electromagnetic induction and its applications.

* Understand the Theory of Superposition of waves. Understand the formation of Newton srings and the working of Michelson interferometer. Remember the basics of diffraction, Evaluate the path difference. Analysis of Fraunhofer Diffraction due to a single slit

* Understand the inter action of matter with radiation, Characteristics of Lasers, Principle, working schemes of Laser and Principle of Optical Fiber. Realize their role in optical fiber communication.

* Understand the intuitive ideas of the Quantum physics and understand dual nature of matter. Compute Eigen values, Eigen functions, momentum of Atomic and subatomic particles using Time independent one Dimensional Schrodinger's wave equation. Understand the fundamentals and synthesis processes of Nano phase materials.

S Y L L A B U S

THERMODYNAMICS : Introduction, Heat and Work, First law of thermodynamics and applications, Reversible and Irreversible process, Carnot cycle and Efficiency, Second law of thermodynamics, Carnot's Theorem, Entropy, Second law in terms of entropy, Entropy and disorder, Third law of thermodynamics (statement only).

ELECTROMAGNETISM : Concept of electric flux, Gaus'slaw-some applications, Magneticfield-Magnetic force on current, torque on current loop, The Biot-Savart's Law, B near a long wire, B for a circular Current loop, Ampere slaw, B for a solenoid, Halleffect, Faraday slaw of induction, Lenz'slaw, Induced magnetic fields, Displacement current, Maxwell's equations (no derivation),Magnetic materials: Classification of magnetic materials and properties.

Ultrasonics: Introduction, Production of Ultrasonics – Piezoelectric and Magnetostriction methods, acoustic grating, applications of ultrasonics.

OPTICS

Interference: Principles of superposition – Young's Experiment – Coherence - Interference in thin films (reflected light),Newton's Rings, Michelson Interferometer and its applications.

Diffraction: Introduction, Differences between interference and diffraction, Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at a single slit (Qualitative and quantitative treatment).

Polarisation: Polarisation by reflection, refraction and double refraction in uniaxial crystals, Nicol prism, Quarter and Half wave plate, circular and elliptical polarization.

Lasers and fibre optics: Introduction, characteristics of a laser beam, spontaneous and stimulated emission of radiation, population inversion, Ruby laser, He-Ne laser, Semiconductor laser, applications of lasers. Introduction to optical fibers, principle of propagation of light in optical fibers, Acceptance Angle and cone of a fibre, Numerical aperture, Modes of propagations, classification of fibers, Fibre optics in communications, Application of optical fibers.

MODERN PHYSICS : Introduction, De Broglie concept of matter waves, Heisenberg uncertainty principle, Schrodinger time independent wave equation, application to a particle in a box. Free electron theory of metals, Kronig - Penney model (qualitative treatment), Origin of energy band formation in solids, Classification of materials into conductors, semiconductors and insulators.

NANOPHASEMATERIALS : Introduction, properties, Top-down and bottom up approaches, Synthesis-Ball milling, Chemicalvapour deposition method, sol-gel methods, Applications of Nano materials.

Text Books:

* Physics by David Halliday and RobertResnick– Part I and Part II-Wiley.

* Atextbook of Engineering Physics, Dr.M.N.Avadhanulu, Dr.P.G. Kshirsagar-S.Chand

* Engineering Physics by R.K. GaurandS.L.Gupta –DhanpatRai

Reference Books:

* Modern Engineering Physics byA.S.Vadudeva

* University Physics by Young and Freedman.

GI 1103 ENGINEERING GRAPHICS

Course Objectives:

* Understand the basics of Engineering Graphics and BIS conventions.

* Develop the graphical skills for communication of concepts, ideas and design of engineering products through technical drawings

* Demonstrate and practice the various profiles/curves used in engineering practice through standard procedures.

* Demonstrate and practice the orthographic projections of points, lines, planes, solids and section of solids

* Demonstrate and practice the development of surfaces of simple solids

* Familiarize the basic concept of isometric views clearly.

Course Outcomes:

* Develop simple engineering drawings by considering BIS standards.

* Able to draw different engineering curves with standard Procedures

* Comprehend the basics of orthographic projections and deduce orthographic projections of points, lines, planes and solids at different orientations in real life environment.

* Visualize clearly the sections of solids.

* Apply the concepts of development of surfaces while designing/analyzing any product.

* Recognize the significance of isometric drawing to relate 2D environment with 3Denvironment.

SYLLABUS

Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions, and Scales. Curves: Conic sections: General construction of ellipse, parabola and hyperbola. Construction of involutes of circle and polygons only.Normal and tangent to curves.

Projections of Points: Principal or Reference Planes, Projections of a point situated in any one of the four quadrants.

Projections of Straight Lines: Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane.

Projections of Straight Line Inclined to Both the Reference Planes: Projections of Planes: Projection of Perpendicular planes: Perpendicular to both reference planes, perpendicular to one reference plane and parallel to other reference plane and perpendicular to one reference plane and inclined to other reference plane. Projection of Oblique planes.Introduction to Auxiliary Planes.

Projections of Solids: Types of solids: Polyhedra and Solids of revolution. Projections of solids in simple positions: Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane and Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to other and axes inclined to both the reference planes.

Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids (Prism, Pyramid, Cylinder and Cone) in simple position only.

Development of Surfaces: Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone.

Isometric Views: Isometric projection, Isometric scale and Isometric view. Isometric view of Prisms, Pyramids, cylinder, cone, and their combinations.

Text Book:

* Elementary Engineering Drawing by N.D. Bhatt, Charotar Publishing House.

Reference Book:

* Engineering Graphics by K.L. Narayana and P.Kannaiah, Tata Mc-Graw Hill

GI 1104 ELEMENTS OF CARTOGRAPHY

Course Objectives:

* Understand the basics of Maps and Scales

* Understand the basics of map projections

* Acquisition of Map data

* Demonstrate the various map designs

* Demonstrate and practice the development of surfaces of simple solids

* Create an idea about relief feature of the terrain

Course Outcomes:

* Students can understand the basic rules to prepare a map.

* Students are able to draw maps based on Topo sheets for their requirements.

* Students able to draw different signs, symbols, lines, and curves with standard Procedures.

* Students can Visualize clearly the sections and Apply the concepts of development of surfaces while designing/ analyzing any product.

SYLLABUS

Fundamentals of Maps and Scale

Maps: basic characteristics of maps; types of maps– classified by scale, function and subject matter. Map scale; Representation of scale on maps; Determining the scale of a map; Geographical coordinates-latitudes and longitudes; Properties of the graticule

Map Projections

Map Projections-conformal, equivalent and azimuthal projections; Perspective projections, Non-perspective projections, Conventional projections

Conical projections; Cylindrical Projections; Zenithal projections; Space map projection

Sources of Map data

Ground surveys: Principles of surveying; Measurement technology–traditional and automated survey systems

Remote sensing: aerial photography and satellite-based imaging;

Census: population enumerations, geocoding– entity focus and aggregation

Spatial sampling: sample size, sampling units, dispersion of sampling units, sample distribution

Cartographic Map Design

Cartographic design: Graphic elements of map design; Contrast, Figure-ground, colour and balance. Typography and lettering - type form, type size and type colour; Methods of lettering - cerographic technique, free-hand lettering, stick-up lettering, mechanical lettering; Guidelines for positioning of letters; lettering as a graphic symbol.

Relief and Slope Representation

Relief representation on maps: Pictorial methods–hachuring, hill-shading; Quantitative methods – Spot heights, Bench Marks, contours

Slope representation: Methods of expression of slopes–degrees, gradient percentage; finding slopes from contours– Wentworth's method and Smith's method Block diagrams, Digital Cartography

Textbooks:

* Elements of Cartography by A.H. Robinson, J.L.Morrison, P.C. Muehrcke, A.J. Kimerling and S.T. Guptill,JohnWiley & Sons,2004

* Elements of Cartography by A.H. Robinson and K.D. Sale, John Wiley &Sons

Reference Books:

* Fundamentals of Cartography by R.P. Misra and A. Ramesh, McMillan Co., New Delhi

* Elements of Practical Geography by R.L. Singh, KalyaniPublishers, New Delhi

GI 1105 SURVEYING

Course Objectives:

* Understand the basics of Surveying

* To determine the relative position of any objects or points of the earth.

* To determine the distance and angle between different objects.

* To prepare a map or plan to represent an area on a horizontal plan.

* To develop methods through the knowledge of modern science and the technology and use them in the field.

* To solve measurement problems in an optimal way.

Course Outcomes:

* The students are able to understand the use of different surveying instruments and their use

* Students are able to calculate compute the area and earthwork for different works by using surveying instruments.

* Use and operate dumpy Level and Theodolite in the field.

* Apply the knowledge of principles and purpose of Tachometry in finding out the constants.

* Use total station in the field for land survey.

* Summarize the basic principles of GPS and GIS.

SYLLABUS

Fundamentals and Classification of Surveying

Principles of Surveying, Classification of Surveying, Introduction to various traditional surveys –Chain Surveying: Instruments, Sources of errors – Compass Surveying: Definitions of Bearings, Theory of Magnetic Compass, Problems and errors in compass survey – Plane Table Surveying: Working Operations, Leveling– Centering–Orientation, Methods of Plane Table Surveying.

Types and Methods of Leveling

Leveling – Methods of Leveling – Dumpy Level: Differential Leveling, Profile Leveling, Cross sections, Reciprocal Leveling, Precise Leveling – BS, FS, IS, HI, TP, reduction of levels –Theodolite: Measurement of horizontal and vertical angles, Open and Closed traversing, Concepts of Trigonometric leveling.

Tacheometric Surveying

Tacheometric Surveying–Principles of Tacheometry, Stadia method-Principle of Stadia method, Distance and Elevation formulae for staff vertical & staff normal, Sub tense method -Principle of Sub tense method, vertical base observations, horizontal base sub tense measurement, methods of reading the staff, Tangential method–constant base tangential measurements, variable base tangential measurements.

Concepts of Triangulation

Concepts of Triangulation–Geodetic surveying, classification of triangulation systems, Triangulation figures and systems, Topographic Surveying – methods of representing relief, contours and contour interval, characteristics of contours, procedure in topographic surveying, contour interpolation.

Advanced Methods of Surveying

Advanced Methods of Surveying – Electronic devices: Total Station, Global Positioning System, Differential Global Positioning System, Remote Sensing, Aerial Photogrammetry.

Text Books:

* B.C. Punmia. Surveying (VolumeI&II).

* Paul R Wolf.Elements of Photogrammetry–With Application in GIS. McGrawHill

Reference Book:

· Laxmi Publications Surveying Volume –1,5thEdition.S.K.Duggal.

GI 1106 WORKSHOP

Course Objectives:

Get hands on experience with the working skills in Carpentry trade.

* Know how to work with Sheet Metal tools.

* Get familiar with the working skills of Metal Fitting operations.

* Get hands on experience with house hold electrical wiring.

Course Outcomes:

* Can be able to work with Wood Materials in real time applications.

* Can be able to build various parts with Sheet Metal in day-to-day life.

* Can be able to apply Metal Fitting skills in various applications.

* Can be able to apply this knowledge to basic house electrical wiring and repairs.

SYLLABUS

Carpentry: Any three jobs from – Half lap joint, Mortise and Tenon joint, Half – lap Dovetail joint, Corner Dovetail joint, Central Bridle joint.

Sheet Metal: Any three jobs from – Square tray, Taper tray (sides), Funnel, Elbow pipe joint.

Fitting: Any three jobs from – Square, Hexagon, Rectangular fit, Circular fit and Triangular fit.

House wiring: Any three jobs from – Tube light wiring, Ceiling fan wiring, Stair-case wiring, Corridor wiring.

Text Books:

* Elements of workshop technology, Vol.1 by S. K. and H. K.Choudary.

* Work shop Manual / P.Kannaiah/ K.L.Narayana/ SciTech Publishers.

Reference Book:

* Engineering Practices Lab Manual, Jeyapoovan, SaravanaPandian, 4/ eVikas

GI 1107 PHYSICS LAB

Course Objectives:

* To enable the students to acquire skill, technique and utilization of the Instruments

* Draw the relevance between the theoretical knowledge and to imply it in a practical manner with respect to analyze various electronic circuits and its components.

* To impart the practical knowledge in basic concepts of Wave optics, Lasers and Fiber optics.

* To familiarize the handling of basic physical apparatus like Verniercallipers, screw gauge, spectrometers, travelling microscope, laser device, optical fibre etc.

Course Outcomes:

* Ability to design and conduct experiments as well as to analyze and interpret

* Ability to apply experimental skills to determine the physical quantities related to Heat, Electromagnetism and Optics

* The student will learn to draw the relevance between theoretical knowledge and the means to imply it in a practical manner by performing various relative experiments.

SYLLABUS

1. Determination of Radius of Curvature of a given Convex Lens By forming Newton's Rings.
2. Determination of Wave length of Spectral Lines in the Mercury Spectrum by Normal Incidence method.
3. Study the Intensity Variation of the Magnetic Field along axis of Current Carrying Circular Coil.
4. Determination of Cauchy s Constants of a Given Material of the Prism using Spectrometer.
5. Determination of Refractive Index of Ordinary ray and Extraordinary ray.
6. Determination of Thickness Given Paper Strip by Wedge Method.
7. Calibration of Low Range Voltmeter.
8. Calibration of Low Range Ammeter.
9. Determination of Magnetic Moment and Horizontal Component of Earth's Magnetic Field.
10. Lees Method-Coefficient of thermal Conductivity of a Bad Conductor.
11. Carey Foster's Bridge–Verification of laws of Resistance and Determination Of Specific Resistance.
12. Melde's Apparatus –Frequency of electrically maintained Tuning Fork.
13. Photo electric cell-Characteristics.
14. Planks Constants.
15. Laser-Diffraction.

Textbooks:

* Physics by David Halliday and Robert Resnick– Part-I and Part-II-Wiley.
* Atext book of Engineering Physics, Dr.M.N.Avadhanulu,Dr.P.G.Kshirsagar-S.Chand
* Engineering Physics by R.K.GaurandS.L.Gupta–DhanpatRai

ReferenceBooks:

* Modern Engineering Physics by A.S.Vadudeva
* University Physics byYoung and Freedman

GI 1108 SURVEYING FIELD WORK

Course Objectives:

* To enable the students to acquire skill, technique and utilization of the Instruments
* Understand the basics of Surveying
* To impart the practical knowledge in basic concepts on Surveying Instruments
* To determine the distance and angle between different objects.
* To solve measurement problems in an optimal way.

Course Outcomes:

* The students are able to understand the use of different surveying instruments and their use
* Students are able to calculate compute the area and earthwork for different works by using surveying instruments.
* Use and operate of Chain, Compass and Plane Table in the field.
* Use and operate dumpy Level and Theodolite in the field.
* Apply the knowledge of principles and purpose of Tacheometry in finding out the constants.
* Use total station in the field for land survey.
* Summarize the basic principles of hand held GPS.

SYLLABUS

1. Chain survey
2. Prismatic Compass survey
3. Dumpy Level
4. Survey Plane Table Survey
5. Total Station Survey
6. GPS Survey
7. Integration of field surveys with various software.

Text Books:

* B.C. Punmia.Surveying (VolumeI&II).
* Paul RWolf.Elements of Photogrammetry–With Application in GIS. McGrawHill

Reference Book:

* Laxmi Publications Surveying Volume –1,5thEdition.S.K.Duggal.

(FIRSTYEAR) 2nd SEMESTER

GI 1201 MATHEMATICS–II

Course Objectives:

* The way of obtaining rank, eigen values and eigen vectors of a matrix.
* To know the importance of Cayley-Hamilton theorem and getting canonical form a given quadratic form.

* To solve the system of equations by using direct and indirect methods.

* To solve first order and higher order differential equations by various methods.

* To obtain the Laplace transforms and inverse Laplace transforms for a given functions and their applications.

Course Outcomes:

* Find rank, eigen values and eigen vectors of a matrix and understand the importance of Cayley-Hamilton theorem.

* Reduce quadratic form to canonical forms and solving linear systems by direct and indirect methods.

* Demonstrate solutions to first order differential equations by various methods and solve basic applications problems related to electrical circuits, orthogonal trajectories and Newton's law of cooling

* Discriminate among the structure and procedure of solving higher order differential equations with constant and variable coefficients.

* Understand Laplace transforms and its properties and finding the solution of ordinary differential equations.

SYLLABUS

Linear Algebra : Rank of a matrix- Echelon form, Normal Form - Solution of Linear System of Equations -Consistency of Linear System of Equations - Direct & Indirect Methods: Gauss elimination method, LU Factorization method, Gauss Seidal Method. Complex Matrices: Hermitian, Skew-Hermitian and Unitary Matrices and their Properties.

EigenValues and Eigen Vectors : Eigen Values and Eigen Vectors of a Matrix - Cayley-Hamilton theorem - Inverse and Powers of a Matrix using Cayley-Hamilton's theorem and its applications.Diagonalization of a Matrix -Quadratic Forms - Reduction of Quadratic Form to Canonical Form - Nature of a Quadratic Form.

Ordinary Differential Equations of First Order and its Applications : Formation of ordinary differential equations (ODEs) –Solution of an ordinary differential equation-Equations of the first order and first degree-Linear differential equation-Bernoulli sequation - Exact differential equations - Equations reducible to exact equations - Orthogonal Trajectories -Simple Electric (LR & CR) Circuits – Newton's Law of Cooling - Law of Natural growth and decay.

Differential Equations of Higher Order : Solutions of Linear Ordinary Differential Equations with Constant Coefficients-Rules for finding the complimentary function-Rules for finding the particular integral-Method of variation of parameters- Cauchy slinear equation - Legendre's linear equation- Simultaneous linear differential equations.

Laplace Transforms : Introduction-Existence Conditions-Transforms of Elementary Functions-Properties of Laplace Transforms - Transforms of Derivatives - Transforms of Integrals - Multiplication by t^n -Division by t – Evaluation of integrals by Laplace Transforms - Inverse Laplace Transform -Applications of Laplace Transforms to Ordinary Differential Equations - Simultaneous Linear Differential Equations with Constant Coefficients-Second Shifting Theorem-Laplace Transforms of Unit Step Function, Unit Impulse Function and Laplace Transforms of Periodic Functions.

Text Book:

* Scope and Treatment as in "Higher Engineering Mathematics", by Dr.B.S.Grewal, 43r^{d}edition, Khanna publishers.

ReferenceBooks:

* Advanced Engineering Mathematics by Erwin Kreyszig.

* Graduate Engineering Mathematics by VBKumarVatti., I.K. International publishing house Pvt. Ltd.

* Atext book of Engineering Mathematics, by N.P.Bali and Dr.ManishGoyal. Lakshmi Publications.

* Advanced Engineering Mathematics by H.K.Dass.S.Chand Company.

* Higher Engineering Mathematics by B.V.Ramana, Tata McGraw Hill Company.

GI1202 GREEN CHEMISTRY

Unit 1: Water Technology : Sources of Water – Impurities and their influence of living systems – WHO Limits – Hardness and its Determination – Boiler Troubles and their removal – Water Softening Methods – Lime-Soda, Zeolite and Ion Exchange - Municipal Water Treatment-Break Point Chlorination – Desalination of Sea Water – Reverse Osmosis Method, Electro-dialysis.

Unit 2: Batteries : Primary batteries: The chemistry - Types: Zinc-carbon (Leclanche type), zinc alkaline (Duracell), zinc/air batteries; Lithium primary cells – liquid cathode, solid cathode and lithium-ferrous sulphide cells. Secondary batteries: Lead acid and VRLA (valve regulated (sealed) lead acid), nickel-cadmium, nickel-zinc, nickel-metal hydride batteries, lithium ion batteries, ultrathin lithium polymer cells. Advanced Batteries for electric vehicles, requirements of the battery – sodium-beta and redox batteries.

Unit 3: Fuel Cells : Fuel Cells: Description, working principle, anodic, cathodic and cell reactions, fabrication of electrodes and other components, applications, advantages, disadvantages and environmental aspects of the following types of fuel cells: Proton Exchange Membrane Fuel Cells, alkaline fuel cells, phosphoric acid, solid oxide, molten carbonate, direct methanol fuel cells- Membranes and Fuels

Unit 4: Corrosion : Corrosion: Origin and Theory – Types of Corrosion: Chemical and Electrochemical; Pitting, Inter granular, Waterline, Stress – Gal-

vanic Series – Factors Effecting Corrosion. Corrosion Controlling Methods,Protective Coatings, Metallic Coatings, Electroplating and Electro less Plating.

Unit 5: Green Chemistry and Technology : Introduction and significance of green chemistry, Goals of green chemistry, 12 principles of green chemistry, toxicity of chemicals, material safety data sheet (MSDS), concept of zero pollution technologies, atom economy, functional toxicity vs non-functional toxicity, functional group approaches to green chemistry, Elimination of toxic functional group, optimization of frameworks for the design of greener synthetic pathways, Applications of green chemistry - Green solvents, green fuels and propellants, biocatalysts.

Text Books

1. Engineering Chemistry – PC Jain and M. Jain – DhanpathRai and Sons, New Delhi.

2. A Text book of Engineering Chemistry – S. S. Dara – S. Chand & Co. New Delhi.

3. Hand Book of Green Chemistry and Technology; by James Clarke and Duncan Macquarrie; Blakwell Publishing.

GI 1203 ENGLISH

Course Objectives:

* To make students understand the explicit and implicit meanings of a text/topic;

* To give exposure to new words and phrases, and aid to use them in different contexts;

* To apply relevant writing formats to draft essays, letters, emails and presentations and

* To adapt oneself to a given situation and develop a functional approach to finding solutions: adaptability and problem solving.

Course Outcomes:

* Students will be able to analyses a given text and discover the various aspects related to language and literature;

* Learn the various language structures, parts of speech and figures of speech;

* Develop one's reading and writing abilities for enhanced communication and

* Learn to apply the topics in real-life situations for creative and critical use.

SYLLABUS

On the conduct of life: William HazlittLifeskills: Values and Ethics

If:RudyardKipling

The Brook: Alfred Tennyson Lifeskills: Self-Improvement

HowIBecameaPublic Speaker:George Bernard Shaw

The Death Trap: Saki

Lifeskills:Time Management

OnsavingTime:Seneca

ChinduYellama

Lifeskills:Innovation

Muhammad Yunus

Politics and the English Language: George Orwell Lifeskills: Motivation

Dancer with a White Parasol: Ranjana Dave

Grammar: Prepositions – Articles – Noun-Pronoun Agreement, Subject-Verb Agreement –MisplacedModifiers– Clichés, Redundancies.

Vocabulary: Introduction to Word Formation – Root Words from other Languages – Prefixes and Suffixes –Synonyms, Antonyms– Common Abbreviations

Writing: Clauses and Sentences – Punctuation – Principals of Good Writing – Essay Writing –Writing a Summary

Writing: Essay Writing Lifes kills: Innovation Muhammad Yunus

TextBook:

* Language and Life: A Skills Approach Board of Editors, Orient Blackswan Publishers,India.2018.

ReferencesBooks:

* Practical English Usage, Michael Swan.OUP.1995.

* Remedial English Grammar, F.T.Wood. Macmillan.2007

* On Writing Well, William Zinsser. HarperResourceBook.2001

* Study Writing, LizHamp-Lyons and Ben Heasly. Cambridge University Press.2006.

* Communication Skills, Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.

* Exercises in Spoken English, Parts. I-III.CIEFL, Hyderabad.Oxford University Press.

GI 1204 COMPUTER PROGRAMMING AND NUMERICAL METHODS

Course Objectives:

* The course is designed to provide complete knowledge of C language.

* To provide students with understanding of code organization and functional hierarchical decomposition with using complex data types.

* To provide knowledge to the Students to develop logics which will help them to create programs, applications in C.

* This course aims to identify tasks in which the numerical techniques learned are applicable and apply them to write programs, and hence use computers effectively to solve the task.

* This course provides the fundamental knowledge which is useful in understanding the other programming languages.

Course Outcomes:

* Identify basic elements of C programming structures like data types, expressions, control statements, various simple functions and Apply them in problem solving.

* Apply various operations on derived data types like arrays and strings in problem solving.

* Design and Implement of modular Programming and memory management using Functions, pointers.

* Apply Structure, Unions and File handling techniques to Design and Solve different engineering programs with minimal complexity.

* Apply Numerical methods to Solve the complex Engineering problems.

SYLLABUS

Introduction to C: Basic structure of C program, Constants, Variables and data types, Operators and Expressions, Arithmetic Precedence and associativity, Type Conversions. Managing Input and Output Operations Formatted Input, Formatted Output.

Decision Making, Branching, Looping, Arrays & Strings: Decision making with if statement, Simple if statement, The if…else statement, Nesting of if…else statement, the else..if ladder, switch statement, the (?:) operator, the GOTO statement., The while statement, the do statement, The for statement, Jumps in Loops, One, Two-dimensional Arrays, Character Arrays. Declaration and initialization of Strings, reading and writing of strings, String handling functions, Table of strings.

Functions: Definition of Functions, Return Values and their Types, Function Calls, Function Declaration, Category of Functions: No Arguments and no Return Values, Arguments but no Return Values, Arguments with Return Values, No Argument but Returns a Value, Functions that Return Multiple Values. Nesting of functions, recursion, passing arrays to functions, passing strings to functions, the scope, visibility and lifetime of variables.

Pointers: Accessing the address of a variable, declaring pointer variables, initializing of pointer variables, accessing variables using pointers, chain of pointers, pointer expressions, pointers and arrays, pointers and character strings, array of pointers, pointers as function arguments, functions returning pointers, pointers to functions, pointers to structures-Program Applications

Structure and Unions: Defining a structure, declaring structure variables, accessing structure members, structure initialization, copying and comparing structure variables, arrays of structures, arrays within structures, structures within structures, structures and functions and unions, size of structures and bit-fields-Program applications.

File handling: Defining and opening a file, closing a file, Input/output operations on files, Error handling during I/O operations, random access to files and Command Line Arguments-Program Applications

Numerical Methods: Solutions of Algebraic and Transcendental Equations, Bisection Method, Newton RaphsonMethod.Newton's forward and backward Interpolation, Lagrange's Interpolation in unequal intervals. Numerical Integration: Trapezoidal rule, Simpson's 1/3 rules. Solutions of Ordinary First Order Differential Equations: Euler's Method, Modified Euler's Method and Runge-Kutta Method.

Text Books:

* Programming in ANSIC, E Balagurusamy, 6th Edition. McGrawHill Education (India) Private Limited.

* Introduction to Numerical Methods, SS Sastry, Prentice Hall

Reference Books:

* Let Us C,YashwantKanetkar,BPB Publications, 5thEdition.

* Computer Science, Astructured programming approach using C",B.A. Forouzan and R.F.Gilberg,"3rd Edition, Thomson,2007.

* The C –Programming Language B.W. Kernighan,DennisM. Ritchie, PHI.

* Scientific Programming: C-Language, Algorithms and Models in Science, Luciano M.Barone(Author), Enzo Marinari (Author), Giovanni Organtini, World Scientific.

GI1205 : FUNDAMENTALS OF GEOLOGY

Course Objectives:

The Objective of the course is

* To train the student in basics of geology, i.e. Origin of the earth, layers of earth.

* To impart knowledge on rock and mineral types, geological landforms and formations.

* To impart knowledge on geophysical investigations.

* To teach the importance of geology in designing of dams, reservoirs, tunnels and roads.

Course Outcomes:

Upon successful completion the student will be able to,

* Understand the dynamics of Earth –endogenetic and exogenetic forces.

* Identify different minerals and their properties.

* Identify different rocks, their origin and properties.

* Identify lithology and structure of geological formations.

* Understand geological importance in different civil engineering projects.

SYLLABUS

Branches of Geology – Solar system, Origin of the Earth, Age of the Earth, Interior of the Earth, Isostasy, Elements of seismology, Earthquakes, Volcanoes, Elementary knowledge on continental drift and plate tectonics with evidences. Groundwater.Minerology-Classification of minerals, diagnostic physical and optical properties of rock forming minerals.

Igneous rocks - classification, forms, Structures and textures – Description of Granite, Syenite, Diorite, Gabbro, Pegmatite, Dolerite and Basalt. Sedimentary rocks - classification, forms, structures and textures- Description of sandstone, limestone, shale, Conglomerate and breccia.Metamorphicrocks-classification,forms,structuresandTextures-Description of Quartzite, Marble, Slate, Phyllite, Gneiss and Schist, Khondalite, Charnockite. Igneous and metamorphic provinces of India.

Strike, Dip, Plunge; Description and classification of folds, faults, Joints and Unconformities; Use of Brunton compass; Clinometer compass.

Stratigraphy: Stratigraphic principles; Geological timescale, majorstrati graphic divisions of India. -Major geological formation of India: Achaeans group, Cuddapah system, Vindhyan formations, Gondwana system, Deccan traps, Siwaliks. Geology and Mineral Resources of Andhra Pradesh.

Geophysical Investigations (Electrical, Seismic survey) for constructions of dams, reservoirs, buildings, roads, coastal structures, and Tunnels. Importance of geology in construction and development of civil Engineering projects.

Text Books:

* ParbinSingh,"Engineering and General Geology",Katson Publication House, 2013.

* K.M. Bangar" Principles of Engineering Geology. Standard publishers Distributors.

* KrynineandJudd,"EngineeringGeology and Geotechniques", McGraw Hill Book Company, 1970.

Reference Books:

* Legeet,"GeologyandEngineering",McGrawHillBookCompany,1998.

* Blyth, "GeologyforEngineers",ELBS,1985.

GI 1206 ENGLISH LANGUAGE LAB

Course Objectives:

* To make students recognize the sounds of English through Audio-Visual aids;

* To help students build their confidence and help them to over come their inhibitions and self-consciousness while speaking in English;

* To familiarize the students with stress and in to nation and enable them to speak English effectively

* Togive learner sexposureto and practicein speakingin bothformal and informal contexts.

Course Outcomes:

* Students will be sensitized to wards recognition of English sound patterns and the fluency in their speech will be enhanced;

* A study of the communicative items in the laboratory will help students become successful in the competitive world;

* Students will be able to participate in group activities like role plays, group discussions and debates.

* Students will be able to express themselves fluently and accurately in social as well professional context.

SYLLABUS

Introduction to Phonetics: The Sounds of English (Speech sound – vowels and consonants) –Stress and Intonation -Accent and Rhythm.

Listening Skills: Listening for gist and specific information-listening for Note taking, summarizing and for opinions-Listening to the speeches of eminent personalities.

Speaking Skills: Self-introduction - Conversation Skills (Introducing and taking leave) – Giving and asking for information-RolePlay-Just A Minute(JAM)session-Telephone etiquette.

Reading and Writing skills: Reading Comprehension–Précis Writing-E-Mail writing-Punctuation.

Presentation skills: Verbal and non-verbal communication - Body Language - Making a Presentation.

ReferenceBooks:

* Ashraf Rizvi. Effective Technical Communication. Tata McGraw Hill Education Private Limited, New Delhi.

* SpeakWell.OrientBlackswanPublishers,Hyderabad.

* Allan Pease.BodyLanguage. ManjulPublishingHouse,NewDelhi.

GI1207 GREEN CHEMISTRY LAB

Course Objectives:

CO 1: To develop the fine skills of quantitative determination of various chemi cal components through titrimetric analysis

CO 2: To prepare ion exchange/ zeolite column for removal of hardness

CO 3: To develop the skill of green synthesis through the preparation of a polymer/ drug

Learning Outcomes:

LO 1: The students are able to determine the amount of various chemical species in solutions by titrations quantitatively with accuracy

LO 2: The students are able to develop novel materials to be used as zeolite and prepare columns for removal of hardness of water

LO 3: The students develop skills to synthesise a polymer or a drug

SYLLABUS

1. Determination of Sodium Hydroxide with HCl (Na_2CO_3 Primary Standard)
2. Determination of Alkalinity (Carbonate and Hydroxide) of water sample
3. Determination of Chromium (VI) by Mohr's Salt Solution
4. Determination of Hardness of Water sample by EDTA method
5. Ion exchange/ Zeolite column for removal of hardness of water
6. Green Synthesis of Polymer/ drug

Text Books:

1. Vogel's Quantitative Chemical Analysis – V – Edition – Longman.

2. Experiments in Applied Chemistry (For Engineering Students) – Sirita Rattan – S. K. Kataria& Sons, New Delhi

GI 1208 COMPUTER PROGRAMMING AND NUMERICAL METHODS LAB

Course Objectives:

* To impart writing skill of C programming to the students and solving problems.

* To write and execute programs in C to solve problems such as Modularize the problems into small modules and then convert them into programs.,

* To write and execute programs in C to solve problems such as arrays, files, strings, structures and different numerical methods.

* This reference has been prepared for the beginners to help them understand the basic to advanced concepts related to Objective-C Programming languages.

Course Outcomes:

* Understand various computer components, Installation of software. C programming development environment, compiling, debugging, and linking and executing a program using the development environment.

* Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs.

* Construct programs that demonstrate effective use of C features including arrays, strings, structures, pointers and files.

* Apply and practice logical ability to solve the real world problems.

* Apply Numerical methods to solve the complex Engineering problems.

SYLLABUS

1. Write a program to read x, y coordinates of 3 points and then calculate the area of a triangle formed by them and print the coordinates of the three points and the area of the triangle. What will be the output from your program if the three given points are in a straight line?

2. Write a program,which generates 100 random integers in the range of 1 to 100. Store them in an array and then print the arrays. Write 3 versions of the program using different loop constructs.(e.g. for, while, and do while).

3. Write a set of string manipulation functions e.g. for getting a substring from a given position, Copying one string to another, Reversing a string, adding one string to another.

4. Write a program which determines the largest and the smallest number that can be stored indifferent data types like short, int, long, float, and double. What happens when you add 1 to the largest possible integer number that can be stored?

5. Write a program, which generates 100 random real numbers in the range of 10.0 to 20.0, andsortthem in descendingorder.

6. Write a function for transposing a square matrix in place (in place means that you are not allowed to have full temporary matrix).

7. First use an editor to create a file with some integer numbers. Now write a program, which reads these numbers and determines their mean and standard deviation.

8. Given two points on the surface of the sphere, write a program to determine the smallest are length between them.

9. Implement bisection method to find the square root of a given number to a given accuracy.

10. Implement Newton Raphson method to det.a root of polynomial equation.

11. Given table of x and corresponding f(x) values, Write a program which will determine f(x) value at an intermediate x value by using Lagrange's interpolation/

12. Write a function which will invert a matrix.

13. Implement Simpson's rule for numerical integration.

14. Write a program to solve a set of linear algebraic equations.

(SECOND YEAR) 1st SEMESTER

GI 2101 PROBABILITY AND STATISTICS

Course Objectives:

The objective of the courseis to introduce the students to:

* The basic concepts inprobability, conditional probability and independent events.

* Therandomvariables and mathematical expectation.

* Different types of distributions, designs and queueing models.

* The concept of reliability, series and parallel systems.

Course Outcomes:

Upon completion of this course the student will be able to,

* Find derivatives of random variables

* Evaluate distributions, Regressions and Transformation of random variables.

* Understand random process classification, Markov process and queueing models

* Understand concept of reliability, Series and parallel systems

* Understand design of experiments, quality control and different designs

SYLLABUS

Probability and Random Variables:Probability concepts, Random variables, Moments, Moment Generating function,Binomial,Poisson,Geometric, Negative binomial, Exponential, Gamma,Weibull distributions, Functions of random variable, Chebychev inequality.

Two Dimensional Random Variables, Marginal and conditional distributions, Covariance, Correlationand Regression,Transformation of random variables, Central limit theorem.

Random Processes: Classification, Stationary and Markov processes, Poisson process, pure birth process,Birth and deathprocess, Markovchains, Markovianqueueingmodels.

Reliability Engineering: Concepts of reliability, Hazard function, Series and parallel systems, Reliability and Availability of Markovian systems, Maintaina bility, Preventive maintenance.

Design of Experiments and Quality Control: Completely randomized design, Randomized block design, Latins quarede sign, Process control, Control charts of measurements and at tributes, Tolerance limits.

TextBooks:

* Miller, I.RandFreund,J.D., Probability and Statistics for engineers, Prentice-Hall,1995

* Kapur, J.Nand Saxena,H.C, Mathematical statistics, S.Chand & CompanyLtd., New Delhi,1997

* Balagurusamy,E,Reliabilityengineering,Tata-McGrawHill Publishers, New Delhi,1984

* Bhat,U.N, Elements of applied stochastic processes, Wiley Seriesin Probability and Mathematical statistics, New York, 1983

GI 2102 FUNDAMENTALS OF ATMOSPHERIC SYSTEMS

Course Objectives:

The Objective of the course is

* To impart the basic knowledge in concepts of Atmosphere Science and Meteorology.

* To give knowledge on weather system and disturbances.

* To impart knowledge on weather forecasting.

Course Outcomes:

Upon completion of this course the student will be able to,

* Understand the atmospheric structure and composition.

* Measure atmospheric pressure and wind parameters.

* Understand concepts of monsoons and their movements.

* Understand weather disturbances and weather forecasting models.

SYLLABUS

The Atmosphere: Nature, origin, composition and vertical structure.

Insolation and Heat Budget: Insolation, solar constant, distribution, atmospheric depletion of solar radiation, heat budget, latitudinal heat budget. Temperature of the atmosphere: Heat and temperature, processes of heat energy transfer, heating and cooling of atmosphere ; Controls of temperature

; Distribution of temperature: Air temperature and its measurement, measurement of sunshine and insolation ; Horizontal distribution, seasonal distribution, vertical distribution, temperature inversion.

Air Pressure and winds: Measurement of air pressure, variations of air pressure and weather, pressure gradient; Pressure variations: diurnal and seasonal; basic atmospheric pressure patterns; vertical variation in air pressure; horizontal distribution of pressure; seasonal variations in pressure pattern; Wind: Factors affecting wind direction and speed, wind observation and measurement; wind shift. General circulation of the atmosphere : Thermal circulation on non-rotating earth, thermal circulation on a rotating earth. Surface wind systems. Departure from idealized circulation pattern; Surface wind systems; Latitudinal shifting of wind belts; Longitudinal variations in air flow patterns; Winds in tropical region; Subtropical winds; Westerlies; polar winds ; Jet stream

Atmospheric Moisture : Sources of atmospheric moisture, humidity measurements, evaporation, factors affecting evaporation, potential evapotranspiration; Clouds : Formation and classification.

Precipitation: Causes, forms, processes, and types, observations of precipitation, regional distribution and seasonal variation of precipitation, artificial precipitation.

Monsoons : Economic importance of monsoon, concepts of the origin of monsoon, Asian monsoon; Indian monsoon, burst of monsoon, climatic significance of monsoon.

Weather disturbances :Air masses: source regions, classification, air mass modification. Fronts : General characteristics, frontogenesis and frontolysis, classification of fronts.

Tropical disturbances : Types of tropical disturbances, origin of tropical cyclones, movement and tracks of hurricanes, hurricane seasons, regional distribution.

Thunderstorms, tornadoes and waterspouts : Thunderstorms-origin and structure, stage of development, Thunderstorm electricity and thunder, precipitation in thunder storm, classification and distribution; tornadoes and water spouts.

Weather forecasting and analysis: Historical background, how weather forecasting in done, types of weather forecasts, weather forecasting methods, satellites in weather forecasting.

Applied climatology: climate and natural vegetation, climate and agriculture, climate and animal husbandry, climate and housing, Air pollution and health, climate and human comfort, climate and urban planning.

Text Books:

* Climatology, Lal, D.S., Sharda Pustak Bhawan, 11, University road, Allahabad, 2003

* General climatology, Howard J. Critch field, Prentice-Hall of India private Limited, NewDelhi, 1987.

ReferenceBooks:

* PhysicalGeography, Tikka, R.N., KedarNath Ram Nath & Co, Meerut, 2006

* Meteorology Today, C. Donald Ahrens, West Publishing company, New York, Third edition

* Atmosphere, weather and climate, Siddhartha, K., Kisalaya Publications Pvt. Ltd., 2004

GI 2103 GEOMORPHOLOGY

Course Objective:

The objective of this course is to impart the fundamental principles of geomorphology, the pivotal branch of earth system science.

Course Outcome:

The student will gain a conceptual understanding of the processes that shape landforms, which are the earth's surface manifestations of the geologic structure at various stages of their evolution, as well as how this knowledge is useful in the exploration of natural resources and the development of engineering projects.

SYLLABUS

Geomorphological Concepts, Processes and Agents:

Geomorphology: definition and scope. Fundamental concepts of geomorphology. Outline of the geomorphic processes: Endogenetic processes – Volcanism and Tectonism, Exogenetic processes – Weathering, Mass-wasting and Erosion. Geomorphic agents.

Fluvial and Coastal Landforms:

Fluvial Landforms: Valleys and valley forming processes, and Fluvial erosional and depositional landforms; Classification of streams.

Coastal processes and forms: Definition of Shoreline, Shore zone and Coast; Wind waves, Tides, Littoral currents, Storm surges and Tsunamis; Erosional and Depositional landforms.

Glacial and Eolian Landforms:

Glacial processes and landforms: Snow, Firn and Ice; Types of glaciers; Glacial motion; Regimen of glaciers – nourishment and wastage of glaciers; Active, passive and dead glaciers; erosional and depositional landforms

Eolian processes and landforms: Wind as a dominant geomorphic agent in arid and semi-arid regions; Erosional and depositional landforms.

Soil Geomorphology:

Soil and regolith; Soil forming factors: geological, climatic, topographical, biological and time; Soil components: Mineral matter, Organic matter, Soil-water and Soil-air; Soil Properties: Colour, Texture, Structure, Acidity and Alkalinity; Soil profile; Pedogenic regimes: Laterisation, Gleisation, Podzologisation, Calcification and Salinisation; Soil classifications: Zonal system and Seventh approximation system.

Geomorphic Cycle and Applied Geomorphology:

Theories of landform evolution and erosion cycle: Peneplain concept of Davis, Penck's concept of erosion cycle; Planar surfaces.

Applied Geomorphology: Landform interpretation for exploration of groundwater, minerals – surface expression of ore bodies, weathering residues, placer deposits, hydrocarbon resources. Applications in engineering projects: route selection for highways, canals and transmission lines; Site selection for dams, industries and townships.

Text Books

1. Geomorphology by A.L. Bloom, Waveland Pr.Inc. 2004

2. Principles of Geomorphology (Third Edition) by W.D. Thornbury, New Age International (P) Ltd. 2019

3. Basics of Geomorphology: Key Concepts by K.J. Gregory and J. Lewin, SAGE, 2014

4. Fundamentals of Geomorphology (Fourth edition) by R. Huggett, Routledge, 2018

GI 2104 OBJECT ORIENTED PROGRAMMING THROUGH C++ AND JAVA

Course Objectives:

The objective of the course is

* To understand the concepts and features of Object Oriented Programming.

* To examine key aspects of C++ and Java.

* To learn java's exception handling mechanism, multi threading, packages and interfaces.

* To develop skills in internet programming using applets and swing.

Course Outcomes:

Upon completion of the course the student will be able to

* Define, understand and differentiate Object oriented concepts.

* Understand basics of Java.

* Create different classes and Objects.

* Understand concept of Inheritance, Polymorphism.

* Design and develop applications using applets and swings.

SYLLABUS

Overview of object-oriented programming (OOP): OOP paradigm, basic concepts underlying OOP: data abstraction and encapsulation, objects and classes, inheritance, polymorphism. Operator overloading, function overloading, single inheritance, multiple inheritance.

Review of Language constructs of C used in C++: variables, types and type declarations, user defined data types; increment and decrement operators, relational and logical operators; if then else clause; conditional expressions, input and output statement, loops, switch case, arrays, stacks, queues, structure, unions, functions, pointers; preprocessor directives and examples of these applications in C++.

Creation of Classes and Objects, accessing class members, Private Vs Public, Constructor and Destructor, Objects, Member Functions, Method definition, Inline Function Implementation, Constant member functions, Overloading Member Functions ,Need of operator overloading, prefix and postfix, overloading binary operators and examples in C++.Inheritance and types, protected data, private data, public data, inheriting constructors and destructors, constructor for virtual base classes, constructors and destructors of derived classes, and virtual functions, size of a derived class, order of invocation. Polymorphism and Virtual Functions, Importance of virtual function, abstract base classes and pure virtual functions, virtual destructors, File and Streams Components of a file, different operation of the file, communication in files, creation of file streams, stream classes, header files, updating of file, opening and closing a file, file pointers and their manipulations, functions manipulation of file pointers, detecting end-of file.

JAVA Language: Basics of Java, Constants, Variables, and Data Types, Operators and Expressions, Decision Making and Branching, Decision Making and Looping, Class fundamentals, declaring objects, assigning object reference variables, introducing methods, Constructors, this keyword, Garbage collection, The Finalize () method, A stack class, Over loading constructors, Using objects as parameters, Arguments passing, Returning objects, Recursion.

Advanced OOP in Java : Arrays, Strings and Vectors Inheritance basics, Member access and inheritance, using super class, creating a multilevel hierarchy, Method overriding, Dynamic method dispatch, Using abstract classes, Using final with inheritance, The object class. Packages: Putting Classes Together, Defining a package, Understanding classpath, Importing Packages, Defining an interface, Implementing interfaces, Applying Interfaces, Variable in interfaces. Multi threaded Programming, Managing Errors and Exceptions.

Applet Programming: The applet class, Applet architecture, An applet skeleton: Initialization and termination, Overriding update, Status window, Handling events: The event class, Processing mouse events, Handling keyboard events, HTML applet tag, Passing parameters to applets, Applet context and show document, The audio clip & applets tub interface, Outputting to the console. Swing concepts, JDBC connectivity Managing Input / Output Files in JAVA.

Text Books:

* Object Oriented Programming in C++ by E. Balaguruswamy, TMH Publishing Co. Ltd., New Delhi.

* Mastering C++ by KR Venugopal and Rajkumar, T. Ravishankar; Tata McGraw Hill Publishing Co. Ltd., New Delhi

* Programming with Java: A Primer, 3E, E BALAGURUSAMY, Tata Mc Graw Hill

* The Complete Reference JAVA, Patrick Naughton and Herber tSchildt, Tata McGraw-Hill Publishing Company Ltd

Reference Books:

* Object Oriented Programming using C++ by B Chandra, Narosa Publishing House Pvt, Ltd., Daryaganj, New Delhi 110002

* Object Oriented Programming using C++ by R Rajaram, New age International (P) Ltd., Publishers New Delhi.

GI 2105 MANAGERIAL ECONOMICS

(Common for all Branches)

Course Objectives:

* To bring about an awareness about the nature of Managerial Economics and its linkages with other disciplines.

* To understand the Micro and Macro Environment of Business.

* To familiarize the prospective engineers with the concepts and tools of Managerial Economics with an objective to understand the real world of business.

Course Outcomes:

After completion of the course, student will be able to:

* Understand the various economic activities in business and industry.

* Analyze the real – world business problems.

* Make optimal business decisions for the effective and efficient management of Organisations.

SYLLABUS

Significance of Economics and Managerial Economics:

Economics: Definitions of Economics- Wealth, Welfare and Scarcity definitions Classification of Economics - Micro and Micro Economics.

Managerial Economics : Definition, Nature and Scope of Managerial Economics, Differences between Economics and Managerial Economics, Main areas of Managerial Economics, Managerial Economics with other disciplines.

Demand and Utility Analysis:

Demand - Definition, Meaning, Nature and types of demand, Demand function, Law of demand-Assumptions and limitations. Exceptional demand curve.Elasticity of demand -Definition, Measurement of elasticity, Types of Elasticity (Price, Income, Cross and Advertisement), Practical importance of Price elasticity of demand, Role of income elasticity in business decisions, Factors governing Price Elasticity of demand.

Utility Analysis: Utility- Meaning, Types of Economic Utilities, Cardinal and Ordinal Utility, Total Utility, Marginal Utility, The law of Diminishing Marginal Utility and its Limitations.

Theory of Production and Cost analysis: Production-Meaning, Production function and its assumptions, use of production function in decision making; Cost analysis - Nature of cost, Classification of costs - Fixed vs. Variable costs, Marginal cost, Controllable vs. Non - Controllable costs, Opportunity cost, Incremental vs. Sunk costs, Explicit vs. Implicit costs, Replacement costs, Historical costs, Urgent vs. Postponable costs, Escapable vs. Unavoidable costs, Economies and Diseconomies of scale.

Market Structures: Definition of Market, Classification of markets; Salient features or conditions of different markets - Perfect Competition, Monopoly, Duopoly, Oligopoly, Importance of kinked demand curve; Monopolistic Competition.

Pricing and Business Cycles: Pricing Analysis : Pricing – Significance; Different Pricing methods-Cost plus pricing, Target pricing, Marginal cost pricing, Going-rate pricing, Average cost pricing, Peak load pricing, Pricing of joint Products, Pricing over the life cycle of a Product, Skimming pricing Penetration pricing, Mark-up and Mark-down pricing of retailers. Business cycles - Definition, Characteristics, Phases, Causes and Consequences; Measures to solve problems arising from Business cycles.

Text Books:

* Sankaran,S., Managerial Economics, Marghan Publications, 2015, Chennai.

* Aryasri, A.R., Managerial Economics and Financial Analysis, MC Graw Hill Education, New Delhi, 2015.

Reference Books:

* Dwivedi, D.N., Managerial Economics, Vikhas Publishing House Pvt. Ltd. 6th Edition, New Delhi, 2004.

* Dewett, K.K., Modern Economic Theory, S.Chand & Company Ltd., New Delhi, 2005.

GI 2106 GEOLOGY LAB

Course Objective:

This course is to train the students to in the laboratory to interpret the geological maps, models, rocks and mineral samples.

Course Outcomes:

Upon successful completion of the course, the student get necessary experimental knowledge and training to

* Identify the minerals based on their physical properties by simple tests.
* Solve various geological problems.
* Classify rocks using basic geologic classification systems.
* Interpret the geological structures in the geological maps and model.

SYLLABUS

1. Working with Geological maps and sections.
2. Identification of some important rock forming minerals.
3. Study of Physical properties of minerals.
4. Description and Identification of typical rocks.
5. Identification of geological structures-folds, faults and joints.

GI 2107 GEOMORPHOLOGY LAB

Course Objective:

The course enables the students to identify various geomorphological features from topographic maps in the laboratory.

Course Outcomes:

Upon successful completion of the course, the student will gain necessary knowledge to:

* Identify Land forms from topographic maps.
* Gain in-depth knowledge topographic profiles.
* Prepare slope maps.
* Interpret lithological and climatic controls in formation of different drainage patterns.

SYLLABUS

1. Description of landform models.
2. Topographic profiles–projected and composite profiles.
3. Preparation of slope maps.
4. Stream profiles from topographic maps.
5. Land form interpretation from topographic maps.
6. Drainage Morphometry.

GI2108 OBJECT ORIENTED PROGRAMMING LAB

Course Objective:

The objective of the course is

* To impart knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc.

* To teach the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc. and exception handling mechanisms.

* To impart knowledge on the principles of inheritance, Polymorphism, packages and interface.

Course Outcomes:

Upon completion of the course the student will be able to,

* Write Object oriented programme using C++.

* Write Object oriented programs with Java.

* Identify classes, objects, members of a class and relationships among them needed for a specific problem.

* Write Java application programs using OOP principles and proper program structuring.

SYLLABUS

Cycle-I : Write a function using variables as arguments to swap the values of a pair of integers Write a program to read a matrix of size m*n from the keyboard and display the same on the screen. Define a class to represent a bank account including the following members:-Data members: a) Name of the depositors; b)Account number; c)Type of account; d)Balance amount in the account and Member function – To assign initial values, To deposit an amount, To withdraw an amount after checking the balance, To display the name and balance.

Create a class Float that contains 2 float data members. Overload all the 4 arithmetic operators sothat to operate on the objects of float. Operations related to file handling

Cycle–II : Write programs in JAVA to implement the following concepts-

Streams and File operations; Packages in JAVA; Exception handling mechanism; Applets anda pplications; Multi-threading in JAVA; Fundamental applications using swing.

GI2109 Auto CAD

Course Objectives:

The Objective of the course is to,

* Introduce the concepts of CAD, its interface.
* Teach different tool sand Geometry.
* Impart knowledge on different lay outs & annotations.
* Introduce the concept of 3D CAD.

Course Outcomes:

Upon successful completion of the course the student will be able to,

* Operate CAD interface.
* Utilize different tools of CAD.
* Performs drawings and modify their geometry and annotations.
* Gain knowledge on 3D CAD.
* Import survey data and calculate different parameters.

SYLLABUS

Introduction: About Autodesk & AutoCAD, CAD History, Graphical User Interface, Application Menu, Workspaces, Ribbon, File Tabs, Accessing Help, Drawing Templates, Standards Based Design, Create New Drawings and Templates, Managing Layers, Configure Object Property Settings, Automatic Management of Layers, Layer Functions and Display

Geometry: Drawing Creation Workflows and Organization, Structuring Data in Drawings, Reusing and Editing Structured Data. Tools for Creating Key Geometry**:** Core Design Tools: Creating Rectangles, Placing Hatch, Fillets, Chamfers, Contours, Power Snaps, Centerlines, Construction Lines, Designing with Lines, Adding Standard Feature Data for Holes and Slots. Tools for Manipulating Geometry**:** Editing Tools, Power Commands, Associative Hide.

Drawing & Printing**:** Model Space Views in Layouts, Creating Drawing Sheets in Model Space, Annotation, Title Blocks and Drawing Borders. Dimensioning and Annotating Drawings; Annotation and Annotation Symbols, Creating Dimensions, Editing Dimensions. Printing Concepts, Working in Layouts, Creating Layouts, Guidelines for Layouts. Import & Export, DWG Files, IGES Files, Project Documentation, Printing Layouts, Print & Plot Settings. Projects Printing / Plotting

Auto CAD 3D**:**AutoCAD Civil 3D GUI, AutoCAD Civil 3D Tool space, AutoCAD Civil, 3DPanorama, Workshops, AutoCAD Civil 3D Projects, Sharing Data, Using Data Shortcuts for Project Management.

Lines and curves, Introduction to Parcels, Creating and Editing Parcels, Parcel Reports, Labels, Tables.

Survey & Surfaces: Survey Workflow Overview, Survey Figures, Points, Importing Survey Data, Point Groups. Surface Processes, Surface Properties, Contour Data, Other Surface Data, Break lines and boundaries, Surface Labels. Surface Volume Calculations, Surface Analysis Display.

GI 2110 PROFESSIONAL ETHICS AND UNIVERSAL HUMAN VALUES

(Common for all B.Tech and B.Tech+M.Tech Integrated Courses)

Course Objectives:

* To recognize the moral values that should guide the Engineering profession.
* To resolve moral issues concerning one's profession.
* To develop and exhibit a set of moral beliefs and attitudes that engineers should inculcate.
* To inculcate social values and morality in one's life.
* To develop awareness about Professional/Engineering Ethics and Human Values.

Learning Outcomes:

Students will be able to:

* Apply the conceptual understanding of ethics and values into everyday practice.
* Understand the importance of moral awareness and reasoning in life.
* Acquire professional and moral etiquette that an engineer requires.
* Develop the acumen for self-awareness and self-development.
* Develop cultural tolerance and integrity.
* Tackle real-life challenges with empathy.

CONTENTS

Unit - I: HUMAN VALUES : Values - Respect - Caring - Sharing - Honesty-Courage - Self confidence - Communal Harmony Morals – Virtues

Unit –II PROFESSIONAL VALUES : Integrity - Discipline - Valuing time - Cooperation - Commitment - Code of conduct - Challenges in the workplace

Unit – III PROFESSIONAL ETHICS : Overview - Engineering ethics - Moral issues - Profession - Models of professional roles – Responsibility

Unit – IV RESPONSIBILITIES AND RIGHTS : Safety and risk - Collegiality and loyalty - Confidentiality - Occupational crime - Human rights - Employee rights - Intellectual property rights

Unit – V GLOBAL ISSUES : Globalization - Environmental ethics - Computer ethics - Code of ethics - Multinational corporations - Engineers as advisors in Planning and Policy making

Suggested Textbook:

R.S. Nagarazan. *A Textbook on Professional Ethics and Human Values.*New Age International Publishers. 2006.

Reference Books:

* Premvir Kapoor. *Professional Ethics and Human Values.* Khanna Publishing House. 2019.

* B.S. Raghavan. *Human Values and Professional Ethics*. S.Chand Publications. 2012.

* R.R. Gaur & Others. *A Foundation Course in Human Values and Proff. Ethics*. Excel Books. 2009.

* A. N. Tripathi. *Human Values*. New Age International (P) Limited. 2009

* R. Subramanian. *Professional Ethics*. OUP India. 2013

(SECOND YEAR) 2nd SEMESTER

GI2201 INFORMATION TECHNOLOGY AND APPLICATIONS

Course Objectives:

The Objective of the course is

* To teach basics of computers and different components.

* To give knowledge on different types of data and their representation.

* To impart overview of Operating system fundamentals and software.

* To impart knowledge business information systems, e-commerce.

* To impart knowledge on Computer networking, Internet, Email.

Course Outcomes:

Upon successful completion the student will be able to

* Identify computer, its components and other devices.

* Understand different types of computer data, storage.

* Understand and operate different operating systems and other applications.

* Explain E-commerce architecture, payment schemes, Intellectual property rights.

* Operate internet, email and communicate through internet.

SYLLABUS

Computer Fundamentals: Introduction to computers, types of computers, basic components of computer systems- CPU-memory, Input devices-Keyboard, smart cards, Light pen, touch screen, mouse, digitizer. Output devices – Video display devices, flat panel display, printers, audio output.

Data Acquisition: Acquisition of Numbers and Textual Data: Input units, internal representation of numeric data, representation of characters error detecting codes. Acquisition of image Data: Acquisition of textual data, pictures, storage format for pictures, fundamentals of image compression, image acquisition with digital camera.

Acquiring Audio Data**:** basics of audio signals, acquiring and storing audio signals.

Acquisition of Video: Capturing a moving scene with a video camera, compression of video data, MPEG compression standard.

Computer Software: Overview of Operating Systems: operating system fundamentals, software –system software, application software (overview of Word, Excel, Power Point).Overview of Windows; Linux (Windows-Desktop-Control panel -Start menu; Operations on file (new, save, copy, edit, etc).

Business Information Systems and E-commerce: Types of information needed by organizations, Management structure and information needs, design of an operational information system, system life cycle, computer system for transaction processing.

E-commerce: Introduction, Business to business, business to customer and customer to customer e-commerce, their advantages and disadvantages. E-commerce system architecture, payment schemes, electronic cheque payment, Cash transactions, EDI, Intellectual properties rights and e-commerce.

Computer Networks and Internet: Overview of computer Networks and Internet: computer networks- LAN, WAN and their applications, intranet, naming computers connected to internet.

Some Internet Applications: Email, Information browsing, WWW, Information retrieval from the web, Other facilities provided by the browser, audio on the internet, pictures, animation, video on the internet. Introduction to applications such as Google maps and Google earth.

Text Books:

* Introduction to Information technology by V.Rajaraman, PHI

* Information technology: Theory and Practice by Pradeep K.Sinha, PritiSinha, PHI

Reference Books:

* Introduction to Computers by Peter Norton

* Information Technology: Principles and Applications Hardcover – 1 January 2004 by Ray Ajoy Kumar, Acharya Tinku

GI2202 PRINCIPLES OF PHYSICAL OCEANOGRAPHY

Course Objectives:

The Objective of the course is,

* To impart knowledge on Oceans and their physical properties

* To impart knowledge on oceanographic instruments, measurement of different parameters

* To give knowledge on ocean waves, tides and their characteristics.

* To impart knowledge on sea level change, its effects and conservation of Marine resources

Course Outcomes:

Upon successful completion of the course the student will be able to,

* Understand the concept of oceans, their importance and physical properties.

* Understand measurement of sea temperature, salinity. Waves.

* Explain Tides, waves and their characteristics.

* Understand about sea level changes, its effects.

* Identify different marine resources and their conservation concepts.

SYLLABUS

The World Oceans; Physical Properties of Sea Water and their Distribution: Salinity of Sea Water: Factors Affecting Salinity, Salinity Distribution in Oceans. Temperature in the Oceans: Factors Influencing Sea Water Temperature, Temperature Distribution in Oceans. Pressure; Density: Factors Affecting Density of Ocean Water, Density distribution in the Oceans; Colour of Sea Water: Colour Determination, Factors influencing the Colour of Sea Water. Light Transmission in Sea Water: Extinction Coefficients in the Sea, Variation of Extinction Coefficient; Sound Transmission in Sea Water: Velocity of Sound Waves, Variation of Sound Velocity in the Ocean, Refraction of Sound-Shadow Zone and Sound Channel, Attenuation of Sound in the Ocean.

Oceanographic Instruments and methods: Sea Water Temperature Measurement, Salinity Measurement ,Current Measurement, Ocean Wave Measurements, Tide Measuring Instruments, Water Transparency Measurement, Radiation Measurement and Platform- Sea and Airborne and Remote Sensing Satellites, Satellite Navigation, DGPS, Eco-sounder.

Ocean Waves: Classification of Ocean Waves, Characteristics of Waves, Motion of an Ocean Wave, Wind-Generated Waves, Wave Height Conditions in Different Regions of the Oceans, Deep Water Wave Characteristics in the Arabian Sea and Bay of Bengal of Indian Coasts, Wave Propagation in Shallow Water, Problem Waves.

Ocean Tides: Tide Producing Forces, Tide Characteristics, Tidal Theories, Harmonic Analysis and Prediction of Tides, Tidal Range sand Tidal Periods, Tidal Bore

Water Masses: Introduction, T-S diagrams, Properties of Water Masses, Types of Water Masses. Ocean Circulation: Introduction, Currents: Some General observations, Factors controlling Ocean Circulation, El Nino, Western Intensification of currents, Currents in Atlantic Ocean, Currents in Pacific Ocean, Currents in Indian Ocean.

Sea level changes: Introduction, Evidences for Sea Level Changes, Mechanisms of Sea level Changes, Impact of Sea level Change, Impact of Projected Sea level rise.

Marine Resources: Introduction, Maritime zones, Types of Marine Resources, Resources: extent, distribution and utilization, Problems of Marine Resources-Marine Pollution, Conservation of Marine Resources.

Text Books:

* Descriptive Physical Oceanography, Reddy, M.P.M., Oxford & IBH Publishing Co.2001

* Oceanography – A Brief Introduction, Siddhartha, K.,Kisalaya Publications,2004

* Introductory Oceanography, Harold V.Thurman, Macmillan Publishing Company,1994

Reference Books:

* Introductory Oceanography, J.Weisberg and H.Parish, McGraw-HillKogakusha,1974

* Descriptive Physical Oceanography, Gorge L.Pickard and William J.Emery, Pergamon Press, Fourth Edition.

GI 2203 PHOTOGRAMMETRY AND PHOTO INTERPRETATION

Course Outcomes:

The Objective of the course is,

* To impart knowledge on basic concepts of Photogrammetry.

* To impart knowledge on aerial photographs, measurements and interpretation.

* To measure different errors and elevations from photographs.

* To impart knowledge on importance of aerial photographs in different surveys and projects.

Course Outcomes:

Upon successful completion of course the student will be able to,

* Classify the photogrammetry methods and their applications.

* Determine the scale, ground coordinates and the aerial extent of aerial photograph.

* Demonstrate interior and exterior orientation on two overlapping aerial photographs.

* Measure parallax and compute elevations from parallax measurements.

* Prepare mosaics, orthophotos and photomaps for mapping of resources.

SYLLABUS

Fundamentals of Photogrammetry and photo interpretation; History of aerial photography; Types of photographs: vertical and oblique photographs. Aerial cameras: lens, optical axis, focal length, focal plane and fiducial marks; Principal Point; Geometry of vertical photographs.

Scale on vertical photographs–over flat terrain and variable terrain; average photo scale; Methods of determining the scale on vertical photographs. Overlap, side lap and flight planning. Stereoscopic viewing of vertical photographs; Depth perception; Stereoscopes and their use; Vertical exaggeration – factors involved and determination.

Relief Displacement on vertical photographs. Determination of horizontal ground lengths, directions and angles from photo coordinates. Parallax: *Y*-parallax and *X*-Parallax; Parallax measurement– monoscopic method and stereoscopic method– principle of floating mark.

Aerial mosaics: comparison with maps. Elements of air photo pattern: rock types, landforms, surface drainage patterns, erosion features, gray tones, vegetative and land use details.

Applications of aerial photographic techniques in soil surveys; forest surveys, agricultural and land use planning; geological and geomorphological investigations; civil engineering projects.

Latest developments in Photogrammetry: UAV survey, Drone surveying.

TextBooks:

* Elements of Photogrammetry by P.R.Wolf and B.A.Dewitt, McGraw Hill,2004

* Remote Sensing and image Interpretation by Thomas M.Lillesand and R.W.Kiefer, John Wiley & Sons, Inc., 2000.

* Aerial Photographic interpretation by Donald R.Lueder, McGraw-Hill 1959

ReferenceBook:

* P.J.Curran, Principles of Remote Sensing, ELBS/Longman1985

GI 2204 REMOTE SENSING - I

Course Objective:

The Objective of this course is,

* To impart knowledge on remote sensing basics.

* To give knowledge on EMR interaction with different earth surface features.

* To impart knowledge on different remote sensing techniques.

* To impart knowledge on different remote sensing satellite programs.

Course Outcomes:

Upon successful completion the student will be able to

* Understand basic concepts of Remote Sensing.

* Analyze energy interaction in the atmosphere and earth surface features.

* Identify earth surface features from satellite images.

* Understand concepts of different remote sensing techniques.

SYLLABUS

Introduction: Remote sensing system, Observe Earth from space. Remote Sensing-A historic prospective, Indian remote sensing programme. The earth Observation Evolution–Paradigm shift, Legal and ethical aspect. Electro Magnetic Radiation (EMR): Velocity of EM radiation, Propagation of EM waves, Attenuation, quantum nature of EM radiation, Thermal emission, EM radiation for Remote Sensing Fundamentals of Radiometry: Measure Geometry-concept of the solid angle, radiometric quantities, Surface characteristic for Radiometric Measurements, Observation geometry in Remote sensing, Radiometric Measurements, scene Reflectance Measurement. Physical Basis of Signature: Signature in the Reflective OIR region, Thermal Infrared(TIR), Microwave region.

EMR Interaction with Atmosphere: Atmospheric characteristics – atmospheric gas composition –pressure and temperature variation with altitude – Rayleigh, Mie scattering and non-selective scattering–atmospheric windows – Atmospheric effects on solar radiation and microwave spectrum –Thermal infrared radiation – Emissivity – Emittance of materials – Kirchoff s Law in spectroscopy – Wien s Displacement Law, Stefan Boltzmann Law – ocean colour temperature measurement –Introduction to Microwave Remote sensing EMR Interaction with Earth materials: Spectral signature concepts – Factors affecting spectral reflectance of materials. Instruments used to study the spectral reflectance– spectrophotometer – spectro - radiometer.

Remote Sensor – An overview: Classification of Remote sensor, selection of sensor parameters, spatial resolution, spectral resolution, radiometric resolution, Temporal resolution Optical and Infrared sensors: Quality of Image in Optical system, Imaging mode, Photographic camera, Television camera, Opto-mechanical scanners, Opto-mechanical scanners operated from satellites, Push broom cameras, Whisk broom cameras. Microwave sensors.

Platforms & Sensors: Principles of satellite Missions, Locating satellites in space, Types of Orbit, Airborne platforms – balloons, helicopters, aircrafts – Space borne platforms – Sun synchronous and Geosynchronous satellites – Projectile geometry – Land coverage – Repetivity – On track and Across track stereovision capability. IRS, LANDSAT, SPOT, CANADA, JAPAN, EUROPEAN, satellite series. Sensors and its specifications, Multispectral Scanner (MSS) used in Landsat series satellites, Return Beam Vidicon (RBV) used in Landsat series satellites, Thematic Mapper (TM) used in Landsat series satellites, High Resolution Visible (HRV) Imager used in SPOT Satellite, Linear Image Self Scanning (LISS) Camera used in IRS series, Wi FS, AW iFS, MODIS,ThermalScanners.

Image Interpretation: Introduction to image Interpretation. Basic principles of Image Interpretation, Elements of Image Interpretation. Techniques of image Interpretation and interpretation Keys Methods of searching and sequence of Interpretation.Methods of analysis and Reference levels.

Text Books:

* Lillisand T.M. and Kiefer R.W. Remote Sensing and Image Interpretation (4thed), John willey and Sons, Inc, New York, 2000.

* Fundamentals of Remote sensing – George Joseph, University Press.

* Floyd F.Sabins, Jr. Remote Sensing–Principles and Interpretation W.H. Freeman and Company, NewYork, 1986.

Reference Books:

* Raymond. M. Measures – "Laser Remote Chemical Analyses John Wiley and sons,1988.

* Pandey S.N. Principles and Applications of Photogeology. Wiley Eastern,1987.

* Druny S.A. Image Interpretation in Geology, Chapman and Hall, London,1983.

* Arumugam. M. EngineeringPhysics, Anuradha Publishers,1998.

* Janza. F.J., Blue, H.M., and Johnston, J.E., "Manual of Remote Sensing Vol.I., American Society of Photogrammetry, Virginia, U.S.A., 1975.

GI2205 PYTHON PROGRAMMING

Course Objectives:

1. To develop skills on procedural oriented and object oriented programming in Python

2. To understand and apply different data wrangling techniques using Python.

3. To perform data analysis using python libraries like NumPy, Pandas and exploratory data analysis using Matplotlib

Course Outcomes:

At the end of the course, a student should be able to:

1. Acquire programming knowledge on Basics of Python
2. Acquire programming knowledge on Text and File Handling
3. Develop Python programs to Mean, Median, Mode, Correlation
4. Acquire programming knowledge on NumPy, Pandas Library
5. Acquire programming knowledge on Graph Visualizations in Python and Data Analysis using Python

SYLLABUS

1. Introduction to Python: Rapid Introduction to Procedular Programming, Data Types: Identifiers and Keywords, Integral Types, Floating Point Types

Strings: Strings, Comparing Strings, Slicing and Striding Strings, String Operators and Methods, String formatting with str. format

Collections Data Types: Tuples, Lists, Sets, dictionaries, Iterating and copying collections

2. Python Control Structures, Functions and OOP: Control Structures and Functions: Conditional Branching, Looping, Exception Handling, Custom Functions

Python Library Modules: random, math, time, os, shutil, sys, glob, re, statistics, creating a custom module

Object Oriented Programming: Object Oriented Concepts and Terminology, Custom Classes, Attributes and Methods, Inheritance and Polymorphism, Using Properties to Control Attribute Access

File Handling: Writing and Reading Binary Data, Writing and Parsing Text Files

3. NumPy Arrays and Vectorized Computation: NumPy arrays, Array creation, Indexing and slicing, Fancy indexing, Numerical operations on arrays, Array functions, Data processing using arrays, Loading and saving data, Saving an array, Loading an array, Linear algebra with NumPy, NumPy random numbers

4. Data Analysis with Pandas: An overview of the Pandas package, The Pandas data structure-Series, The Data Frame, The Essential Basic Functionality: Reindexing and altering labels , Head and tail, Binary operations, Functional statistics , Function application Sorting, Indexing and selecting

data, Computational tools, Working with Missing Data, Advanced Uses of Pandas for Data Analysis - Hierarchical indexing, The Panel data

5. Data Analysis Application Examples: Data munging, Cleaning data, Filtering, Merging data, Reshaping data, Data aggregation, Grouping data

6. Data Visualization: The matplotlib API primer-Line properties, Figures and subplots, Exploring plot types-Scatter plots, Bar plots, Histogram plots, Legends and annotations, Plotting functions with Pandas

Text Books:

1. Programming in Python 3: A Complete Introduction to Python Language, Mark Summerfield, Second Edition, Addison-Wesley Publications

2. Python: End-to-End Data Analysis Learning Path, Module 1: Getting Started with Python Data Analysis , Phuong VothiHong , Martin Czygan, , Packt Publishing Ltd.

Reference Books:

1. Learning Python, 5th Edition, Mark Lutz, Orielly Publications

2. Python for Data Analysis, Wes McKinney, Orielly Publications

3. How to Think Like a Computer Scientist: Learning with Python 3 Documentation 3rd Edition, Peter Wentworth, Jeffrey Elkner, Allen B. Downey, Chris Meyers

4. Core Python Programming, Second Edition, Wesley J. Chun, Prentice Hall

5. Python Cookbook – Recipes for Mastering Python 3,3rdEdition, David Beazley, Brian K. Jones, Oreilly

GI2206 REMOTESENSING & IMAGE INTERPRETATION LAB

Course Objective:

The Objective of the course is

* To train student in operation of spectral radiometer.

* To impart knowledge on satellite image interpretation.

* To impart knowledge with bands, indexes of satellite images.

* To impart knowledge on preparation of base maps and their interpretation.

Course Outcomes:

Upon successful completion the student will be able to,

* Read ancillary information of remotely sensed data.

* Calculate different parameters of satellite images.

* Identify the different features from imageries.

* Interpret images and prepare thematic maps.

SYLLABUS

1. Operating Spectral radiometer in the field to collect radiometric values from various natural and artificial features of land surface.

2. Identification of various land features from the satellite images in association with topo sheets and field visits. Calculations of coverage of satellite images for different latitudes, number of swath paths for various satellites.

3. Study of imagery indexes.

4. Visual study of single band images.

5. Visual study of multi-spectral images.

6. Preparation of base maps from the topographic maps.

7. Preparation of thematic maps from visual interpretation.

GI 2207 PHOTOGRAMMETRY AND PHOTOINTERPRETATION LAB

Course Objectives:

The Objective of the course to train student in,

* Calculation of scale, parallax, principal points from aerial photographs.

* Preparation of aerial mosaics.

* Identification and Interpretation of different features and phenomena from aerial photographs.

Course Outcomes:

Upon completion of the course the student will be ableto,

* Operate Stereoscope to view aerial Photographs.

* Determine geometrical elements of aerial photograph

* Analyze the aerial photographs for physical measurements.

* Prepare aerial mosaics.

* Identify and Interpret differential and forms from aerial Photographs.

SYLLABUS

* Testing stereo vision; Use of Lens stereo scope and Mirror stereoscope;

* Use of Parallax Bar for height calculation from aerial photographs; Calculation of scale of the photographs; Marking Principal point and conjugate principal point on the stereo pairs

* Preparation of aerial mosaics; Interpretation of aerial photographs for identification of landforms of fluvial, Aeolian, glacial, coastal, volcanic and arid processes

* Identification of tectonic elements from aerial photographs.

GI 2208 MOBILE APP DESIGN

Course Objectives:

The objective of the course is

* To facilitate students to understand android SDK.

* To help students to gain a basic understanding of android application development

* To inculcate working knowledge of android studio development tool.

Course Outcomes:

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

* Identify various concepts of mobile programming that make it unique from programming for other platforms,

* Critique mobile applications on their design pros and cons,

* Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces,

* Program mobile applications for the both android and ios operating system that use basic and advanced phone features

* Deploy applications to the android market place for distribution.

SYLLABUS

Introduction: Introduction to Mobile Computing, Introduction to Android Development Environment Factors in Developing Mobile Applications: +Mobile Software Engineering, Frame works and Tools, Generic UI Development, Android User. More on UIs: VUIs and Mobile Apps, Text – to – Speech Techniques, Designing the Right UI, Multichannel and Multimodal UIs.

Intents and Services: Android Intents and Services, Characteristics of Mobile Applications, Successful Mobile Development. Storing and Retrieving Data: Synchronization and Replication of Mobile Data, Getting the Model Right, Android Storing and Retrieving Data, Working with a Content Provider.

Communications Via Network and the Web: State Machine, Correct Communications Model, Android Networking and Web Telephony: Deciding Scope of an App, Wireless Connectivity and Mobile Apps, Graphics: Performance and Multithreading, Graphics and UI Performance, Android Graphics Multimedia: Mobile Agents and Peer–to–Peer Architecture, Android Multimedia Putting It All Together: Packaging and Deploying, Performance Best Practices, Android Field Service App.

Security and Hacking: Active Transactions, More on Security, Hacking Android. Platforms and Additional Issues: Development Process, Architecture, Design, Technology Selection, Mobile App Development Hurdles, Testing

PRACTICALS:

1. Installation of Android Studio
2. Development of Hello World Application
3. Create an application that takes the name from a text box and shows hello messages along with the name entered inbox when the user clicks OK button.
4. Create a screen that has input boxes and on clicking submit it must display all the data below submit button
5. Development of calculator Application
6. Design an android application using Radio buttons

TextBook:

? RezaB, Far (2004), Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML, Cambridge University Press.

GI2209 ENVIRONMENTAL SCIENCE

(Common for all Branches)

Course Objectives:

The objectives of the Environmental Science course are to

* Familiarize the fundamental aspects of environment and the environmental management

* Provide information of some of the important international conventions which will be useful during the future endeavors after graduation.

* Make realize the importance of natural resources management for the sustenance of the life and the society.

* Apprise the impact of pollution getting generated through the anthropogenic activities on the environment

* Provide the concept of Sustainable Development, energy and environmental management

* Impart knowledge on the new generation waste like e -waste and plastic waste.

Course Outcomes:

After completion of the course the students will have

* Knowledge on the fundamental aspects of environment and the environmental management

* The knowledge on the salient features of the important international conventions

* Understanding of the importance of natural resources management for the sustenance of the life and the society.

* Familiarity on various forms of pollution and its impact on the environment.

* Understand the elements of Sustainable Development, energy and environmental management

* Knowledge on the new generation waste like e-waste and plastic waste.

SYLLABUS

Introduction: Structure and functions of Ecosystems – Ecosystems and its Dynamics-Value of Biodiversity-impact of loss of biodiversity, Conservation of bio-diversity. Environmental indicators –Global environmental issues and their impact on the ecosystems. Salient features of International conventions on Environment: Montreal Protocol, Kyoto protocol, Ramsar Convention on Wetlands, Stockholm Convention on Persistent Organic Pollutants, United Nations Framework Convention on Climate Change(UNFCCC),

Natural Resources Management: Importance of natural resources management-Land as resource, Land degradation, Soil erosion and desertification, Effects of usage of fertilizer, herbicides and pesticide-watershed management.

Forest resources: Use and over-exploitation, Mining and dams – their effects on forest ecosystems and the living beings.

Water resources: Exploitation of surface and groundwater, Floods, droughts, Dams: benefits and costs.

Mineral Resources: Impact of mining on the environment and possible environmental management options in mining and processing of the minerals. Sustainable resource management (land, water, and energy), and resilient design under the changing environment.

EnvironmentalPollution: Local and Global Issues. Causes, effects and control measures. Engineering aspects of environmental pollution control systems.

Air pollution: impacts of ambient and indoor air pollution on human health. Water pollution: impacts water pollution on human health and loss of fresh water resources. Soil pollution and its impact on environment. Marine pollution and its impact on blue economy. Noise pollution.

Solidwastemanagement: Important elements in solid waste management-Waste to energy concepts. Air (prevention and control of pollution) Act, Water (prevention and control of pollution)Act and their amendments. Salient features of Environmental protection Act,1986.

Sustainable Development: Fundamentals of Sustainable Development– Sustainability Strategies and Barriers – Industrialization and sustainable development. Circular economy concepts in waste(solid and fluid)management.

Energy and Environment: Environmental Benefits and challenges, Availability and need of conventional energy resources, major environmental problems related to the conventional energy resources, future possethics. ibilities of energy need and availability. Solar Energy: process of photovoltaic energy conversion, solar energy conversion technologies and devices, their principles, working and applications, disposal of solar panel after their usage. Biomass energy: Concept of biomass energy utilization, types of biomass energy, conversion processes,Wind Energy, energy converse on technologies, their principles, equipment and suitability in context of India.

Management of plastic waste and E-waste: Sources, generation and characteristics of various e-and plastic wastes generated from various industrial and commercial activities; Waste management practices including on site handling, storage, collection and transfer. E-waste and plastic waste processing alternatives. E-Waste management rules and Plastic waste management rules, 2016 and their subsequent amendments.

TextBooks:

* Bharucha, Erach (2004). Text book for Environmental Studies for Undergraduate Courses of all Branches of Higher Education,University Grants Commission, NewDelhi.

* Basu, M., Xavier, S. (2016). Fundamentals of Environmental Studies, Cambridge University Press, India

* Masters,G.M., & Ela, W.P. (1991). Introduction to environmental engineering and science. Englewood Cliffs, NJ: Prentice Hall.

* Enger, E. and Smith, B., Environmental Science: A Study of Inter relationships, Publisher: Mc Graw – Hill Higher Education; 12th edition, 2010.

ReferenceBooks:

* Sharma, P. D., & Sharma, P.D. (2005). Ecology and environment. Rastogi Publications

* Agarwal, K.C.2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.

* Clark R.S.(2001). Marine Pollution, Clanderson Press Oxford (TB)

* Jadhav, H & Bhosale, V.M. (1995). Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p.

* MoEF&CC, Govt. of India, CPCB: E-waste management rules, 2016 and its amendments 2018.

* MoEF&CC, Govt. of India, CPCB: Plastic waste management rules, 2016.