

Yogi Vemana University

5 year M.Sc., Integrated Course w.e.f 2011-12
Earth Science

Semester - I

Paper No.	Title of the Paper	Teaching Hours per week	Marks
16011	English	4	100
16012	Introduction to Biology	4	100
16013	Mathematics-I	5	100
16014	Physical Sciences-1	4	100
16015/16025	Cell Biology / Earth & Atmospheric Science	4	100
16011P	Biology Lab	3	100
16012P	Physics Lab-I	3	100
16013P	Chemistry Lab-1	3	100
	Total	30	800

Semester - II

Paper No.	Title of the Paper	Teaching Hours per week	Marks
26011	Communication Skills (English)-I	4	100
26012	Computer Science-I	4	100
26013	Mathematics-II	5	100
26014	Physical Sciences – II	4	100
26025	Geomorphology	4	100
26011P	Computer Lab-I	3	100
26012 P	Physics Lab-II	3	100
26013 P	Chemistry Lab-II	3	100
	Total	30	800

Semester - III

Paper No.	Title of the Paper	Teaching Hours per week	Marks
36011	Communication Skills (English) – II	4	100
36012	Computer Science-II	4	100
36013	Mathematics and Statistics	5	100
36014	Physical Sciences – III	4	100
36025	Crystallography & Mineralogy	4	100
36011P	Statistics Lab	3	100
36012 P	Physics Lab-III	3	100
36013 P	Chemistry Lab- III	3	100
	Total	30	800

Semester - IV

Paper No.	Title of the Paper	Teaching Hours per week	Marks
46011	Second Language	4	100
46012	Environmental studies	4	100
46013	Entrepreneurship & Principles of Management	4	100
46014/46024	Computer Application in Biology /Earth Sciences	4	100
46025	Optical Mineralogy	4	100
46011P	Computer Science Lab-II	3	80
46012/46022P	Computer Application in Biology /Earth Sciences Lab	3	80
46023P	Crystallography, Mineralogy and Optical Mineralogy Lab	3	80
46021S	Seminar	3	60
	Total	32	800

Semester - V

Paper No.	Title of the Paper	Teaching Hours per week	Marks
56021	Igneous Petrology	4	100
56022	Metamorphic Petrology	4	100
56023	Sedimentology	4	100
56024	Structural Geology	4	100
56025	Geochemistry	4	100
56021P	Igneous & Metamorphic Petrology Lab	3	80
56022P	Sedimentology & Structural Geology Lab	3	80
56023P	Geochemistry Lab	3	80
56021S	Seminar	3	60
	Total	32	800

Semester - VI

Paper No.	Title of the Paper	Teaching Hours per week	Marks
66021	Hydro Geology	4	100
66022	Stratigraphy and Indian Geology	4	100
66023	Geotectonics	4	100
66024	Paleontology	4	100
66025	Geophysical Exploration	4	100
66021P	Hydro Geology Lab	3	80
66022P	Stratigraphy & Paleontology Lab	3	80
66023P	Geophysical Exploration Lab	3	80
66021S	Seminar	3	60
	Total	32	800

Semester – VII

Paper No.	Title of the Paper	Teaching Hours per week	Marks
76021	Ore Genesis and Mineral Deposit	4	100
76022	Mining and Ore- Beneficiation	4	100
76023	Aerial Photography & Photogrammetry	4	100
76024	Field Geology & Surveying	4	100
76025	Elective-1: Marine Geology/Oceanography	4	100
76021P	Economic Geology & Ore Reserves Estimation Lab	3	80
76022P	Areal Photography & Photogrammetry Lab	3	80
76023P	Mine planning and Survey Lab	3	80
76021S	Seminar Presentation & Field Work	7	60
	Total	36	800

Semester - VIII

Paper No.	Title of the Paper	Teaching Hours per week	Marks
86021	Satellite Remote sensing	4	100
86022	Digital Image Processing	4	100
86023	Environmental Geology	4	100
86024	Geographical Information Systems, GPS & Digital Cartography	4	100
86025	Elective-2: Petroleum Geology/Fuel Geology	4	100
86021P	Remote Sensing lab	3	80
86022P	Digital Image Processing Lab	3	80
86023P	Geographical Information Systems and GPS Lab	3	80
86021S	Seminar Presentation & Field Work	7	60
	Total	36	800

Semester - IX

Paper No.	Title of the Paper	Teaching Hours per week	Marks
96021	Engineering Geology	4	100
96022	Natural Resource Exploration	4	100
96023	Elective-3: Precambrian Geology/Dimensional & Decorative stones	4	100
96024	Elective-4: Watershed Management/Disaster Management/ Quaternary Geology	4	100
96025	Elective-5: Geoinformatics applications in soil, forestry Environment and agriculture /Mineral Economics	4	100
96021P	Engineering Geology & Natural Resource Exploration Lab	3	80
96021T	Project Design	3	80
96021S	Seminar Presentation& Fieldwork	7	40
	Total	32	700

Semester – X

Paper No.	Title of the Paper	Teaching Hours per week	Marks
06021	Research Methodology	4	100
06021T	Project/Dissertation	32	300
	Total	36	400

***Weekend field trips VII to X Semesters**

**** Study tour for 10 to 14 days VIII and X Semester Students**

Semester	Number of Papers	Marks in the Semester End Examinations for each Paper	Internal Tests for Each Paper	Total Marks for all the Paper
I	Theory:4 Physical sciences-I Practicals:3	75 70 100	25 30	100x4=400 100x1=100 100x3=300
II	Theory:4 Physical sciences-II Practicals:3	75 70 100	25 30	100x4=400 100x1=100 100x3=300
III	Theory:4 Physical Sciences-III Practicals:3	75 70 100	25 30	100x4=400 100x1=100 100x3=300
IV	Theory:5 Practicals:3 Seminar	75 80 ----	25 60	100x5=500 80x3=240 60
V	Theory:5 Practicals:3 Seminar	75 80 ----	25 60	100x5=500 80x3=240 60
VI	Theory:5 Practicals:3 Seminar	75 80 ----	25 60	100x5=500 80x3=240 60
VII	Theory:5 Practicals:3 Seminar	75 80 ----	25 60	100x5=500 80x3=240 60
VIII	Theory:5 Practicals:3 Seminar	75 80 ----	25 60	100x5=500 80x3=240 60
IX	Theory:5 Practicals:1 Project Design Seminar& field Work	75 80 --- ---	25 -- 80 40	100x5=500 80x1=80 80 40
X	Research Methodology Project(Individual) Viva Voce	100 150 50	--- 100	100 300
Total				7500

SEMESTER I

PAPER CODE 16011: ENGLISH

80 MARKS

SECTION	SELECTIONS	AUTHOR
Prose – 10 Marks, 7 Hrs.	1. True and rare Genius 2. A Sense of the Future	V.Narla J. Bronowski
Poetry – 10 Marks, 4 Hrs.	3. On killing a Tree 4. Piano and Drums	Gieve Patel Gabriel Okara
Short Stories – 10 Marks 6 Hrs.	1. The Refugee 2. The Fortune - Teller	Pearl S. Buck Karel Capak

Communication Skills – 21 Hrs.	50 Marks
1. Grammar	20 Marks
1. Parts of Speech 2. Tenses	30 Marks
1. Concord (5 Sentences out of ten) 2. Transformation of Sentences 3. Sequence of Sentences	

BOOKS:

1. Selections from English Prose (Common Core Syllabus), Oxford Press
2. Poetry for Pleasure (Common Core for Under Graduate)
3. Non detail (Common Core for Under Graduate)
4. Murphy's English Grammar, Cambridge University Press
5. Oxford English Grammar by John Eastwood, Oxford University Press.

Paper 16012: Introduction to Biology

Unit I: Evolution and classification

Emergence of evolutionary thoughts – Lamarck, Darwin theory of evolution, spontaneity of mutations. Origin of life - Origin of basic biological molecules; concept of Oparin and Haldane; experiment of Miller; evolution of prokaryotes; evolution of eukaryotic cells. Classification of living organisms; viruses, prokaryotes, Eukaryotes, fungi, plants, and animals.

Unit II: Cell and organism biology

Cell structures - Prokaryotic cell, Eukaryotic cell – plant, animal cell structures and differences. Tissues (epithelial tissue, connective tissue, muscle tissue) and systems (digestive system, circulatory system, lymphatic system, respiratory system, sensory systems, homeostasis). Plant structure and functions.

Unit III: Metabolism and reproduction

Energy and metabolism, modes of nutrition, autotrophs, heterotrophs, respiration, fermentation, photosynthesis. Reproduction – Asexual reproduction, sexual reproduction, breeding systems in plants and commercial applications, overview on development of an embryo to adult in humans.

Unit IV: Inheritance biology

Inheritance, DNA, the genetic material, mendelian principles, law of dominance, law of segregation, independent assortment, derivation of Mendelian inheritance, mutations, cytoplasmic inheritance..

References:

1. Biological science – low price ed
2. Biology - Davidson
3. “Evolution” by D. J. Futuyma.
4. “Ecology-Principles and Applications” by Chapman and Reiss Cambridge
5. “Developmental biology” by Scott Gilbert
6. “Animal Physiology”, Hill R, Wise G A & Anderson M Sinauer.
7. “Plant Physiology” Taiz & Zeiger Sinauer.
8. “Molecular biology of the Cell” by Albert et.al
9. Biodiversity
10. Verma PS, Agarwal V.K. Cell Biology, Genetics, Evolution and Ecology. S.chand & Co.

16013: MATHEMATICS-I

Unit-I : Partial Fractions

Introduction – General rules to resolve a given fraction into partial fractions - Non-repeated linear

factors – Repeated linear factors – Quadratic factors.

Sections 1.1 to 1.6 of chapter **I** of Elementary Engineering Mathematics by Dr.B.S.Grewal.

Unit-II : Matrices

Introduction – Definition- Special matrices- Matrix operations – Related matrices – Matrix method of

solution of simultaneous equations.

Sections 5.1 to 5.5 of chapter **V** of Elementary Engineering Mathematics by Dr.B.S.Grewal.

Unit-III : Trigonometry

Trigonometric Ratios of Acute & Compound Angles

Sections 7.1 to 7.4 of Chapter **VII** of Business Mathematics by P.R.VITTAL Margham Publications.

Unit- IV : DIFFERENTIATION:

Definition: General rules of differentiation – Derivatives of standard functions – Derivatives of

parametric forms and implicit functions- Logarithmic differentiation.

Sections 12.1 to 12.4 of chapter **12** of Elementary Engineering Mathematics by Dr.B.S.Grewal.

Reference Books :

Units I & II “Intermediate Mathematics” –Volume II by S.Chand Publications.

Units III & IV “Intermediate Mathematics” by S.Chand Publications.

16014: Physical Sciences
Part A: Physics of Mechanics

Unit-I: Vector analysis **7 hours**

Scalar and Vector fields – Gradient of a scalar field and physical significance. Divergence and Curl of a vector field. Integration of vectors - Line, Surface and Volume integrals. Stock's, Guas's and Green's theorems.

Unit-II: Mechanics of Particles and a Rigid body **18 hours**

Laws of motion - Motion of variable mass system - motion of rocket – Collisions in two and three dimensions – Concepts of impact parameter and scattering cross-section - Rutherford's scattering. Definition of a Rigid body – Rotational motion – rotational kinematics relations – equation of motion of a rigid rotating body – angular momentum and inertia tensor- Euler's equation.

Part B - Inorganic Chemistry

Unit-1 **11 hrs**

Inorganic metals in Biological system

Introduction, Essential and Trace elements, Biological significance of Sodium, Potassium and chlorine, Iron, Zinc, Cobalt, toxic metals and their toxicity of As, Hg, and Pb, Metallophorphyrins with emphasis on hemoglobin - structure and function. Chlorophyll I- structure and function, functions of nitrogenase.

Unit- II **13 hrs**

Co-ordination compounds

Introduction, nomenclature of inorganic molecules and complex compounds. Werner's theory-postulates, experimental evidences. Sidwick's theory-calculation of EAN, limitations. Metal-Ligand bonding in Transition metal complexes-Valence bond theory- postulates, geometries of coordination number 4 -tetrahedral and square planer, and coordination number 6-octahedral complexes, crystal field stabilization energy. (Elementary treatment - diagrams only).

Reference Books:

Physics of Mechanics

1. Fundamentals of Physics by David Haliday, Robert Resnick and Walker (4th Edition), Asian Books Pvt. Ltd., New Delhi.
2. Mechanics by Hans and Puri, Tata McGraw Hill Pub.
3. Introduction to Physics for Scientists and Engineers by F.J. Ruche(Mc Graw Hill).
4. Mechanics by Upadhyaya.
5. A text book of Engineering Mechanics by R.K. Rajput (Dhanpat Rai and sons).
6. B.Sc. Physics Vol.-1 by C. Murali Mohan Sastry, K. Shankar Rao, P. Babu Rao.
7. B.Sc. Physics Vol.-1 – Unified Physics.

Inorganic Chemistry

1. Concise Inorganic Chemistry by J.D. Lee
2. Basic Inorganic Chemistry by Cotton & Wilkinson
3. Inorganic Chemistry by J.E. Huheey
4. Selected Topics in Inorganic Chemistry by Wahid U.Malik and G.D Tuli
R.D. Madan
5. Vogel's Text book of Qualitative inorganic Analysis
6. Unified course in Chemistry by O.P. Agarwal, Vol. I, II, and III

Chemistry Practicals - Inorganic chemistry

1. Acid Base Titrations

Determination weight of carbonate in given Sodium Carbonate solution – by using acid base titration method.

2. EDTA Titrations

Determination of weight of Zinc in given ZnSO₄ solution by using standard EDTA solution.

Determination of weight of copper in given CuSO₄ solution by using standard EDTA solution.

16025 - EARTH AND ATMOSPHERIC SCIENCES

UNIT I

Earth as a Planet – its Shape, Size and Density – Movements and their effects-Origin, Interior and Age of the Earth – Geological Time Scale (GTS).

UNIT II

Continents- Evolution of Continents and Ocean Basins and their permanence – Theories of Paleo magnetism - Ice Ages and their periodicity –Rift Valleys and their characteristics and origin.

UNIT III

Atmosphere – Circulation – Clouds, Precipitation, Air – Pollution- Ozone Layer Depletion - Global Warming – Green house effect – Acid rains- The Air - Masses- Cyclones and Anti Cyclones - Tropical cyclones- Tornadoes

UNIT VI

Natural regions of the World – Tropical regions-Warm Temperate Regions- Cold Temperate Regions - Polar Regions-Forests and Grass lands of World-Weather Forecasting-Economic importance of weather: Agriculture - Aviation – Industry –Marine Activity and Military.

Text Books:

1. Physical Geology - A.N. Strahler , 1980
2. Environmental Geosciences - A.N. Strahler and A.H. Strahler, 1973
3. An Introduction to Earth and Environment - A.K. Sinha, 1990

Reference Books:

1. Elements of Meteorology - Albert Miller and Jack C. Thompson
2. Basic Physical Geology - E. S. Robinson , 1982

II SEMESTER

PAPER CODE 26011: COMMUNICATION SKILLS- 1

80 Marks

1. Communication

20 Marks

1. Objectives of Communication
2. Types of Communication
3. Verbal and Non-verbal Communication
4. Principles and Barriers of Communication
5. Characteristics of Successful Communication

2. Listening

20 Marks

1. The Listening Process
2. Types of Listening
3. Principles of Good Listening
4. Listening with a purpose
5. Barriers to Listening

1. Speaking

20 Marks

1. The Syllable
2. Word Stress
3. Accent and Rhythm in Connected Speech
4. Intonation
5. American and British Accents

2. Writing

20 Marks

1. Principles of Effective writing
2. Formal and Informal Letter Writing
3. E-mail
4. Resume & Job application

Books Suggested:

1. Essentials of Business Communication by Rajendra Rao
2. A Course in Listening and Speaking II
3. Business Correspondence and Report Writing R.C. Sharma Krishna Mohan
4. The Oxford Guide to Writing and Speaking by John Seely, (Oxford)
5. Developing Communication Skills by Krishna Mohan & Meera Benerji, Macmillan.
6. Effective Technical Communication – M. Ashraf Rizvi (Tata Mc Graw Hill)
7. Communication – C.S. Rayudu, Himalaya Publishing House
8. Business Communication – D.D. Chaturvedi, Mukesh Chaturvedi (Pearson Edu.)
9. Communication Skills – Dr. Nageshwara Rao, Dr. Rajendra P. Das (Himalaya Publication House)

26012 COMPUTER SCIENCES-I

UNIT-I

MS Word: Creating New Document; Opening existing document; File, Edit, Insert format, Tools, Table, Window menu commands.

Ms-access: Creation of tables, Queries, Forms and reports.

UNIT-II

MS Excel : working with Excel; spread sheet features; creating new work sheet; file men, Edit menu, Insert menu, Format menu, Tools menu, data menu commands.

MS Power Point: Auto content wizard; Master slides; Fines with other presentations.

UNIT-III

Programming in C: History of C; Structure of C Program; Data types, Variables constants; Type modifiers and storage class; Data types; Constants; operators and Assignment statement operators; I/O statements;

UNIT-IV

Programming in C: Arrays; Pointers; Structures and Unions; File Handling; Functions.

TEXT BOOKS:

- 1.Let us C, Kanethkar
2. ANSI-C BALAGURUSWAMY
- 3.MS Office 2007

Unit – I: Integration:

Definition : Standard results – Integration by substitution – Integration by Parts.

Sections 16.1 to 16.3 and 16.8 of Chapter 16 Elementary Engineering Mathematics by Dr.B.S.Grewal.

Unit – II: The Plane

Definition – Equation to the plane into the normal form – Angles between two planes – Perpendicular

distance of a Point from a Plane – Distance between Parallel Planes – Planes Bisecting the Angles

Between two Planes.

Chapter – 3 of “ A Textbook of B.Sc., Mathematics – Volume –II” by S.Chand Publications .

Unit- III: The Right Line

Definition – Angle between a line and a Plane- Conditions for a line to lie in a plane-

Coplanarity of lines

– Shortest Distance Between two skew lines – Length of the Perpendicular from a point to a line.

Chapter-4 of “ A Textbook of B.Sc., Mathematics – Volume –II” by S.Chand Publications .

Unit-IV : Differential Equation of First order and First degree

Introduction- Separation of variables – Homogeneous equations- Equations reducible to homogeneous

form .**Sections 2.1 to 2.6** of Chapter -2 of Ordinary and Partial Differential Equations by M.D.Raisinghania.

Reference Books:

Unit-I : “Intermediate Mathematics” by S.Chand Publications.

Unit –II, III,IV : Higher Engineering Mathematics by Dr.B.S.Grewal.

26014: Physical Sciences
Part A: Physics of Thermodynamics and Optics

Unit-I: Thermodynamics

The zeroth law and first law of thermodynamics – Internal energy – work done in isothermal and adiabatic processes – reversible and irreversible processes – Carnot's theorem – Carnot's engine – efficiency – Clausius – Clapeyron equation. Second law of thermodynamics – entropy – concept – entropy and disorder measurement of entropy changes in reversible and irreversible processes – entropy of universe. Joule – Kelvin effect – expression for Joule - Kelvin coefficient – Liquefaction of gases – Principle of Refrigeration.

Unit-II: Diffraction & Polarization

Diffraction – Fraunhofer diffraction – Fraunhofer diffraction at a single slit and double slit. Diffraction grating – Grating spectrum – Fresnel half period zones – zone plate.

Polarization – Nicol prism – theory of circular and elliptical polarized light – Quarter and Half wave plates – Polarimeter experiment.

Part – B: Physical Chemistry

UNIT-I

Chemical Kinetics

Rate of a reaction, factors of influencing the rate of a reaction-concentration, temperature, pressure, solvent, catalyst and light. Concentration dependence of rates, mathematical characteristics of simple chemical reaction-zero order, first order second order, pseudo first order, Half-life. Determination of order of a reaction-differential method, method of integration, half-life method and isolation method. Methods of determining order of a reaction.

Unit-II

Phase Equilibria

Homogeneous and heterogeneous system, statement and meaning of the terms-Phase, Component and degrees of freedom, Gibb's Phase rule, phase equilibria of one component system-water system. Phase equilibria of two-component system-solid-liquid equilibria, simple eutectic. Pb-Ag system, desilverization of lead. Solid solutions-definition of compound with congruent melting point system and incongruent melting point system. NaCl-H₂O system.

5 Year Integrated Course in M.Sc.

Semester – II: Chemistry Practicals - Physical Chemistry

1. Chemical kinetics

Determination of specific rate of the hydrolysis of methyl/ethyl acetate catalyzed by hydrogen ion at room temperature

2. Electrochemistry

Determination of strength of HCl Conductometrically using standard NaOH

3. Critical Solution Temperature (CST)

Determination of CST of Phenol-Water System.

Reference Books:

1. B.Sc. Physics Vol.-II by Sastry and Babu Rao (S. Chand and Co.)
2. Optics by Brijlal and Subrahmanyam (S. Chand and Co.)
3. Heat and Thermodynamics by Brijlal and Subrahmanyam (S. Chand and Co.)
4. B.Sc. Physics Unified Physics- II by Gupta and Gupta (Jai Prakashnath & Co.)

Physical Chemistry

1. Thermodynamics for Chemists by S. Glasstone
2. Chemical Thermodynamics by R.P. Rastogi & S.S. Misra
3. Advanced Physical Chemistry by Gurdeep Raj
4. Principles of Physical chemistry by Puri, Sharma and Pathania

26025 - GEOMORPHOLOGY

UNIT I

Nature ,definition, scope and recent trends in Geomorphology- Geomorphic classification of Land forms – Evolution of various Land Forms- Drainage Pattern- Geomorphic Cycle and their interpretation. Rocks- Origin – Classification – Distribution

UNIT II

Earth Movements – Epeirogenic and Orogenic Earth movements- Theories of Continental Drift – Isostasy and Plate tectonics – Earth Quakes - Volcanoes and their distribution.

UNIT III

Geomorphic agents and processes – Weathering – Erosion –Mass wasting –Cycles of erosion Concept – Land forms of Sea – Marine deposits – Coral reefs- Lacustrine deposits- Earth's Heat Budget and Global Climate Change.

UNIT IV

Geomorphic processes – Erosional and Depositional Land forms made by Rivers ,Glaciers ,Wind , Underground Water and Seas and Oceans.

Text Books:

- | | |
|---------------------------------|-----------------|
| 1. Text Book of Geomorphology | - A.L.Bloom |
| 2. Principles of Geomorphology | -W.S. Thornbury |
| 3. A text Book of Geomorphology | - P.Dayal |
| 4. Indian Geomorphology | - H.S. Sharma |

III SEMESTER

PAPER CODE 36011: COMMUNICATION SKILLS -II

80 MARKS

I. Listening Skills 20 Marks

- | | |
|---|-----------------------------------|
| 1. Listening Comprehension | 2. Effective Listening Strategies |
| 3. Listening to structured Talks | 4. Intensive Listening |
| 5. Team Listening (Listening & Note Taking) | |

II. Speaking Skills: 20 Marks

- | | |
|-----------------------|------------------------|
| 1. Oral Communication | 2. Presentation Skills |
| 3. Use of Visual Aids | 4. Group Discussions |
| 5. Facing Interviews | |

III. Reading Skills 20 Marks

- | | |
|-----------------------------------|--|
| 1. Types of Reading | 2. Understanding the gist of an argument |
| 3. Identifying the topic sentence | |

IV. Writing Skills 20 Marks

- | | |
|--|-------------------------------------|
| 1. Paragraph Writing | 2. Report writing, Types of Reports |
| 3. Minutes Drafting | 4. Information Transfer |
| 5. Interpreting data editing a passage | |

Books suggested:

1. Essentials of Business Communication by Rajendra Rao
2. A Course in Listening and Speaking II
3. The Oxford Guide to Writing and Speaking by John Seely, Oxford
4. Developing Communication Skills by Krishna Mohan and Meera Benerji (Macmilan)
5. Speaking English Effectively by Krishna Mohan and N.P. Singh (Macmilan)
6. Effective Technical Communication – M. Ashraf Rizvi (Tata Mc Grew Hill)
7. Communication – C.S. Rayudu, Himalaya Publishing House
8. Business Communication – D.D. Chaturvedi, Mukesh Chaturvedi (Pearson Edu.)
9. Communication Skills – Dr. Nageshwara Rao, Dr. Rajendra P. Das (Himalaya Publication House)

36012 COMPUTER SCIENCES- II

UNIT-I

Introduction to DBMS: Database Systems Applications, Database Systems vs. File Systems, View of Data, Data Models, Database Languages, Data base user and administrators, Transaction Management, Database Systems Structure.

Data Model: Entity Relationship Model-Basic concepts, Contrains, keys, Design issues.

E-R diagrams, weak entity sets, extended E-R diagrams. Design of an E-R Database schema.

UNIT-II

Relation Models: Structure, relational algebra, extended relational algebra operations, modifications of data base, views.

SQL: Basic structure and queries (DML and DDL Statements)

UNIT-III

Visual Basic: Introduction, Integrated Development Environment, Menu bar, tool bar, Form designer, code editor, properties window, form layout, project explorer

UNIT-IV

Visual Basic Language, variables, Constants, data types, user defined data types, arrays, Functions.

References

1. Silberschatz, Korth.Sudarshan, Dtabase system concepts 4th edition-Mc GrawHill Publishers.
2. Data VJ, An introduction to database systems.7th edition Pearson Education
3. Garycornell, visual Basic6.0 Tata McGraw Hill Publishers

36013: MATHEMATICS & STATISTICS

Unit-I : Vector Calculus:

Definitions and Properties of the Dot or Scalar products and Cross or Vector products - Gradient – Divergence – Curl.

Chapter 4 of “Vector Analysis” by Schaum’s Outline Series.

STATISTICS

Unit-II :

Definition – Scope – Limitations- Primary and Secondary data -collection and Sources of data –

Classification and Tabulation – PieChart – Histogram- Frequency Polygon- Frequency Curve- Ogive.

Scope and standard as in “**Fundamentals of Statistics – by SC Gupta, Himalaya Publications**”

Sections 1.1 to 1.4 of chapter 1,

Sections 2.1.3, 2.1.4 of 2.1; 2.2,2.3,2.5 of chapter 2

Sections 3.1 to 3.5 of chapter 3

Sections 4.1 to 4.4 of chapter 4

Unit-III : Measures of Central Tendencies and Dispersion.

Mean –Median – Mode- Range- Quartile Deviation – Mean Deviation – Standard derivation – coefficient of variation. Scope and standard as in “**Fundamentals of Statistics – by SC Gupta, Himalaya Publications**”. Sections 5.3,5.4,5.6,5.7,of Chapter 5 and Sections6.1, 6.4,6.5,6.6,6.8.6.9 of Chapter 6

Unit-IV: Correlation and Regression.

Curve fitting-Fitting of a straight line-Fitting of a parabola-fitting of Exponential Curve-Types of Correlation-Regression Line of Y on X – Regression Line of X on Y.

Scope and standard as in “**Fundamentals of Statistics – by SC Gupta, Himalaya Publications**”

Sections 11.5.3 of Chapter 11.

Sections 8.1 to8.4 of Chapter 8.

Sections 9.1 to9.3 of Chapter 9.

Statistics Practicals:

Quartile Deviation – Mean Deviation – Standard derivation – coefficient of variation.

Skewness :Karl Pearson’s Coefficient of Skewness.

Correlation : Karl Pearson’s Coefficient of Correlation & Probable Error

Regression: Regression of Y on X

Regression of X on Y

Curve Fitting : Fitting of a Straight Line

Fitting of a Parabola

Fitting of an Exponential Curve

Reference Books:

“**Fundamentals of Statistics – by SC Gupta, Himalaya Publications**”

S.P.Gupta : Stistical Methods by S.Chand.

S.C.Gupta : and V.K.Kapur – Fundamentals of Mathematical Statistics by S.Chand.

Probability and Statistics by SCHAUM’S OUT LINE SERIES.

36014: Physical Sciences

Part A: Physics of Semiconductor devices and Lasers

Unit-I: Semiconductor devices (15 hours)

Intrinsic and extrinsic semiconductors –p-n junction diodes - Zener diode - Half wave and full wave rectifiers and filters - Bipolar junction transistor- p-n-p transistors - CB,CE,CC configurations - transistor hybrid parameters - determination of hybrid parameters from transistor characteristics.

Unit-II: Lasers (10 hours)

Introduction – Characteristics of Laser – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Ruby Laser – Helium- Neon Laser – Applications of Lasers In Industry, Scientific and Medical Fields.

Part B - Organic Chemistry

Unit-I

Structural theory in Organic Chemistry

Bond polarization: Factors influencing the polarization of covalent bonds, electro negativity – electromeric effect, inductive effect, mesomeric effect or resonance and hyperconjugation, and their applications. Concept of aromaticity-definition, Huckel's rule-application to Benzenoid and Non-benzenoid compounds. Reactions-General mechanism of electrophilic substitution, mechanism of nitration and sulfonation. Mechanism of halogenation, Friedel Craft's alkylation and acylation. Orientation of aromatic substitution-definition of *ortho*, *para* and *meta* directing groups

UNIT-II

Stereochemistry of carbon compounds

Molecular representations: Wedge, Fischer, Newman and Saw-horse formulae, stereoisomers: enantiomers and diastereomers, conformational and configurational isomerism. Enantiomers: Optical activity: wave nature of light, plane polarized light, interaction with molecules, optical rotation and specific rotation. Chiral centers: definition-molecules with similar chiral carbons-definition of mesomers. Molecules with dissimilar chiral carbons. Number of enantiomers and mesomers-alculation. D, L & R, S configuration for symmetric and dissymmetric molecules. Cahn-Ingold-Prelog rules. Racemic mixture, racemization and resolution techniques.

Chemistry Practicals

Organic chemistry:

1. Qualitative analysis: identification of an organic compound through the functional group analysis and preparation of suitable derivatives

2. Preparations

- Preparation of *p*-bromo acetanilide
- Preparation of *p*-nitro acetanilide

Reference Books

- B.Sc. Physics: Unified Physics Vol.III
- Engineering Physics by M. R. Srinivasan, New Age Publications

Organic Chemistry

- 1) Advanced Organic chemistry- Reactions, Mechanism and Structure, Jerry March, John Wiley.
- 2) Organic Chemistry, R.T. Morrison & R.N. Boyd, Prentice-Hall.
- 3) Text book of Organic Chemistry, T.W. Solomon.
- 4) Stereo Chemistry, P.S. Kalsi
- 5) Reaction mechanisms by P.S. Kalsi
- 6) A guide book to Mechanisms in Organic Chemistry by Mukherji & S.P. Singh
- 7) A Guide Book to Mechanism in Organic Chemistry, Peter Sykes, Longman.

36025 - CRYSTALLOGRAPHY AND MINERALOGY

UNIT I

Definition of Crystal –Amorphous and Crystalline states-Morphology of Crystals-Face, Edge, Solid angle, Interfacial angle – Forms of crystals- Symmetry- Parameters – Crystallographic notation – Miller Index-

UNIT II

Classification of Crystals into 7 systems- Morphological characters of 7 crystal systems- Twin Laws - Twinning in Crystals.

UNIT III

Definition of Mineral –Classification of Minerals – Rock forming and Ore forming minerals , Physical properties of minerals– Magnetic properties- Electrical properties –Pyro and piezo-electricity ; Modes of mineral formation- Occurrence and association of minerals – Chemical properties of minerals- Isomorphism –Solid solution- polymorphism- Allotrophy- Pseudomorphism- Radio activity- Silicate structures

UNIT IV

Study of physical and chemical properties and mode of occurrence of the following mineral groups : Nesosilicates, Sorosilicates, Cyclosilicates, Inosilicates, Phyllosilicates and Tektosilicates

Text Books:

- | | |
|--------------------------------|----------------------------|
| 1. A Text Book of Mineralogy | - E.S.Dana |
| 2. Elements of Crystallography | - F.A.Wade and R.B.Mattrox |
| 3. Elements of Mineralogy | - Rutleys |

SEMESTER IV

46011: SECOND LANGUAGE

5 సం॥ ఇంటిగ్రేటెడ్ కోర్సు

మొదటి సెమిస్టర్

తెలుగు పాఠ్య ప్రణాళిక - 2009 - 2010

I. ప్రాచీన కవిత్వం :-

- PPD 1. తిక్కన - మూషిక మార్జాల వృత్తాంతం
ఆంధ్ర మహా-భారతం - శాంతి పర్వం - మూడవ ఆశ్వాసం
(202 నుండి 242 వరకు)
- PPD 2. తరికొండ వెంగమాంబ - ఎఱుకత
శ్రీ వేంకటాచల మహా-త్వం - ఐదవ ఆశ్వాసం . (4-51)

II. ఆధునిక కవిత్వం :-

- MMU 1. కుసుమ ధర్మన్న - ఆలకింపుమయ్య హరిజన శతకం (1-20) |
- MMU 2. బెళ్ళూరి శ్రీనివాస మూర్తి - రాయలసీమ - గంజి కేంద్రం |
(తపోవనము లోంచి)
- MMU 3. విమల - వంటిల్లు (ఎంత అద్భుతమైంది నుండి ఒంటరి
వంట గదులు వరకు) :

III: - గద్య భాగం :-

- SPK 1. కేతు విశ్వనాథ రెడ్డి - నమ్మకున్న నేల.
- SPK 2. అభివ్యక్తి నైపుణ్యం - పి.వి. సుబ్బారావు.
- SPK 3. తెలుగు భాష - జి. కృపాచారి

IV. నాటకం :-

- ALP బోయి బీమన్న - పాలేరు

Head of the Department of Telugu
YOGI VEMANA UNIVERSITY
KADAPA - 516 003

46012: ENVIRONMENTAL STUDIES

Unit – I

Environment: introduction; Bio- geo chemical cycles and their significance in nature. Ecosystem: Definition, Components, Structure, types food chain, food web and energy flow, environmental impact and assessment.

Unit –II

Natural resources and sustainable development energy resources renewable energy resources bio fuels solar energy forest type of India soil erosion water management

Unit –III

Biodiversity conservation: biodiversity definition concept biodiversity centers in India types of conservation Ex- situ conservation in-situ conservation

UNIT-IV

Pollution and control measures air pollution green house effect global warming ozone depletion water pollution industrial effluents agricultural and municipal wastes. Soil pollution heavy metals pesticides prevention and control measures.

References

1. Prithipal Sigh (2006) Perspectives in Plant Ecology and environmental biology. Scientific Publishers Jodhpur
2. SAHU T.R and sahu P.K (2006) biodiversity and sustainable utilization of biological resources. Scientific Publishers Jodhpur
3. Aravind Kumar(2003)environmental challenges of the 21 century . APH Publishing Corporation New Delhi.
4. Subramanian V (2002)A text book of environmental science. Narosa Publishing House , New Delhi
5. Sharma PD.(2006) Ecology and environment Rastogi Publications , Meerut.
6. Biswarrop Mukharjee (1997) Environmental biology. Tata Mc Graw hill publishing Company Limited.
7. Kumar H.D.(1994)Environmental ecology, Vikas Publishing House Pvt. Ltd. New Delhi
8. A.B. Choudary and sarkar D.D (2006) Biodiversity Endangerd . Scientefic Publishers Jodhpur.
9. Dwivedi A.P. (1980) Forestry in India JUgal Kishore and Company dehradun, India.

46013: ENTERPRENEURSHIP AND PRINCIPLES OF MANAGEMENT

UNITS-I

Entrepreneur and Entrepreneurship; Concept and Definition- Characteristics and Functions of Entrepreneur-Types of Entrepreneurs- Relationship between entrepreneur, entrepreneurship and enterprise-role of entrepreneurship in Economic development- Role of Government in promotion of Entrepreneurship- Problems in entrepreneurship development in India.

UNIT-II

Entrepreneurship development programmes; (EDPs)
Need for EDP-objectives of EDPS-Course contents and curriculum of EDPS-
Evaluation of EDPS-Various Entrepreneurship Development institutions in india.

UNIT-III

Management; concepts, principles and functions- Management and Administration- managerial skills-managerial roles-social responsibility and ethics-business environment.

UNIT-IV

Planning; Nature and process of planning- Decision making – Nature of decision making- Organization levels- Organization structures-Staffing policies-Line and Staff lateral relations- Delegation and Decentralization.

Reference books:

- 1.Dollinmeger; Entrepreneurship; Strategies and resource (Pearson Education)
- 2.Peter Hrisch; Entrepreneurship (TMH publication House).
- 3.Agrwa; R.D. Organisation and Management, Tata McGraw hill.
- 4.Knooz and weichrich Essential of management, Text and cases, Tata Mcgraw.

46024: COMPUTER APPLICATION IN EARTH SCIENCE

UNIT-1

Introduction-principle concept, definitions and procedures-Auto cad drawing, units, scales and paper sized, drawing layers, prototype drawings, graphic concepts, graphic workstation features, command entries. Using the pull down menus, data entry. Cartesian co-ordinates, distance and numeric values, angles, dialogue boxes. Snap techniques, xyz point filtering. Introduction to autocad commands-Setting drawing environment (Units,Limits,Qtext, Viewers-Blipmode. Fill, Status), entry drawing commands (Line, point,Circle, Are, Ellipse, plane. Polygon. Hatch, Bhatch, Dtext),Basic utility commands(Redraw, Save, End Quit)

UNIT-II

Drawing control and Manipulation- Tools for drawing area-Zoom scale and zoom features , pan, Vpoint, Deiew, Model space, paper space and view ports, Drawing tools- UCS, Snap, Grid, Axis, Ortho, Osnap, Aperture. Editing commands- Deletion operations-Erase, Oops. Transformation operations-Move, Copy, Rotate, Scale. Minrror, Stretch, Array,Offest, Edition and Changing existing entities-Change, Pedit, Break,Trim, Extend, Fillet, Chamfer,Devide, Measure. Error recovery-U.Redo, Undo. Enquiry operations-List. Dist, Id.Area.

Crouping entities- Layering-Layer, Ddlmodes, Vplayer, Blocks-Block, Wblock. Insert,Explode, Minesrt. External reference blocks- Xref. Xbind. 2D and 3D drawings- Maps and DEM.

UNIT III

Surfer in Earth Science:2D

Installation, Introduction, Menu Bar Tool Bar, Grid files, fried menu surface plot Interpolation, Overlays and individual Maps.

UNIT IV

Surfer in Earth Science:3D

Introdution to Grid , Gridding Methods, Contour Mapping and 3Dviews , Overlays and individual maps

46025 - OPTICAL MINERALOGY

UNIT I

Principals of optics –Polarizing Microscope-Theories of Light- Refringence- Birefringence- Plane polarized Light- Crossed polarized light- Double refraction-Snell's Law- Index of Refraction- -Dispersion-Critical angle- Total Reflection

UNIT II

Interference Colors- Determination of Retardation with Berek Compensator – Extinction- Elongation- Anomalous interference-Formation of Interference Figures- Biaxial Interference Figures- Optical ellipsoids-Fresnel's and Fletcher indicatrix- Dispersions – Optical anomalies-

UNIT III

The Axial Angles $2E$ and $2V$ variation in Axial Angle –Determination of optical sign of a Biaxial Mineral-The Optic-Axis Figure- Dispersion in Biaxial Interference Figures-The Universal Stage adjustment, Orientation with the Universal stage- Location of the Uniaxial Optic Axis.

UNIT IV

Optical Directions in Biaxial Crystals – Illustrative mounts – Illustrative exercise- Stereographic Net – Color and Pleochroism- Optical properties of important minerals – Uniaxial minerals – Calcite, Dolomite, Beryl, Apatite, Corundum, Quartz, Zircon. Biaxial minerals - Gypsum, Albite, Barite, Olivine, Orthoclase, Muscovite, Hypersthene, Kyanite

References and Text Books:

- | | |
|------------------------------------|----------------|
| 1. Rutley's Elements of Mineralogy | -H.H.Reed |
| 2. Manual of Optical Mineralogy | -Shelly |
| 3. Optical Mineralogy | - Paul F. Kerr |
| 4. Mineral Optics | -Phillips W.R |
| 5. Elements of Optical Mineralogy | -Winchell A. N |

46021P - Crystallography, Minerology and Optical Mineralogy Lab (Practicals):

1. Study of physical properties and diagnostic features of the selected minerals
2. Study of symmetry and form of the all classes of seven crystal systems.
3. Study of optical properties of selected minerals

V semester

56021: IGNEOUS PETROLOGY

Unit – I

Introduction to igneous petrology – Earth zones – Formation of igneous rocks – Crystallization of unicomponent magma – Grain of igneous rocks – Formation of glass. Crystallisation of Binary magmas – Eutectics – Mixed crystals – Crystallisation of ternary magmas – the reaction relation. Forms of intrusive igneous rocks; concordant forms and discordant forms. Composite intrusions, multiple intrusions.

Unit – II

Structures: Vesicular and amygdaloidal, block lava, ropy lava, pillow, flow, jointing, sheet & platy structures, columnar and prismatic structures. Textures – Definition of Texture, crystallinity, granularity, shapes of textures, micro-structures, devitrification, allotriomorphic, hypidiomorphic, panidiomorphic, porphyritic, poikilitic, ophitic, trachytic, graphic and micro-graphic textures. Reaction structures corona, myrmekitic, orbicular, spherulitic.

Unit – III

Classification of igneous rocks- CIPW and tabular classification, nomenclature of Igneous rocks, composition and constitution of magma. Bowen's reaction principle. Origin of primary basic magmas. Differentiation, assimilation, role of volatiles in evolution of magmatic rocks, role of trace elements in igneous petrogenesis. Geothermo metry, geobaro metry.

Unit – IV

Descriptive study of following rock types: granite, granodiorite, syenite, nepheline syenite, diorite, porphyry, pegmatite, aplite, gabbro, anorthosites, peridotite, pyroxenite, dunite, dolerite, rhyolite, obsidian, trachyte, andesite, basalt, Kimberlite, lamprophyres and Carbonatite

Reference Books:

1. Philpotts, A., 1992. Igneous and metamorphic petrology
2. Best, M.G., 1986. Igneous and metamorphic petrology
3. Raymond, L.A., 1995. Petrology
4. Tyrrell, G.W. The principles of petrology
5. Turner & Verhaugen. Igneous and Metamorphic Petrology

56022: METAMORPHIC PETROLOGY

Unit – I

Definition of metamorphism, agents of metamorphism, types of metamorphism, zones of metamorphism – metamorphic minerals – stress and anti-stress minerals. Structures of metamorphic rocks – cataclastic, maculose, schistose, granulose and gneissose. Textures of metamorphic rocks – crystalloblastic, palimpsest, xenoblastic, idioblastic.

Unit – II

Classification of metamorphic rocks, concept of metamorphic facies. Cataclastic metamorphism of argillaceous and arenaceous rocks. Thermal metamorphism of argillaceous, arenaceous and calcareous rocks, dynamothermal metamorphism of argillaceous, arenaceous and igneous rocks. Plutonic metamorphism.

Unit – III

Mineral assemblages and pressure, temperature conditions, characteristics of different grades and facies of metamorphism. Metasomatism and additive processes. Metamorphism and granitization, Metamorphic differentiation: anatexis and origin of migmatites. Regional metamorphism and paired metamorphic belts in reference to plate tectonics.

Unit – IV

Descriptive study of the following metamorphic rocks, gneiss, schist, slate, phyllite, quartzite, marble, granulite, eclogite, amphibolite, migmatite, gondite, charnockite and khondalite.

Reference Books:

1. Philpotts, A., 1992. Igneous and metamorphic petrology
2. Best, M.G., 1986. Igneous and metamorphic petrology
3. Raymond, L.A., 1995. Petrology
4. Tyrrell, G.W. The principles of petrology
5. Yardley, B.W., 1989. An introduction to metamorphic petrology
6. Turner & Verhaugen. Igneous and Metamorphic Petrology

56023: SEDIMENTOLOGY

Unit I: Earth Surface System: Liberation and flux of sediments, Physical, Chemical and Biological processes. Sedimentary structures and textures. Classification of Sedimentary Rocks; Sedimentation and tectonics.

Unit II: Sedimentary environments and facies. Continental alluvial-fluvial, lacustrine, desert-aeolian and glacial sedimentary systems. Shallow coastal clastics. Marine and continental evaporites. Shallow water carbonates. Deep sea basins. Volcanoclastic: on-land and marine. Palaeocurrents and basin analysis. Concept of sedimentary facies; basic principles of palaeoenvironment and palaeoclimate analyses.

Unit III:

Application of trace element, rare-earth element and stable isotope geochemistry to sedimentological problems.

Unit IV: Provenance and Diagenesis of terrigenous and chemical sediments. Diagenesis of mudstones, sandstones, and carbonate rocks: changes in mineralogy, fabric and chemistry. Descriptive study of Common Sedimentary Rocks – Conglomerate, Breccia, Sandstone, Shale, Limestone, Laterite

Reference Books:

1. Pettijohn, F.J., Potter, P.E. and Siever, R.C., 1990: sand and sandstone. Springer-Verlag
2. Boggs Sam Jr., 1995: Principles of sedimentology and Stratigraphy, Prentice Hall.
3. Sengupta, S., 1997: Introduction to Sedimentology, Oxford-IBH
4. Davis, R.A. Jr., 1992: Depositional Systems Prentice Hall.
5. Nichols, G., 1999: Sedimentology and Stratigraphy. Blackwell.
6. Sloss. Sedimentary Tectonics

Practicals:

- a) Study of primary, secondary and biogenic sedimentary structures in hand specimens, in photographic atlases, field photographs and wherever possible on the outcrops.
- b) Microscopic study of sedimentary structures, textures and diagenetic features in sedimentary rocks.
- c) Microscopic study of heavy minerals.
- d) Size analysis (Sieving).

56024: STRUCTURAL GEOLOGY

Unit-I

Definition, aim and objectives of structural geology. Types of structures – primary and secondary; their distinctions and importance in determination of top of beds, Outcrop, attitude of beds- strike, dip and apparent dip, use of clinometer and Brunton compass.

Mechanical principles and properties of rocks and their controlling factors – theory of rock failure; concept of stress and strain. Types of strain ellipses and ellipsoids and their properties and geological significance.

Unit-II

Classification of folds. Mechanics of folding and buckling. Superposed folding and formation of domes and basins. Micro, meso and macroscopic folding and their importance.

Fractures and joints; their nomenclature, classification, origin and significance. Foliation, cleavage and schistosity. Lineation-types and their significance in recognition of fold generation.

Unit-III

Definition, classification and mechanics of faults. Criteria for recognition of faults. Effects of faulting on topography – anticlinal valleys, synclinal ridges, fault scarp, fault line scarp, nappe, window and klippe. Shear zone and its characteristics.

Unconformity, definition, types of unconformities- overlap, offlap, outlier and inlier. Criteria for distinguishing the unconformity from fault.

Unit-IV

Effect of structure on discordant forms. Forms of extrusive igneous rocks- volcanic hill, cinder cone, composite volcano, caldera, crater and volcanic neck. Introduction to petrofabric analysis.

Diapirs and related structural features- salt dome, shale sheath. Criteria for distinguishing the diapiric dome from structural dome.

Reference Books:

1. Structural Geology by M.P.Billings
2. Structural Geology and Tectonic Principles by P.C.Badgley
3. Principles of physical geology by A.Holmes and D.L.Holmes
4. An outline of structural Geology by Bruce E. Hobbs
5. Introduction to modern structural Geology by S.K. Ghosh

56025: GEOCHEMISTRY

Unit – I

Introduction to geochemistry – its scope. The earth in relation to the solar system and the Universe. Cosmic abundance of elements, composition of planets and meteorites. Structure composition and distribution of elements in the earth. Geochemical classification of elements. Geochemistry of hydrosphere, biosphere and atmosphere.

Unit –II

Elementary crystal chemistry and thermodynamics. Lattice energy of crystals, principles of ionic substitution in minerals. Ionization potential, electro negativity, Pauling's rule, Periodic table with special reference to rare earth elements. Geochemistry of Uranium & Lithium.

Unit – III

Introduction to isotope geochemistry, stable isotopes, geochemistry of carbon, oxygen, sulfur Isotopes, Radiogenic Isotopes, Decay scheme of K-Ar, U-Pb and Rb-Sr, carbon dating and its applications in geology.

Unit – IV

Geochemical prospecting; fundamental concepts, pathfinder elements. Threshold values, geochemical anomaly. Primary and secondary dispersion Halos sampling. Geochemical cycles and Geochemical methods for prospecting of metallic minerals, petroleum and natural gas. Techniques in geobotanical survey.

Reference Books:

1. Mason, B and Mooro, C.B., 1991: Introduction to Geochemistry, Wiley Eastern
2. Kranskopf, K.B.,1967 : Introduction to Geochemistry McGraw Hill
3. Faure, G., 1986: Principles or Isotope Geology, John Wiley
4. Evans, R.C, 1986: Introduction to Crystal Chemistry, Cambridge Univ.Press.

VI semester

66021: HYDRO GEOLOGY

Unit – I

Groundwater: Origin, types, importance and occurrence, Hydrologic cycle. Hydrologic properties of rocks – Porosity, Permeability, Specific Yield, Specific Retention, Hydraulic Conductivity, Transmissivity, Storage Coefficient; Aqifer types; Subsurface distribution of groundwater; Groundwater occurrence in the different geological formations.

Unit – II

Groundwater movement, Darcy's law and its applications, Determination of Permeability in laboratory and in field: Well hydraulics: Confined, Unconfined, Steady, Unsteady and radial flow, water level fluctuations, Types of wells, drilling methods.

Unit – III

Groundwater Quality: Physical, Chemical and bacteriological parameters; Quality criteria for groundwater use, graphical presentation of water quality data, Saline Water intrusion in coastal aquifers problem of arsenic and fluoride.

Unit – IV

Groundwater Exploration: Geophysical and geological methods of groundwater exploration, Remote Sensing techniques and Radio isotopes in hydrogeological studies. Artificial recharge of groundwater, consumptive and conjunctive use of surface and groundwater; Groundwater budgeting and basin management. Ground water provinces of India.

Reference Books:

1. Todd, D.K., (1987), Ground water hydrology, John Wiley & Sons, New York.
2. Davies, S.N. and De Wiest, R.J.M., (1966) Hydrogeology, John Wiley & Sons, New York
3. Karanth, K.R., Hydrogeology. Tata McGrawHill Publ., New Delhi.
4. Karanth, K.A. (1997) Ground water assessment, development and management, Tata McGrawHill Publ., New Delhi

66022: STRATIGRAPHY AND INDIAN GEOLOGY

Unit I

Stratigraphy: Definition, scope, history and evolution. Stratigraphic terminology, nomenclature and classification – Lithostratigraphy, Biostratigraphy, Chronostratigraphy, Magnetostratigraphy and seismic Stratigraphy. Concept of lithofacies and biofacies. Historical Evolution of Geological Time Scale.

Unit II

Principles and concepts of Sequence Stratigraphy: Scope, stratigraphic terminology. Principles of palaeogeography and paleoclimate. Completeness and incompleteness of Stratigraphic records. Preservation and Net rates of accumulation in various basinal settings.

Unit III

Major stratigraphical divisions and their equivalents in India. Brief account of classification, lithology, structures and fossil content with economic importance of Archaean, Cuddapah and Vindhyan Super Groups. Gondwana super group, Triassic, Jurassic, Cretaceous formations of India. Short account of Siwaliks and Deccan Traps – Intra and Inter traps – Origin, composition, distribution. Tertiary and Quaternary rocks of India.

Unit –IV

Age problems pertaining to Indian stratigraphy. a) Saline Series b) Deccan trap. Study of the following boundary problems with reference to India a) Precambrian - Cambrian, b) Permian – Triassic, and c) Cretaceous – Tertiary

Reference Books:

1. Fundamentals of historical Geology and Stratigraphy of India – Ravindra Kumar
2. Principles of Stratigraphy - Lemon, R.R
3. Principles of Sedimentology and Stratigraphy - Boggs, S.
4. Principles of Stratigraphy - Danbar, C.O. and Rodgers, J.
5. Geology of India and Burma by M.S.Krishnan
6. Geology of India by D.N.Waladia
7. Geology of India by M. Ramakrishna & R. Vidyanadhan

66023: GEOTECTONICS

Unit – I

Earth's crustal structure and earth movements – endogenic diastrophic forces and movements and exogenic forces and their importance in formation of peneplanation and oceanic plains. Isostasy – concepts and global isostatic adjustment.

Unit – II

Evaluation of continents and ocean basins – Tetrahedral hypothesis, Continental drift theory of F. B. Taylor and A. G. Wegner and Plate tectonic theory – seafloor spreading, mid-oceanic ridges, continental collision and divergence, island arcs. Tectonic elements of continents and ocean basins.

Unit – III

Tectonic divisions of India – peninsular India, extra – peninsular India and indo – gangetic alluvial plains. Tectonics of Precambrian orogenic belts of India. Tectonics of Gondwana basin.

Unit – IV

Palaeo tectonic reconstructions – tectonic analysis of facies maps; tectonics analysis of isopach maps, diastems, angular unconformity and paleomagnetism. Neotectonics – definition, evidences for neo-tectonism and their geological significance.

Reference Books:

1. Principles of physical geology by A.Holmes and D.L.Holmes
2. Aspects of Tectonics, focus on South Central India by K.S.Valdiya
3. Badge, P.C., 1965: Structure and Tectonics. Harper and Row.
4. Summerfield, M.A., 2000: Geomorphology and Global Tectonics. Springer Verlag
5. Candie.

66024: PALEONTOLOGY

Unit – I

Concept of species – Nomenclature – Life through Geological Time Scale – Taphonomy – Definition of fossil – Modes of preservation of fossils – Index fossil – Zone fossil.

Unit – II

Morphology, classification and evolutionary trends of Graptolites, Corals, Trilobites and Brachiopods.

Unit – III

Morphological and evolutionary trends of Mollusks (Lamellibranches, Gastropods and Cephalopods), Echinoderms – Plant fossils.

Unit – IV

Scope of Micropaleontology – Detailed morphology of Foraminifera, Ostracoda – Utility of microfossils in oil exploration – Palaeoecology – Paleobotony.

Reference Books:

1. Invertebrate Paleontology – Henry woods
2. Principles of Invertebrate Paleontology – Shorrock & Twenhofel
3. Elements of Micropaleontology – Bignot. G
4. Principles of Micropaleontology – F. H. Glessener

66025: GEOPHYSICAL EXPLORATION

Unit – I

Gravity methods – principles of gravity methods – field investigations, reduction of gravity data and interpretation anomalies. Magnetic properties of rocks and minerals. Magnetic methods - principles of magneto-meter, field procedures, corrections to magnetic data and interpretation.

Unit – II

Geomagnetic field of the earth: Magnetic properties of rocks, working principles of magneto meters earth's magnetic field regional and local anomalies. Magnetic balances and torsion magnetometers.

Resistivity methods: basic principles, various types of electrode configurations: field procedure profiling and sounding. Electrical prospecting: Electrical methods in ground water investigation.

Unit – III

Seismic methods: fundamental principles of wave propagation: reflection and refraction surveys, elastic properties of rock, different types of elastic waves. Radiometric methods: radio activity of rocks and minerals, and instruments used in detection and measurement of radiation in different exploration techniques.

Unit – IV

Application in mineral and petroleum exploration, brief outline of various well-logging techniques; principles of electrical logging and its applications in petroleum; ground water and mineral exploration, prospecting for radio activity.

Reference Books:

1. Mining Geology by H.E. McKinstry
2. Mineral Exploration by P.K.Ramam
3. Introduction to Geophysical prospecting by Dorbin, M.B.
4. Geophysical methods in Geology by Sharma, P.V.
5. Principles of applied geophysics by Parasnis, D.S.
6. Outlines of Geophysical prospecting by Ramachandra Rao, M.B.

VII semester

76021: ORE GENESIS AND MINERAL DEPOSIT

Unit-I

Spatial and temporal distribution of ore deposits- a global perspective. Mode of occurrence of Ore bodies. Textures, paragenesis and zoning of ores and their significance. Processes of formation of mineral deposits- magmatic concentration, sublimation, contact metasomatism, hydrothermal process, cavity filling, replacement, evaporation, sedimentation, residual and mechanical concentration, oxidation and supergene sulphide enrichment.

Unit-II

Precious Metals – Mineralogy, genesis, uses, distribution of Gold, and Diamond in India.
Non-Ferrous Metals - Mineralogy, genesis, uses, distribution of Cu, Pb, Zn in India.
Iron and Ferro Alloy Metals - Mineralogy, genesis, uses, distribution of Fe, Ni, Cr, and Mo in India. Mineralogy, genesis, uses, distribution of Atomic minerals.

Unit-III

Minerals used for chemical Industry- mineralogy, genesis, uses, distribution of Sulphur and Pyrite, Baryte, Fluorspar in India. Minerals used for Ceramic Industry: mineralogy, genesis, uses, distribution of Gypsum, Talc, Steatite and Soapstone and Clay in India.

Unit-IV

Minerals used for Fertilizer industries: mineralogy, genesis, use and distribution of Rock phosphates and phosphorites, Gypsum, Apatite.
Minerals used for Refractory Industry: mineralogy, genesis, use and distribution of Graphite, Dolomite, Magnesite, Kyanite, Sillimanite and Andalusite, Fire clay and Ball clay in India.
Minerals for insulation and Electrical industry: mineralogy, genesis, use and distribution of Mica, Asbestos in India.

Reference Books:

1. Ore Deposits – Lindgren, W.
2. Ore Deposits – Park, Jr. C.F. and MacDiarmid, R.A.
3. Ore Petrology – Stanton, R.L.
4. Economic Mineral Deposit – Bateman, A.M. and Jenson, M.L.
5. Ore Microscopy – Cameron, E.C.
6. The ore Minerals and their intergrowths – Ramdohr, P.

76022: MINING AND ORE BENEFICIATION

Unit-I

Introduction to mining terminology. Preliminary and detailed mining. Tracing and outlining of mineral deposits. Mining methods- surface mining- alluvial, open pit and open cast mining. Sub-surface mining- classification of stoping methods, underground development different types of stoping.

Unit-II

Mine supports, Subsidence, Methods of breaking of rocks, mine atmosphere, ventilation, drainage, pumping, haulage and winding. Mining hazards and safety measures. Sampling methods- Chip channel, trench, cutting and underground mine samples. Methods of drilling- diamond, core, rotary, percussion and auger drilling. Bore hole problems. Preparation of mine plans.

Unit-III

Principles of mineral processing- methods of treatment- sequence of operations and its importance, Properties of minerals and rocks and their considerations in ore techniques. Primary crushers- jaw crushers, rod crusher, gyratory crusher. Secondary crusher- cone crusher, hammer mill and gravity sampled. Grinding mills- ball mill, rod mill, pebble mill, tube mill, hand mill, industrial screens, stationary.

Unit-IV

Movable and vibrational classifiers- sizing classifiers, mechanical classifiers, pneumatic classifiers. Jigging- methods of design hand jigging, bacum jig, dauber jig, pneumatic jig, tabling- flowing film concentration- principles; Humphrey spiral tables- shaking tables Wilfrey table.

Flocculation and description- flotation- agglomeration- physical and chemical aspects- technology-, magnetic separation.

Reference Books:

1. Mineral Beneficiation and agglomeration plant in India- Indian bureau of Mines, Nagpur
2. Oreprocessing- S.K.Jain
3. Principles of mineral dressing- A.M.Gaudin
4. Mineral Processing- E.J.Pryor
5. Courses in Mining Geology- R.N.P.Arogyaswamy
6. Mining Geology- H.C.Mckinstry
7. Elements of ore dressing-A.F.Taggart
8. Mineral Economics-R.K.Sinha and N.L.Sharma
9. Ore deposits of India- Their distribution and processing- K.V.G.K.Gokhale and T.C.Rao

76023: Aerial Photography and Photogrammetry

Unit I Aerial photography: History, Types of photography, basic information and specification for aerial photography, Planning and execution of photographic flights. Aerial cameras – Optical aspects of aerial cameras. Photographic films and uses of filters. Aerial mosaics: Types of mosaics - Uncontrolled, semi-controlled, and controlled. Compilation of mosaics. Aerial triangulation.

Unit II Geometrical elements of aerial photos and terminology, scale in vertical and tilted photographs, Image displacement due to Relief, tilt, and stereoscopic parallax. Calculation of height by parallax measurements. Measurement of parallax difference with parallax bar. Stereoscopy: Pseudoscopy, distortions in a stereo modal. Instruments for stereo viewing-pocket and mirror stereoscope. Stereoscopic exaggeration – Base height ratio. Estimation of dip and slope.

Unit III Transfer of planimetric details and map making. Stereo plotters – Sketch master and radial planimetric plotter. Three dimensional photogrammetry: Data capturing, image coordinate system, image space coordinate system, interior orientation and exterior orientation. Orthorectification, generation of orthophoto and Digital Elevation Model. Application of orthophoto and Digital Elevation Model.

Unit IV Aerial Photo/Image interpretation – Factors affecting image quality, techniques of interpretation- Photo/image recognition elements – tone, texture, colour, shape, shadow and pattern. Geotechnical analysis – land form, drainage, vegetation and Land use analysis and convergence of evidence . Interpretation of lithology: Igneous, Sedimentary and metamorphic rocks. Interpretation of various structural elements – Bedding, foliation, joints, folds, faults and lineaments.

Reference Books:

1. Photogeology by Miller V.C. and Miller C.F., 1961.
2. Aerogeology by Bandat, H.F.V., (1962)
3. Aerial photographs in Geological interpretation and mapping by Ray R.G., (1961)
4. Aerial photographs and their applications by Smith, H.T.U. (1943)
5. Principles of Remote Sensing, Longman Curran, P. 1985.
6. Elements of Photogrammetry Woll, P.R. 1974 Mcgraw Hill Book Co., Tokyo.
7. Photogrammetry Moffit H.F. and Edward, M.M, 1980.
8. Mapping from Aerial Photographs Burside, C.D., 1985.
9. Aerial Photograophy & Remote Sensing Bhatt.A.B.
10. Qiheyans, Map Projection transformation, Principles and its Applications.
11. Rampal; Handbool of Aerial Photography and interpretation, concept publishing.
12. David Paine; Aerial Photography and image interpretation for Resource. Management, john Wiley & Sons, N,Y.

76024: FIELD GEOLOGY AND SURVEYING

UNIT – 1

FIELD GEOLOGY: Toposheet and map reading. Various methods of locating a point on toposheet or map. Basic field procedures: Determination of slopes and gradient, measuring differences in elevation. Basic field observations at a point or out crop.

Geological mapping: general considerations, reconnaissance, study of surface features and rocks. Transfer of field data collected on to a base map, finalization of map, preparation of geological cross section.

Contouring: Definitions of contour- Contour interval-characteristics of contours. Direct and indirect methods of contouring. Uses of contours. Grade contours.

UNIT-II

SURVEYING & MEASUREMENTS: Surveying – History; Definition; Classification; Principles of surveying; Plan and map; Measurements – Basic Measurements and methods; Scale – Scales used for Maps and plans

CHAIN AND PLANE TABLE SURVEY: Principles of chain survey, use and adjustment of various instruments employed in chain survey. Offsets and error in offsets. Obstructions in chaining. Errors and sources of errors. Determination of areas by chain survey.

Compass Survey: Use and adjustment of prismatic and surveyor's compass. Methods of surveying with a compass. Magnetic Declination, Local attraction. Errors in Prismatic Survey. Drawing up field books. Plotting of compass survey. Plane table survey- preparation of detailed maps.

UNIT-III

Dumpy Leveling: Definitions and Principles of construction of a leveling instrument and its various parts with special reference to the spirit bubble and the telescope. Use and adjustment of Dumpy and tilting levels. Establishment of Bench Marks by Levelling. Methods of booking and reduction of levels. Errors in levelling.

UNIT-IV

Theodolite: Transit Vernier Theodolites , Setting, use and temporary adjustments. Use of micro-optic theodolite. Measurements of horizontal angles and bearings by repetition and reiteration methods. Permanent adjustments of a transit theodolite.

Total Station : Features, concepts, types and applications

Reference Books:

1. Surveying Vol I & II by K R Arora, Standard Book house.
2. Fundamentals of Surveying by S K Roy, Prentice- Hall of India Private Ltd.
3. Surveying Vol I, II & III by B.C.Punmia , Ashok Kumar Jain & Arun Kumar Jain -Laxmi Publications.
4. Plane Surveying by A.M.Chandra, New age international .

References:

1. Surveying Vol I & II by S.K.Duggal Tata Mc.graw Hill Publications.
2. Elements of plane Surveying by Arthur R Benton and Philip J Tacty. Tata Mc.graw Hill Publication

76025 – Elective-1(A): MARINE GEOLOGY

Unit- I

Morphology of the oceans; oceanic crust- structure, petrology and source of oceanic crust; crustal changes after formation. Sea level history.

Unit- II

Nearshore geological processes on the continental shelf – Marine zones, Continental margin types: Divergent margins, Convergent margins, Transform active margins; collision processes on convergent margins.

Unit- III

Deep sea sediments; Classification; Terrigenous deep sea sediments; Biogenic sediments; Authigenic sediments. The geologic record of bottom currents- Method of study; erosion, transportation and deposition.

Unit- IV

Palaeo-oceanography and sediment history of the ocean basins- Pacific, Atlantic and Indian Oceans, Oceanic history of Calcium Carbonate Compensation Depth (CCD), Global palaeo-oceanography evolution- critical events in ocean history.

Reference Books:

1. James P. Kennett 1982, Marine Geology, Prentice Hall
2. Shepard, F.P. 1948, Sub Marine Geology, Harper and Row
3. Seibold, E and Berger, W.H. 1982 The Sea Floor, Springer- Verlag
4. William W.A. Nikojevich and R.W. Strenburg, The World Ocean
5. Pipkin, B.N., Gorsline, D.S., Cassey, R.E. Hammind, D.E., 1972 Laboratory Exercises in oceanography, Freeman

76025(B): OCEANOGRAPHY

Unit- I

Physical properties of sea water, salinity, temperature, density and their distribution. Specific volume anomaly, sound in the sea, color of sea water, light in sea, sea ice, absorption and extinction coefficient in the sea.

Unit-II

Waves and tides: Characteristics of waves, growth and decay, transformation of waves in shallow water, wave breaking, measurement of waves, characteristics of tides, tide theories, tide gauge. Circulation and water masses of the oceans. Tsunamies and sea mounts.

Unit-III

Sea as source of raw materials; Salinity and Chlorinity, Eh, pH of sea water, transparency; refractive index and electrical conductivity. Geochemical balance of oceans. Major and minor elements and factors effecting their distribution.

Unit-IV

Dissolved and particulate organic matter in the sea. Its nature, origin and distribution, photosynthesis and respiration. Dissolved gases- Oxygen, CO₂, and their solubility in sea water. Factors effecting the concentration of sea water. Nitrogen and phosphorous cycle in the sea.

Reference Books:

1. Descriptive Physical Oceanography by G.L.Pickard
2. Dynamical Oceanography by S.Pond and G.L.Pickard
3. Introduction to marine chemistry- J.P.Riley and R. Chester, Academic Press, London (1971) Chapters 1 to 9
4. Marine Chemistry- D.P.Martin, Vols. I & II 2nd Edition, Marcel, Dukker, Inc., New York (1976)
5. Practical hand book of sea water analysis by J.D.H.Stickland and T.R.Parson, Fis, Res. Board Canada, 2nd Ed., 1972

VIII semester

86021: SATELLITE REMOTE SENSING

UNIT-I

Introduction to Remote sensing: History and basic concepts. Advantages of Remote sensing, aerial conventional ground surveys. History of space energy. Geostationary and Sun synchronous satellites. Sensors and its resolutions of Land sat, Spot and IRS series. Development of Remote sensing in India.

UNIT-II

Physics of Remote sensing: Electromagnetic energy, Electromagnetic radiation, interaction of Electromagnetic radiation with atmosphere and Electromagnetic radiation with the earth surface. Atmospheric windows and spectral regions useful for Remote sensing.

Data Acquisition: Platforms- Terrestrial, aerial and space borne. Sensors- passive sensors, photographic cameras, Vidicon television camera, multispectral scanners and microwave radiometer Radar altimeter and scatarometer. Active sensors- Radar and Lidar

UNIT-III

Multispectral Remote sensing: Multispectral photography and multispectral scanning. Remote sensing in solar optical region- basic characteristics and its interpretation.

Remote sensing in thermal infrared region: Basic concepts and its characteristics. Geological interpretation of thermal imagery. Advantages of thermal imagery.

UNIT-IV

Microwave Remote sensing: Basic concepts, characteristics of radar imagery. Radar geometry and resolutions and data acquisition. Advantages and disadvantages of Radar imagery.

Interpretation of lithology, structure, landforms, land use and land patterns using satellite imagery.

REFERENCES

1. Remote Sensing principles and interpretation, by Sanfrancisco. Sabins, F.F.jr 1978.
2. Remote Sensing and Image Interpretation Lillis and, T.M. and P.W. Kiefer, 1986.
3. Remote Sensing Geology by R.P. Gupta, 1991.
4. Principles of Remote Sensing Curran, Longman.
5. Applied Remote Sensing, Lo.C.P. 1986 Longman.
6. Introduction to Remote Sensing of the Environment, B.F.jr.(Ed), 1978. Kendall/Hunt, Dubuque, Iowa.
7. A Guide to Remote Sensing-interpreting images of Earth Drury S.A.1990. Oxford Science Publications, Oxford.

86022: DIGITAL IMAGE PROCESSING

Unit I

Introduction of Digital Image Processing: Need for Digital Image Processing, interpretability of raw data, raster and vector files, Digital image, Image formats and its characteristics, Image magnification, Image reduction.

Statistical analysis in image processing: Bin functions, Standard deviation, Variance, covariance, correlation coefficient. Significance of image statistics in image processing.

Unit II

Image pre-processing: Introduction, radiometric errors due to sensor, sun angle and haze and its corrections. Geometric errors due to earth curvature, Earth rotation and unstable satellite platform. Panoramic distortion

General concepts on map projections, geometric rectification, georeferencing and image to image registration.

Unit III

Image enhancement: Need for image enhancement. Radiometric enhancement: Contrast stretching- linear, non-linear, histogram equalization and histogram stretching. **Spatial enhancement:** Filtering in spatial domain: low-pass filtering, high-pass filtering, Edge enhancement, linear edge enhancement- Laplacian filtering, non-linear edge enhancement- Sober- prewitt filtering. **Spectral enhancement:** Principle component analysis, decorrelation stretch, tasseld cap transformation, hue, saturation and intensity transformation, band ratio/indices.

Unit- IV

Image classification: Need for image classification, image space and feature space. Process of classification, pattern recognition and feature extraction, supervised classification, minimum distance to mean, parallelepiped and maximum likelihood. Unsupervised classification, isodata clustering, pixel analysis and RGB clustering and data accuracy assessment. Problems in image classification, image mosaicing and change detection.

Reference Books:

1. American Society of Photogrammetry, 1983: Manual of Remote Sensing (2nd Ed), ASP Falls Church, Virginia.
2. Duda, R.D and PE Hart 1972: Pattern Classification and Scene analysis, Wiley Interscience. New York.
3. Jensen, J.R 1986: Introductory Digital Image Processing: A Remote Sensing Perspective. Prentice. Hall, New York.
4. Leviadi, S (Ed) 1984: Digital Image Analysis, Pitman, London.
5. Pratt, S.K. 1978 : Digital Image Processing, Wiley- Interscience, New York
6. Rosenfeld, A and A.C. kek, 1982: Digital Picture Processing, Academic Press, New York.
7. Schowengerdt, R.A 1983: Techniques for Image Processing and Classification in Remote Sensing, Academic Press, New York.
8. Swain Phillip, H 1978: remote sensing the quantitative approach, McGraw hill international book co.,
9. Rosen field a 1976: topics in applied physics digital picture analysis, springier vela, Berlin, Heidelberg

86023: ENVIRONMENTAL GEOLOGY

Unit – I Principles of environmental geology; spectrum of environment, ecological perspective of environment; Land and its use, land desertification and land degradation and land management.

Unit – II Soil profile, origin of soil, classification of soils, soil types of India, and soil conservation; Soil degradation due to irrigation, use of fertilizers and pesticides; Water resources – hydrological considerations, problems and management.

Unit – III Environmental management in mining, Impacts of mining activities on the environment, erosion, causes and control.

Unit – IV Geoenvironmental hazards – volcanoes, earthquakes, floods, landslides, coastal hazards. Pollution and energy – Global warming, water contamination, waste disposal, alternate sources of energy.

Reference Books:

1. Valdiya, K.S. 1987, Environmental Geology – Indian Context, TATA-McGraw Hill, New Delhi
2. Keller, E.A. 1978, Environmental Geology- Bell and Howell, USA
3. Subramanian, V, 2001, Text book of Environmental Science, Narosa Publication, New Delhi.
4. Chenna Kesavulu, N. Text book of Engineering Geology, McMillan India Ltd. New Delhi

86024: Geographical Information Systems, GPS & Digital Cartography

Unit I

Introduction to GIS: Definition and Meaning and usefulness of GIS - Components of GIS - Computer Hardware and Software Modules. Data structures: Data structures in GIS – Raster and Vector Data Structures. Type of data (Points, Lines and Polygons) – Data Conversion, (Vector to Raster and Raster to Vector).

Unit II

Data Input, Verification, Storage and Output: Data Input Processes and Devices – Different types of entering Spatial and Non – Spatial data – Data Verification (Data Quality and Errors) – Storage – Data output processes and devices. Digital Elevation Modeling: Need for three dimensional models – Methods of DEM – Products of DTM and usefulness of DEM/ DTM.

Unit III

Global Position System: Introduction – Concepts and segments: Satellite, Control and User segments – Signal components, Errors in GPS – Types of errors and errors in observations and accuracy, GPS positioning: Navigation and Data collection – waypoints, routes and tracks using GPS. GPS data transfer, projections transformations and GPS map making. Error corrections and concepts of DGPS. Merits and demerits of DGPS

Unit IV

Digital Cartography: History of Cartography and types of Maps. Principles of Map Design and symbolization - Colors and Patterns. Generalisation in cartography and attribute data for thematic maps. Digital Input : Data types (point, line , polygon and raster data) – data source (topo sheet, air photo, magnifier, stereoscope, video camera, digitizer board, scanners, satellite data) – Modeling devices (computer, photo writer, plotter) Cartographic process – Making of various maps (contouring density slicing, 3D Projection, Area calculation, volume estimation) - Storage devices - Output Devices - Special merits of digital cartography.

Reference Books:

1. Borough, P.A 1986 PRINCIPLES OF GEOGRAPHICAL INFORMATION SYSTEMS FOR LAND RESOURCES Assessment, vkarabdibe press, oxford.
2. Gauche, N.C 1970: urban land use study through aerial photo interpretations techniques, pink publishing house, mature.
3. Kang Tsung Chang, Geographical Information Systems
4. Campbell, J 1984: introductory cartography, printer's hall Englewood cliffs, Ann.
5. Dent B.D 1985: principles of thematic map design, addition- Wesley, reading, mass.
6. Freeman, H and GG. Pierson 1980: map data processing, academic press, New York.
7. Monomer, M.A 1982: computer assisted cartography- principles and prospects, prentice hall, Englewood cliffs, NJ
8. Tomlinson, R.F catkins, H.S and doff marble 1976: computer handling of geographic data, UNESCO, Geneva.
9. Graeme F. & Bonham- caster, geographic information systems for geoscientists, modeling with GIS, paragon.

Elective -2 - 86025(A): PETROLEUM GEOLOGY

Unit-I

Occurrence of Petroleum: Surface occurrences- Seepages, Mud volcanos- disseminated deposits- vein deposits- Kerogene shale. Subsurface occurrences: Showings- pools- fields- provinces. Reservoir rock: Classification- nomenclature- fragmental chemical- miscellaneous. Classification and origin of pore space- Primary or inter-granular- Secondary of intermediate- relationship between porosity and permeability.

Unit-II

Reservoir fluids- water, oil, gas. Water- Classification- Character oil field brines. Oil-chemical, physical properties. Gas composition- impurities and gas hydrates. Reservoir traps: General and structural, Classification of traps- structural traps- caused by folding- by faulting- by fracturing. Reservoir traps: Stratigraphic, primary stratigraphic traps, in clastic rocks, in chemical rocks. Secondary stratigraphic traps. Reservoir traps: Combination and salt domes.

Unit-III

Origin of petroleum: Organic origin- nature of organic source, materials- modern organic matter. Transformation of organic matter into petroleum, bacterial action- heat and pressure- alteration of petroleum. Migration and accumulation of petroleum: Primary migration: water squeezed out of clays- normal water circulation- sedimentary oil- recycled oil. Secondary migration: entrained particles- capillary pressure- displacement phenomena- buoyancy- dissolved gas effects- accumulation- tilted oil- water- contacts- stratigraphic barriers- vertical migration- time of accumulation. Exploration: Surface and subsurface observations, subsurface and production- geology- well logs and maps.

Unit-IV

Oil bearing basins of India. Geology of the productive oil fields of India. Position of oil and natural gas in India. Future prospects and the economic scenario.

Books:

1. Geology of petroleum by A.I.Levorsen.
2. Petroleum Geology by K.K.Landes
3. Principles of petroleum by W.L.Russell
4. Stuttgart Holson, G.D. and Tiratsoo, E.N. 1985: Introduction to petroleum geology. Gulf pub; Houston, Texas,
5. Tissot, B.P. and Welte, D.H. 1984: Petroleum formation and occurrence, Springer- verlag
6. Selley, R.C., 1998: Elements of Petroleum Geology

86025(B): FUEL GEOLOGY

Unit-I

Petroleum: Composition- nature- origin: inorganic and organic theories- migration (primary and secondary) and accumulation of oil and gas- Geographic locations- petroleum reservoir rocks- Reservoir rock types, Geological age of reservoir rocks- Reservoir traps- Classification of traps, anticlinal theory- Structural traps caused by folding, faulting and fracturing.

Unit-II

Primary stratigraphic traps, Fluid traps, Salt domes, Salt plugs, Cap rocks association traps. Origin reservoir conditions. Oil bearing basins of India. Geology of the productive oil fields of India. Position of oil and natural gas in India. Future prospects and economic scenario.

Unit-III

Coal: Definition- origin, sedimentology of coal bearing strata. Rank, grade and type of coal. Chemical characterization: Proximate and ultimate analysis. Coal forming epochs in the geologic past. Geological and geographical distribution of coal in India. Detailed geology for important coal fields in India.

Unit-IV

Atomic minerals: Mode of occurrence and association of atomic minerals in nature. Atomic minerals in nature. Atomic minerals as source of energy. Methods of prospecting and productive geological horizons in India. Nuclear power stations of country and future prospects. Atomic fuels and environment.

Books:

- a. Petroleum formations and occurrences by Tissort B.P. and Welte D.H. 1984
- b. Text book of coal by Chandra, D., et al., 2000
- c. Uranium ore deposits by Dahlkamp F.J. 1993

IX semester

96021: ENGINEERING GEOLOGY

Unit I

Engineering properties of rocks, soils like specific gravity, porosity, permeability, compressive strength, hardness, toughness, percentage of wear, tensile strength, modules of elasticity, modules of compression and residual stress and their importance in construction of civil engineering structures. Definition of quarrying of rocks, site for quarry, methods of quarrying – quarrying with hand tools, quarrying with channeling machine, quarrying by blasting, precautions in blasting.

Unit II

Neotectonism, seismic hazard and damage assessment, seismic problems of India, Earthquake resisting structures, Classification, causes of landslides, controls of landslides subsidence and its importance, site selection for ghat roads. Detection of causative factors for soil erosion, soil conservative measures. Determination of magnitude measurement and location of epicenter and focuss.

Unit III

Definition and parts of dam, types of dams, geotechnical considerations in selection of dam sites, case histories – Nagarjuna Sagar Dam and Srisailem Dam, characters for investigating relative suitability, geological consideration for reservoir sites. Types of tunnels, objects of geological investigations, methods of investigation, geological considerations in tunnels, types of bridges, Geology for bridge sites, problems of constructing civil engineering structures in areas prone to landslides, faulting, earthquake and coastal erosion.

Unit IV

Application of Remote Sensing and GIS in river valley projects: dams and reservoirs, site suitability evaluation (lithological, structural, geomorphological considerations). Application of Remote Sensing and GIS in Seismic hazards, Landslides Ghat roads- bridges, culverts, route location (highway and rail roads) canal and pipeline alignments, tunnel constructions. Site suitability evaluation (lithological, structural, geomorphological, slope, gradient, economic considerations).

Reference Books:

1. Engineering materials by S.C. Rangwala
2. Text book of Engineering Geology by N.Chennakesavulu.
3. Principles of Engineering Geology and Geotectonics by D.P.Krynine and Judd, W.R.
4. Engineering Geology by B.S.Sathya Narayanaswamy
5. Principles of Engineering Geology by K.V.G.K.Gokhele
6. Engineering and General geology by Parbin Singh.
7. Remote Sensing and Image Interpretation, Lillesand, T.M., Keifer, R.W.,
8. Remote Sensing Principles and interpretation, Sabins F.F.,
9. Remote Sensing Geology, Singh, R.P.,
10. Image Interpretation Geology, Drury, S.A.,
11. Engineering Geology by D.Venkat Reddy

96022: NATURAL RESOURCE EXPLORATION.

Unit I

Stages of mineral exploration: prospecting and exploration. Methods of choosing target areas – study of background literature, ground methods, aerial and special methods. Criteria for accepting or rejecting the target area. Geological exploration: guides to ore search-stratigraphic, lithological, geomorphological, structural, rock alteration and geo-botanical guides.

Unit II

Geophysical methods of Exploration: gravity methods, magnetic methods, aeromagnetic data interpretation and integration with geological data. Electrical methods: Resistivity, Induced polarization, Radiometric methods, An integrated approach in mineral targeting.

Unit III

Geochemical Prospecting: Principles of Geochemical prospecting – Geochemical environment, Deochemical Dispersion- primary and secondary. Geochemical mobility and associated elements. Sampling techniques bed rock, soil, vegetation, water and stream sediment and interpretation of data. Geochemical anomalies – significant – non significant and displaced anomalies.

Unit IV

Remote Sensing applications in various stages of mineral exploration. Spectral characteristics of alteration of minerals - Hydroxyl bearing minerals, carbon and tectosilicates and colour ratio images using digital image processing. Application of Remote Sensing in exploration of gold, base metals (copper, lead and zinc), diamond, bauxite, iron and baryte.

References:

1. Arogyaswamy: Coureses in Mining Geology
2. Mckinstry: Mining Geology
3. GK Gokhale: Ore Deposits of India.
4. Dobrin M.B Introduction to geophysical prospecting
5. Levinson, A.S., Introduction to Exploration Geochemistry
6. Rose, A.W., Hakes, H.E. and Webb, U.S., Geochemistry of the Mineral Exploration.
7. Drury, S.A., Image Interpretation in Geology.
8. Gupta R.P., Remote Sensing Geology
9. Sabins, F.F., Remote Sensing Principles and Interpretation.

ELECTIVE -3 -96023(A): PRECAMBRIAN GEOLOGY

Unit- I

Precambrian Geology of India: Introduction, previous studies, tectonic framework of India-Cratons and mobile belts. Dharwar craton: Introduction, regional stratigraphy structure, metamorphism and tectonic evolution. Granulite belts of India.

Unit- II

Introduction to Granite-Greenstone belts. Western Dharwar Schist belts: Sargur schist belt, Bababudan schist belt, Shimoga schist belt, Chitradurg schist belt, Gadag schist belt, Hutti schist belt, Sandeer schist belt, Hangund schist belt. Dharwar schist belts: Kolar Schist belt, Ramagiri- Penakacherla schist belt, Znnagiri schist belt, Veligallu schist belt.

Unit- III

Bastar Craton: Regional stratigraphy,description of stratigraphic units, Mafic dykes and tectonic evolution.

Singbhum Craton: Introduction, supracrustals and granitoids, volcanic succession, north Singbhum orogeny and tectonic evolution

Unit- IV

Bundelkhand Craton: Introduction, supracrustal- gneisses- Bundelkhand granite and tectonic evolution.

Aravalli Craton: Introduction, tectonic stratigraphic units and their description. Regional metamorphism and tectonic evolution.

Reference Books:

1. Geology of India and Burma by M.S.Krishnan
2. Geology of India by D.N.Valdiya
3. Principles of physical geology by A.Holmes and D.L.Holmes
4. Geology of India (2008) - M.Ramakrishna and R. Vaidyanadhan

96023(B): DIMENSIONAL AND DECORATIVE STONES

UNIT-I:

Ornamental and building stones of India – Commercial granites and their classification. Geological aspects in the quarrying of commercial granites – Selection criteria and evaluation – Quarrying techniques.

UNIT-II:

Physical and Engineering properties of granites, dolerites, marble, sandstone and slates and Environmental impacts of granite quarrying.

UNIT-III:

Granite cutting and polishing – Processing- Granite marketing-History of Granite Industry in India with special reference to Andhra Pradesh, Tamil Nadu and Karnataka.

UNIT-IV:

Characteristic features of Gems-Classification and identification tests of gems – Gemstone mines – Exploration in India – Distinction between natural and synthetic gemstones – Gem properties and instruments for identification.

Reference Books:

1. Practical Gem cutting, Nance and Ronperry, David & Charles, London, 1982
2. Gem and Gem Industry in India, Karanth, K.V., Geol. Soc. India., Bangalore
3. Decorative and Dimensional stones by Venkat Reddy

ELECTIVE-4 - 96024(A): WATERSHED MANAGEMENT

Unit- I

Watershed : Definition, scope, characteristics and classification. Derivation of aquifer parameters, pump test and evaluation of aquifer characteristics. Ground water recharge and its estimation. Application of isotope tracer techniques to ground water hydrology.

Unit- II

Introduction to water modeling techniques, derivation of ground water flow equations, modeling weathered hard rock aquifer system, characterization and modeling an artesian aquifer system.

Unit-III

Management of groundwater in hard rock areas, augmentation of drinking water sources, management of coastal aquifers, Remote sensing applications in ground water studies includes hydrological interpretation and land form analysis for ground water applications., artificial neural networks for estimation of runoff for better watershed management.

Unit- IV

Watershed Management: Soil conservation sites for water harvesting structures. Floods and flood plain mapping. Integrated approach for sustainable planning. Case studies..

Reference Books:

1. Ground water flow and mass transport modeling for Assesment and Management of Aquifers by K.Palanisami, M.Thangarajan, and A.K.Sinha
2. Hydrology and watershed management, JNTU, by B.Venkateswara Rao, G.Jaganmohan Das, C.Sarala and M.V.S.S.Girdhar
3. Engineering Hydrology by K.Subramanyam, Tata McGraw Hill, New Delhi

96024(B): DISASTER MANAGEMENT

Unit- I

Fundamental concepts of Disaster management: Hazard, Disaster, Risk, Vulnerability, Management. Natural and anthropogenic hazards.

Elements of hazard mapping, risk analysis, damage assessment, loss analysis, hazard mitigation.

Unit- II

Environmental Hazards: Soil and land degradation, Mining hazards, deforestation, forest fire. Flood mapping and monitoring. Drought prediction and monitoring. Cyclone prediction and hazard assessment. Tsunami and sea mounts

Unit- III

Volcanic hazards, volcanic belt girdling in India, sub continent origin and types of volcanic activity, nature of volcanic hazards, prediction of volcanic eruptions, Mitigation of volcanic hazards.

Unit- IV

Disaster management policy, National disaster framework. Disaster mitigation. Planning and strategies for implementation. Role of remote sensing and GIS in disaster mitigation measures.

Reference Books:

1. Environmental geology- Indian context K.S. Valdiya (1987).
2. Environmental geology- Flawn, P.T. (1970).
3. Environmental Geology- Keller, E.A. (1976).
4. Landslide and their control- Zaruba, Q and Menel, V (1969).
5. Focus on Environmental geology- Tank, R. W. (1973).
6. Environmental geology- C.W. Montgomery (1989).
7. Environmental geology- D.R. Coats (1981).
8. All you wanted to know about disasters- (Brig) B.K. Kanna (2005).

96024(C): QUATERNARY GEOLOGY

UNIT-I Quaternary stratigraphy: Introduction, scope and its classification-biostratigraphy, microforaminiferal stratigraphy, nannoplanktonic stratigraphy, diatom stratigraphy, radiolarian stratigraphy, faunal abundance stratigraphies, climatostratigraphy and oxygen isotope stratigraphy, magnetostratigraphy.

UNIT-II Quaternary palaeoclimate: climate proxies. Causes of ice ages and other climate changes, cyclic variation in the amount of carbon dioxide and other greenhouse gases in the atmosphere. Variation in amount of volcanic dust and sulphate aerosols in the atmosphere. Variations in solar output, global palaeoclimate, climatic changes in India, Indian Ocean and Arabian ocean, western Rajasthan, Northern India, greenhouse warming model, impact of human induced CO₂ on biota

UNIT-III Quaternary sea-level changes, ocean mass / level distribution, quaternary sea-levels and Milankovitch theory of climatic changes, sea-level indicators, some sea-level indicators along Indian coast, Global sea-level changes, Effect of tectonism on sea-level records at plate boundaries, sea-level changes along Indian coastal margins. Quaternary dating methods, radiometric dating methods, non-radiometric dating methods,

UNIT-IV Structure and neotectonics of east coast India with special reference to Andhra Pradesh. Structure and neotectonics of west coast India with special reference to Kutch.

Reference Books:

1. Quaternary Geology Indian Perspective, U.B. Mathur, Memoir 63, Geological Society of India, Bangalore
2. Geology of Andhra Pradesh, P.K. Ramam and V.N. Murthy, Geological Society of India, Bangalore

ELECTIVE – 5-96025(A): GEOINFORMATIC APPLICATIONS IN SOIL, FORESTRY, ENVIRONMENT AND AGRICULTURE

Unit I

Soil survey methods- soil classification Land evaluation- saline alkaline problems in soil identification and mapping, soil erosion, soil conservation.

Forest taxonomy, Invention of forest land- vegetation Assessment, Factors responsible for forest degradation and deforestation, Delineation of degraded forest damage assessment, emerging concepts in classification of forest and action plan- comparing forest genetic resource from theory and practical.

Unit II

Pollution control to air and water. Pollution studies and its significance on an environment: physico-chemical and geological parameters of near shore and fore shore ecosystems- marine pollution- oil spills, processes of oil- water interface- effects on ecosystems, sewage treatment and disposal, Solid waste Management

Unit III

Classification of crops, cropping seasons, integrated systems, High yielding varieties, hybrids, seeds, seed production. Introduction to agriculture, Importance of agriculture in Indian economy, General features of Indian Agriculture, Food production status, factors affecting plant growth.

Unit IV

Spectral characteristics of soil, crops and vegetation, Change detection study: crops and forest, forest damage assessment and forest fire, solid waste, Sewage treatment and disposal using Remote Sensing data

Reference Books:

1. Steven M.D and Clark, J.A. Application of Remote Sensing in Agriculture, Butterworths, London, 1990
2. Champion, H.G and Seth, S.K. Revised forest types of India. Government of India press, New Delhi, 1968.
3. Ghassem Asrar. Theory and Application of optical remote sensing. John Wiley & sons, New York, 1989.
4. Space Applications centre- Manual of procedure for forest Mapping and Damage Detection using Remote sensing Data, Report No. IRS-UP/SAC/FMDD/TN/16/90, 1990: pp-58.
5. Space Applications centre-Status Report on crop Acreage and Production Estimation, Report No. RSAM/SAC/CAPE/SR/25/90, October 1990, pp-253.

96025(B): MINERAL ECONOMICS

Unit-I

Mineral economics as a concept. Importance of minerals in National Economy. Use of metals, non-metals and fuels. Peculiarities inherent in Mineral Industry. International aspects. Legislation related to minerals. Minerals in India, National mineral policy.

Unit-II

Classification of minerals- Major, Minor, Fuels and Industrial minerals, Strategic, Critical and essential minerals. Present and future minerals supply of the world.

Unit-III

Resources, production and import and export of minerals in the world and India's status. Tenor, grade and specification of important minerals with examples.

Unit-IV

Demand and supply of fuels and minerals. Conservation and substitution of minerals- low-grade ore, use of scrap, new technologies, synthetics and synthesis. Changing pattern of mineral consumption. Mineral Industry in Andhra Pradesh and its growth.

Reference Books:

1. Mineral Economics by R.K.Sinha and Sharma.
2. Minerals in world industry by Voskinil, W.H
3. An introduction to mineral economics by K.K.Chaterjee
4. Indian Bureau of Mines mineral year books