

**SRI VENKATESWARA UNIVERSITY**  
**COLLEGE OF SCIENCES**  
**TIRUPATI – 517 502 (A P)**



**Course:**  
**M.Sc..**  
**GEOLOGY**

**Choice Based Credit System (CBCS)**  
**2015-2016**

**SRI VENKATESWARA UNIVERSITY:: TIRUPATI**  
**DEPARTMENT OF GEOLOGY**  
**M.Sc., GEOLOGY**  
**(CHOICE BASED CREDIT SYSTEM)**

( Revised Scheme of Instruction and Examination, Syllabus etc., with effect from the Academic Year 2015-16 for I and II Semesters and 2016-17 for III and IV Semesters )

**Scheme of Examination**

**SEMESTER – I**

<b>Course Number</b>	<b>Nature of Course</b>	<b>Title of the Course</b>	<b>Credit hrs./ Week</b>	<b>Total marks</b>	<b>No. of Credits</b>
G-101	Theory (Core Subjects)	Crystallography & Mineralogy	4	70+30	4
G-102	“	Sedimentology	4	70+30	4
G-103	“	Geomorphology	4	70+30	4
G-104	“	Stratigraphy & Indian Geology	4	70+30	4
G-105	Practical-I	Crystallography & Mineralogy	9	100	4
G-106	Practical-II	Sedimentology & Geomorphology	9	100	4

**SEMESTER – II**

G-201	Theory (Core Subjects)	Structural Geology & Geotectonics	4	70+30	4
G-202	“	Paleontology	4	70+30	4
G-203	“	Remote sensing & GIS	4	70+30	4
G-204	“	Computer Applications & Geostatistics	4	70+30	4
C-205	“	Human Values and Professional Ethics-	4	70-30	4
G-206	Practical-I	Structural Geology & Paleontology	9	100	4
G-207	Practical-II	Remote sensing	9	100	4

**SEMESTER-III**

**Theory**

<b>G-301</b>	<b>1. (Core subjects)</b>	<b>Igneous Petrology</b>	<b>4</b>	<b>70+30</b>	<b>4</b>
<b>G-302</b>	<b>“</b>	<b>Metamorphic Petrology</b>	<b>4</b>	<b>70+30</b>	<b>4</b>
<b>G-303</b>	<b>2. Internal Electives</b>	<b>Geochemistry and Thermodynamics</b>	<b>4</b>	<b>70+30</b>	<b>4</b>
<b>G-304</b>	<b>“</b>	<b>Environmental Geology &amp; Engineering Geology</b>	<b>4</b>	<b>70+30</b>	<b>4</b>
<b>G-305</b>	<b>“</b>	<b>Surveying and Field Geology</b>	<b>4</b>	<b>70+30</b>	<b>4</b>
<b>G-306</b>	<b>“</b>	<b>Gemology</b>	<b>4</b>	<b>70+30</b>	<b>4</b>
<b>G-307</b>	<b>3. External Electives</b>	<b>Dimensional Stones &amp; Building Materials</b>	<b>4</b>	<b>70+30</b>	<b>4</b>
<b>G-308</b>	<b>Practical-I</b>	<b>Igneous &amp; Metamorphic Petrology</b>	<b>9</b>	<b>100</b>	<b>4</b>
<b>G-309</b>	<b>Practical-II</b>	<b>Geochemistry</b>	<b>9</b>	<b>100</b>	<b>4</b>

---

**SEMESTER IV**

**Theory**

<b>G-401</b>	<b>1. (Core subjects)</b>	<b>Economic Geology</b>	<b>4</b>	<b>70+30</b>	<b>4</b>
<b>G-402</b>	<b>“</b>	<b>Mineral Exploration &amp; Mining</b>	<b>4</b>	<b>70+30</b>	<b>4</b>
<b>G-403</b>	<b>2. Internal Electives</b>	<b>Hydrogeology</b>	<b>4</b>	<b>70+30</b>	<b>4</b>
<b>G-404</b>	<b>“</b>	<b>Natural Hazards and Risk Management</b>	<b>4</b>	<b>70+30</b>	<b>4</b>
<b>G-405</b>	<b>3. External Electives</b>	<b>Watershed Management</b>	<b>4</b>	<b>70+30</b>	<b>4</b>
<b>G-406</b>	<b>Human Values and Professional Ethics- II</b>		<b>4</b>	<b>70-30</b>	<b>4</b>
<b>G-407</b>	<b>Practical-I</b>	<b>Economic Geology</b>	<b>9</b>	<b>100</b>	<b>4</b>
<b>G-408</b>	<b>Practical-II</b>	<b>Project Work</b>	<b>9</b>	<b>100</b>	<b>4</b>

---

## **SEMSTER :I**

### **GEO 101: CRYSTALLOGRAPHY AND MINERALOGY**

#### **UNIT : I**

Elements of crystallography – Derivation of the 32 crystal classes, Hermann – Maugin symbols, Twinning in crystals, X – ray crystallography.

#### **UNIT:II**

General principles of optics; Refringence – Birefringence, pleochroism, Extinctions and measurements of extinction angles, optical ellipsoids (a) Fresnel's ellipsoid and (b) Fletchers indicatrix, optic axial angle and optic sign, Interference figures – Uniaxial and Biaxial figures, and optic anomalies.

#### **UNIT : III**

Structure of silicates, Isomorphism and polymorphism , Structure, Chemistry, physical and optical characters and paragenesis of the following mineral groups; Olivine, pyroxene, Amphibole, Mica.

#### **UNIT: IV**

Structure, chemistry, physical and optical characters and paragenesis of the following mineral groups; Quartz, Feldspars, Feldspathoids, Aluminium silicates, Granet. and Epidote. Study of the following minerals: Beryl, Apatite, Sphene, Tourmaline, Talk and Spinel.

### **PRACTICALS**

1. Megascopic identification of rock forming minerals; Microscopic Identification of rock forming minerals.
2. Determination of Optic axial angle (2V) extinction angle ( $Z^{\wedge}C$ ) Anorthite content and Twin laws.
3. Crystallography: Identification of crystal models of 32 crystal classes and their crystals.

### **BOOKS RECOMMENDED**

1. Optical Mineralogy by F.F. Kerr
2. Elements of Optical Mineralogy by A.N winchell vol. 1,2 and 3
3. Mineral optics by F.C. Phillips
4. An Introduction to the methods of Optical crystallography by F.D. Bloss
5. The Universal stage by R.C. Emmons.
6. Introduction of crystallography by E.E. Ford
7. Modern Mineralogy by K. Frye
8. Rock forming minerals volumes 1 to 5 by W.A. Deer et al.

## **GEO.102: SEDIMENTOLOGY**

### **UNIT I:**

Introduction – Scope of Sedimentology. Processes of weathering – Surface processing and Rock weathering. Source of sediments.

### **UNIT II:**

Classification of Clastic and Non-clastic rocks, Clastic rocks – Rudaceous rocks, Arenaceous rocks, Argillaceous rocks Non-clastic rocks – Chemical deposits and Organic deposits. Dolomites and dolomitisation.

### **UNIT III:**

Sedimentary textures: Grain size, Grain shape and Grain fabric

Sedimentary structures: Ripples, Dunes and Cross bedding, Graded beds and Sole structures.

### **UNIT IV:**

Classification of sedimentary environments.

Non-marine environments-Glacial, Eolian, Lacustrine and Fluvial environemtns

Marine: Shelf and Deep sea sediments.

### **PRACTICALS**

Identification of sedimentary rocks in hand samples as well as in thin sections.

Size and shape analysis, statistical methods and graphical representations.

Identification of clastic grains.

Mass properties of sedimentary rocks.

### **BOOKS RECOMMENDED:**

1. Sedimentary Rocks – Pettijohn, F.J
2. Origin of Sedimentary Rocks – Blatt, H., Middleton, G, and Murray, R.
3. Procedures in Sedimentary Petrology – Carver, R.C
4. Introduction to Sedimentology – Sengupta, S.M
5. An Introduction to Sedimentology – Shelly, R.C.
6. Practical Manual of Sedimentary Rocks – Lindholm, R

## **GEO 103: GEOMORPHOLOGY**

### **UNIT I:**

Volcanoes & Volcanism – Nature and Origin of volcanoes – Products of volcanism eruptive styles and associated land form. Volcanic Hazards and mitigation. Earthquakes and Earth's Interior. Causes, occurrence and effects of Earthquakes. Earth's interior according to seismic theory.

### **UNIT II:**

Mass wasting – Factors influencing mass wasting, types of mass movements – Recognizing and minimizing the effects of mass wasting. Plate tectonics – theory of plate tectonics – nature and origin of ocean floor, origin and shaping of continents.

### **UNI III:**

Geological action and resulting forms of Glaciers, wind and groundwater

### **UNIT IV:**

Geological action resulting landforms of River. Drainage patterns – Morphometric analysis and interpretations.

### **PRACTICALS**

Interpretation of Morphometric data.

### **BOOKS RECOMMENDED:**

1. Essentials of Geology-Stanley chermicoff, Haydn A. Chip Fox, Ramesh Venkatakrishnan.
2. A. Holmes – Physical Geology.
3. William D. Thornbury – Principles of Geomorphology.
4. Carls W. Montgomery – Principles of Geomorphology.

## **GEO 104: STRATIGRAPHY AND INDIAN GEOLOGY**

1. Unit – I Introduction-Physiographic Divisions of India – Structure and Tectonics of India.
2. Unit – II Archaen Stratigraphy, Geological history, Origin of Achaens, Classification, Post - Dharwars, A.P. Dharwars, Eastern ghat, Chotanagapur, Madhya Pradesh, Rajasthan, Assam, Correlation of peninsular Archaens, Mineral resources of Archans.
3. Unit.- III Purana group of Stratigraphy, Geological history of Purana basins, Cuddapah super group, Pakala Basin, Bhima Basin, Kaladgi Basin, Indravati basin, Chattisgarh basin, Kolhan basin, Vindhyan basin and Kurnool basin.
4. Unit – IV Critical study of the following stratigraphic units: - Gondwanas, Deccan traps, Cretaceous of Trichinapalli & Siwaliks.

### **BOOKS RECOMMENDED:-**

1. Krumbin & solss , L.L; Sedimentation and stratigraphy.
2. Dunbars & Rodgers: Principles of stratigraphy.
3. M.S. Krishnan : Geology of India & Burma
4. D.N. Wadia, Geology of India.
5. Ravindra Kumar : Fundamentals of Historical Geology and stratigraphy.
6. R.C. Mehadiretta : Geology of India, Pakistan, Bangladesh & Burma.
7. Purana basins of peninsular India – published by geological society of India, Bangalore.
8. Gondwana of India Special volume Published by Gondwana society of India.
9. Geokarnataka , Centenary Volume, Published by Mysore geological department.

## **SEMSTER: II**

### **GEO 201: STRUCTURAL GEOLOGY AND GEOTECTONICS**

#### **UNIT I:**

Concept of stress and strain. Analyses of stress, stress ellipsoid. Analyses of deformation, strain ellipsoid. The response of rock to stress. Behaviour of materials, Factors controlling the behaviour of rock materials.

#### **UNIT II:**

Mechanics of folding and buckling, geometry of superimposed folding, fold systems. Construction projects, underground mining mechanics of faulting. Classification and recognition of faults. Strike slip faults, normal faults. Unconformities and their recognition.

#### **UNIT III:**

Tectonic aspects of Igneous rocks. Geometric classification of plutonic igneous rocks, tectonic setting of plutons.

Structures in metamorphic rocks, Foliation, Axial plane foliation, transported foliation, other metamorphic foliation.

Lineation – problem of lineation indicating extension parallel to fold axis, small scale folds.

Structural association, salt domes, diapirs, nappe, tectonic mélanges.

#### **UNIT IV:**

Plate tectonics – Dynamic evolution of continental and oceanic crust. Sea – floor, Islands arcs, orogeny and epirogeny. Geo-dynamics of Indian plate, evolution of Himalayas, Isostasy and neotectonics.

## **PRACTICALS**

Preparation and interpretation of Geological maps and sections, Structural Problems concerning economic mineral deposits, Recording, and plotting of field data, Three point problems, contour diagrams.

### **BOOKS RECOMMENDED:**

1. Badgley, P.C. 1965: Structural and Tectonic principles, Harper & Raw, New York.
2. Bayly B. 1992, Mechanics in Structural geology, Springe Verlag.
3. Billings M.P. 1968: Structural geology, printice-Hall of India, Private Ltd., New Delhi.
4. Davis G.R. 1984: Structural geology of rocks and region. John Wiley & Sons, Inc., New York.
5. Gass I.B, Peter J-smith and smith PGL: understanding the Earth.
6. Hobbs, B.E, Meaus, W.D. and Williams P.F., 1976: An outline of Structural geology. John wiley & sons, Inc, New York.
7. Keary. P and vine F.J. 1990: Global Tectonics. Blackwall
8. Modres. E and Twiss. R.J. 1995: Tectorics. Blackwall
9. Ramsay, J.G., 1967: Folding and fracturing of racks. Mcgraw.Hill, Inc USA.

## **GEO.202: PALEONTOLOGY**

### **UNIT I:**

Fossil record in geological time scale. Classification of fossils. Uses of micro fossils with special reference to petroleum exploration. Origin and evolution of life.

### **UNIT II:**

Detailed study of Morphology, Classification, evolution and geological distribution of (i) corals (ii) Brachipod (iii) Mollusca (iv) Trilobita and (v) Echinodermeta.

### **UNIT III:**

Origin and distribution of plant life – A brief morphological study of different plant fossils – classification nomenclature – Application of Paleobotany with particular reference to stratigraphic correlation and paleoclimates.

### **UNIT IV:**

Evolution of Horse, Elephant and Man.

Different micro fossil groups and their distribution in India.

## **PRACTICALS**

1. Identification of Important (a) Invertebrates and (b) plant fossils.
2. Reconstruction of fossils.
3. Arrangement of fossils in chronological order.
4. Processing of samples, separation of microfossils, packing up and identification of foraminifera based on morphology.

### **BOOKS RECOMMENDED :**

1. Henry Woods – Invertebrate paleontology
2. Reymond C. Moore et.al – Invertebrate Follsils
3. Jain, P.C. et al – An introduction to paleontology
4. Glaessner F. – Techniques of micropaleontology
5. Bignot. G. – Elements of micropaleontology
6. Haq, B.V. – etal – Introduction to Marine Micropaleontology
7. Arnold, C.A., - An introduction to paleobotany.

## **GEO 203: REMOTE SENSING AND GIS**

### **UNIT I:**

Basic concepts and fundamentals of aerial photography scale of photography, Aerial cameras, factors influencing image quality, procurement of aerial photographs, side lap and over lap, Information to be recorded on Aerial photographs and their numbering. Preparation of photo index, mosaicing of Aerial photographs, stereoscopy, distortions in stereo model, stereoscopic exaggeration, estimation of dip and slope. Aerial photo interpretation for Geology. Techniques of interpretation. Recognition elements, Geotechnical land forms, drainage, vegetation analysis and land use analysis, sensing. Convergence of evidence for interpretation of Geology.

### **UNIT II:**

Basic concepts and fundamentals of Remote sending. Electromagnetic energy and its sources, Interaction of EM radiation with atmosphere. Interaction of EM radiation with earth surface. Atmospheric windows, different sp[ectral regions useful for Remote sensing.

### **UNIT III:**

Sensors – platforms, multispectral Remote sensing in micro wave regions, Remote sensing in thermal infrared regions, Present remote sensing satellites and their pay load characteristics. Application of remote sensing for gold, diamond and ground water exploration.

### **UNIT IV:**

**GIS:** Development and definitions – Hardware and software in GIS trends – spatial and non spatial data, GISDATABASE: Data structure - Raster and vector data structures – Data conversions-comparision of raster and vector data bases – data compression of spatial objects. Elements of GIS – Data capture – Verification and processing – data storage. Data base management systems: Types, merits and demerits, data manipulation analysis and spatial modeling – output format and generation.

## **PRACTICALS**

Photo interpretation of different lithounits and photo image interpretation of different lithounits and structures. GIS, Geostatic computer application.

### **BOOKS RECOMMENDED:**

1. Sabbins F.F., 1985 – Remote sensing – Principles and application.
2. Freeman Ray R.G., 1969 – Aerial photographs in Geologic interpretations.
3. USGS Prof.paper 373 Bandat H.F.V. 1962: Aeroeology.
4. Miller V.C. & Miller C.F. 1961 – Photogeology.
5. Siegal B.S & Gillespie A.R. 1980 – Remote sensing in Geology.
6. Arranaff S: Geographical Information System: A management perspective. DDL publication, Ottawa 1989.
7. Burrough, P.A.: Principles of Geographic Information System for Land resource assessment, Oxford University Press, New York 1986.



## **GEO 204: COMPUTER APPLICATIONS AND GEOSTATISTICS**

### **UNIT I: COMPUTER FUNDAMENTALS**

Introduction to computers: Definition - Characteristics – History and Generations of computers – Classifications of computers – Block diagram – Peripheral devices – Merits and demerits of the computers – Hardware and Software – Data and Information.

### **UNIT II: OPERATION SYSTEM**

Introduction to operating system: Windows. MS Office: MS Word – MS Excel – MS Access – MS Power Point.

**Lab Exercises:** MS Word

### **UNIT III: DATA IN EARTH SCIENCES**

Classification – Tabulation – Representation of field and laboratory data. Statistical analysis of geological data.

### **UNIT IV: QUANTITATIVE TECHNIQUES**

Central tendency and dispersion, Correlation and regression, Theoretical distribution analysis of one way variance.

### **BOOKS RECOMMENDED:**

1. Hunt and sheily, computer and commonsense, PHT
2. Fundamentals of Mathematical statistics-Gupta S.C and V.K Kappor
3. Statistical methods-Snedeca G.W and Loncron W.G
4. MS Office 2000 – Hand Book.

## **GEO-205: HUMAN VALUES AND PROFESSIONAL ETHICS-1**

**(With effect from 2014-2015)**

**(Effective from the batch of Students admitted from the academic year 2014-15)**

- I. Definition and Nature of Ethics. Its relation to Religion. Politics. Bussiness. Law. Medicine and Environment. NBed and Importance of Professional Ethics – Goals – Ethical Values In various Professions
- II. Nature of Values- Good and Bad. Ends and Means, Actual and potential Values, Objective and Subjective Values, Analysis of basic moral concepts- rights, ought, duty, obligation, justice, responsibility and freedom, Good behaviors and respect for elders, Character and Conduct.
- III. Individual and Society:
  - a. Ahimnsa (Non-Violence), Satya (Trub), Brahmacharya (Celibacy), Asteya (Non Possession) and Aparigraha (Non- stealing). Purusharthas (Cardinal virtues)- Dharma (Righteousness), Artha (Wealth), Kama(Fulfillment Bodily Desire), Moksha (Liberation)
- IV. Bhagavad Gita- (a) ?Niskama karma. (b) Buddhism. The Four Noble Truths – Arya astanga marga, (c) Jainsim- mahavratas and anuvratas. Values Embedded in Various Religions, Relirious Tolerance, Gandhain Ethics.
- V. Crime and Theories of punishment-(a) Regformative, Retributive and Deterrent. (b) Views on manu and Yajnavalka.

## **Books for study:**

1. Join S Mackenzie: A manual of ethics.
2. “The Ethics of Management” by Larue Tone Hosmer, Richard D Irwin Inc.
3. “Management Ethics – Integrity at work’ by Joseph A. Petrick and John F. Quinn, Response Books: New Delhi.
4. “Ethics in Management” by S.A. Sherlekar, Himalaya Publishing House.
5. Harold H Titus: Ethics for Today
6. Maitra. S.K. Hindu Ethics
7. William. Lilly: Introduction of Ethics
8. Sinha: A Manual of Ethics
9. Manu: Manava Dhjarama Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil(ed.) G.C. Haughton.
10. Susruta Samhita: Tr.Kaviraj Kunjanlal, Kunjalal Brishagratha, Chowkamba Sanskrit Series, Vol I, II & III, Varansi, Vol 100, 16-20, 21-32 and 74-77 only.
11. Caraka Samhita: Tr. Dr. Ram Karam Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I, II, III Vol I PP 183-191.
12. Ethics: Theory and Contemporary Issues, Barbara Mackinnon, Wadsworth/Thomson Learning 2001.
13. Analyzing Moral Issue, Judith, A Boss, Mayfield, Publishing Company, 1999.
14. An Introduction to Applied Ethics (Ed) John H Piet and Ayodha Prasad, Cosmo Publications.
15. Text Book for Intermediate logic, Ethics and Human Values, board of Intermediate Education & Telugu Academic Hyderabad.
16. I.C Sharma Ethical Philosophy of India Nagin&Co Julundhar.

## **SEMESTER: III**

### **GEO 301: IGNEOUS PETROLOGY**

#### **(CORE SUBJECTS)**

##### **Unit – I**

Definition and scope of Igneous petrology  
Classification of Igneous rocks: mode, Norm,  
CIPW Norm calculations, IUGS classification  
Irvine – Barager classification.  
Structures and textures of Igneous rocks.

##### **Unit - II**

Factors effecting evolution of magma, Differentiations assimilation and mixing of the magmas. Some important magma types – magma generation in the crust and mantle.

##### **Unit: III**

Petrography and petrogenesis of the following rock types: granites, basalts, layered intrusions anorthosites, alkaline rocks, carbonatites, lamprophyres, ultramafic related rocks, pegmatites and kimberlites.

##### **Unit: IV**

The behaviour of major and trace elements in magmatic crystallization and their relation to tectonics.  
Correlation between tectonic setting and igneous rock suites.  
Petrographic provinces and associations.

#### **BOOKS RECOMMEND:**

1. Principles of igneous and metamorphic petrology by A.R. Philpotts.
2. Igneous petrology by Carmichael et. Al.,
3. Igneous and metamorphic petrology by Turner and Verhoogen.
4. Igneous and metamorphic petrology by M. Best
5. Igneous petrology by Hughes
6. Petrography of the igneous and metamorphic rocks of India by S.C. Chatterjee.
7. Igneous petrology Hyndman.

## **GEO 302: METAMORPHIC PETROLOGY**

### **UNIT I:**

Metamorphism, Introduction, metamorphic processes, kinds of metamorphism, Agents of metamorphism. Classification and nomenclature of metamorphic rocks, structures and textures of metamorphic rocks.

### **UNIT II:**

Grades and zones of metamorphism – concepts of metamorphic facies, classification and description, mineralogical phase rule, ACF – AFM – AKF phase diagrams.

### **UNIT III:**

Contact metamorphic facies – hornfels, sanidinite – regional metamorphic facies – zeolite, blue schist, amphibolite, granulite, eclogite, genesis of granulites, and charnockites.

### **UNIT IV:**

Metamorphic differentiations, Anatexis and origin of migmatites, Regional metamorphism and paired metamorphic belts, mineralization associated with metamorphic process.

### **PRACTICAL – PETROLOGY**

1. Megascopic and microscopic examination of igneous rocks.
  - a. Different types of granites, pegmatites, syenites, anorthosites, dunites, peridotites, pyroxenites, basalts, andesites, rhyolites, trachytes, phonolites, kimberlites, dolerites, lamprophyres.
2. Megascopic and microscopic examination of metamorphic rocks.
  - a. Different types of schists, gneisses, amphibolites, granulites, eclogites, slates, marbles and quartzites.
  - b. Arranging metamorphic rocks according to the facies of metamorphism.
3. Modal analysis of some important igneous rocks and their classification.
4. Calculation of CIPW Norm
5. Variation diagrams Harker and Niggli
6. Discriminant diagrams of Pearce and Cann.

### **BOOKS:**

1. B. Bhaskara Rao – Metamorphic petrology
2. Hyndman – Petrology of igneous metamorphic rocks.
3. Turner and Verhoogen – Igneous and metamorphic rocks.
4. Linkler H.G.F. – Petrogenesis of metamorphic rocks.
5. Philpotts A.R. – Principles of igneous and metamorphic petrology.
6. Yardly B.W. – An introduction to metamorphic petrology.
7. Turner F.J. – Metamorphic petrology.
8. Congillan – Metamorphic Geology
9. S.C. Chatterjee – The Petrography of igneous and metamorphic rocks in India.

### **(INTERNAL ELECTIVES)**

### **GEO303: GEOCHEMISTRY AND THERMODYNAMICS**

#### **UNIT: I**

Definition, scope and development of geochemistry, geochemical classification of elements, Goldschmidt's geochemical principles, geochemical cycle. Meteorites – classification, mineralogy, age and origin.

#### **UNIT: II**

Atmosphere – structure, composition and evolution, Biosphere – composition – biogenic deposits – geochemical cycle of carbon. Hydrosphere – nature, physicochemical properties of water, structure and bonding. Composition of sea and terrestrial water. Evolution of the oceans.

#### **UNIT: III**

Isotope geology – Isotopes and the periodic table. Stable Isotopes – oxygen Isotopes, sulfur Isotopes, carbon Isotopes – Radioactivity and geochronology brief outline of Rb-Sr, K-Ar and radiocarbon ( $C^{14}$ ) systems.

#### **UNIT IV:**

Thermodynamics – historical development – basic concepts and terms, first law of thermodynamics, entropy and second law of thermodynamics, Gibbs phase rule. Activity and fugacity.

#### **PRACTICALS:**

1. Methods of the chemical analysis of rocks and minerals.
  - a. Spectrophotometric methods
  - b. Flame photometric methods
  - c. Titrimetric methods.
2. Chemical analysis of water samples.
3. Graphical representation of water analyses data and classification of natural waters.
4. Classification of groundwater for use in drinking, irrigation and industrial purposes.
5. Estimation of organic matter soils and water.

#### **BOOKS RECOMMENDED:**

1. Manson, B. and Moore, C.B. 1991: Introduction to Geochemistry, Wiley Eastern.
2. Krauskopf, K.B., 1967: Introduction to Geochemistry. McGraw Hill.
3. Faure, G., 1986: Principles of Isotope geology. John Wiley.
4. Nordstrom, D.K., and Munoz, J.L. 1986: Geochemical thermodynamics, Blackwell.
5. Henderson, P., 1987: Inorganic Geochemistry, Pergamon Press.
6. Arthur H. Brownlow, 1979. Geochemistry. Prentice-Hall, Inc. Englewood Cliffs, N.J 07632.

### **GEO 304: ENVIRONMENTAL GEOLOGY AND ENGINEERING GEOLOGY** **ENVIRONMENTAL GEOLOGY**

#### **UNIT I:**

Dimensions of Environmental Stress, History of Environmental degradation. Scope and Objectives of Environmental geology. Biogeochemical cycling and provinces.

#### **UNIT II:**

Air pollution - Pollution due to burning of fossil fuels, Acid rain, Greenhouse effect, Ozone depletion, Air pollution control technologies.

#### **UNIT III:**

Medical geology-Introduction. Basic principles. Excess and deficient of Trace Elements in Environment. Controls on Elemental intake- Fluorine, Iodine, Zinc

#### **ENGINEERING GEOLOGY:**

Role of geologist in the engineering projects. Geological consideration for the selection of dams and sites. Types of dams, case histories of some major dams Nagarjuna Sagar, Srisaïlam and Bhakrananagal. Geological considerations in the selection of tunnels and their alignment, methods of tunneling. Influence of geological conditions on foundations and design of buildings.

#### **BOOKS RECOMMENDED:**

1. Environmental Geology – D.R. Coats (1971)
2. Environmental Geology – E.A. Keller (1985)
3. Environmental Geology – Indian context – K.S. Valdiya (1987)
4. Environmental Geology – C.W. Montgomery (1988)
5. Principles of Engineering Geology and Geotechniques – D.P. Krynine and W.R. Judd
6. A Geology for Engineers – F.G.H. Blyth
7. Engineering Geology for Civil Engineers – D. Venkata Reddy

## **GEO 305: SURVEYING AND FIELD GEOLOGY**

### **Unit:- I**

Introduction : Definition, Scales, examples and Problems, Measurement of distances with the instruments.

Chair Survey : Principles, offsets, cross staff, obstacle in chasing cross staff survey: plathap.

Compass Survey: Prismatic Compass, surveyors compass: Traverse with chair and compass: boalip of lives, mapretis declaration sources of error in compass , problems.

### **Unit: II**

Plane – tables :, Methods of plane tabling, the two point problems, the three point problems.

Levelling : Definitions of terms used in leveling , Different type of level, Principles of leveling, classification of leveling, errors in levelling , Precision of leveling, centowes interpretation of centowes, centow drawing . Theodolite, optics, qualities of telescope, Measurement of angles, Traverse survey with the theodolite, checks in traversing, sources of errors, Traverse computation .

### **Unit: III**

General basis of field geology, planning a field project, basic field equipment , taking geological notes in the field collection rock samples, fossils their numbering and making , use of the compass, clinometer and Hard level in the field .

### **Unit : IV**

Plotting geological features on a base map, mapping geological features on aerial photography , Making a geological map from Aerial photographs, Detailed mapping and sampling, preparation of geological report.

### **REFERENCES.**

1. Surveying & Levelling (part 1<sup>st</sup>) – Late T.P. Kanethan and Prof. S.V. Kulkarni
2. Surveying and Leveling \_\_\_ B.C. Punmiya
3. Manual of field geology \_\_\_ Robert R. Compton
4. Field geology \_\_\_ Lahee.

## **GEO 306: GEMOLOGY**

### **UNIT – I**

Introduction to Gemmology – Relation to Mineralogy and Crystallography Lithological Association of Gemstones in India – What is a Gem – Precious and Semi-Precious Stones – Gem-bearing stratigraphic Units in India – Gemstone Resources of India.

### **UNIT – II**

Criteria for recognition of gemstones – Virtues of gemstones – Colours – Optical Properties – Hardness – Fractures – inclusions – zoning – Brittleness – Pleochroism – Clarity – Amenability for cutting and polishing – 4 C's – Processing of gemstones – Preforming – Styles of Cutting – Cabachon cut-Rose cut, Brilliant cut, zircon cut, step, trap or emerald cut and mixed cuts.

### **UNIT – III**

Determination of various physical properties in the laboratory – Hardness – Specific gravity – Reflectivity and Reflectance – Dispersion – Lustre – Streak – Measurement of Refractive index – Colour distinction.

### **UNIT – IV**

Uses of gemstones in jewellery, medicine, health and customs. Important Gem Species : Diamond, Corundum and Ruby, Beryl – Chrysoberyl - Cat's Eye – Alexandrite, Topaz, Spinel, Garnets, Tourmaline, Peridot, Zircon, Varieties of Quartz Group – Sphene, Feldspar, Lapis Lazuli. Synthetic Gems.

### **BOOKS RECOMMENDED:**

1. Industrial minerals and rocks of India by S. Deb (1975)
2. Introductory Gemology by Robert Webster (1945)
3. Prospecting for gemstones and minerals by John Sinkankas (1970)
4. Gems and Gem Industry in India by R.V. Karanth (2000)
5. Gems and Gem materials by E.H. Kraus (1941)
6. Precious Stones by Max Bauer (2 Vols.) (1968)
7. Van Nostrand's Standard Catalog of Gems by John Sinkankas (1968)
8. Geology of India and Burma by M.S. Krishnan (1968)

## (EXTERNAL ELECTIVES)

### GEO 307: DIMENSIONAL STONES AND BUILDING MATERIALS.

#### Unit : I Dimensional Stones :-

1. Introduction
2. Historical background
3. Criteria for selection of dimensional stones
4. Importance of dimensional stones in archaeological monuments

#### Unit : II

1. Dimensional stone \_\_\_ Indian scenario
2. Granite industry in India
3. Dimensional stones through Geological time scale
4. Granite trade in south India .

#### Unit : III

1. Dimensional stone varieties
2. Distribution of dimensional stones in Andhra Pradesh
3. Export and import qualities.

#### Unit: IV Building Materials:

1. Introduction
2. Varieties of building materials
3. Ornamental and Building stones in Indian History.
4. Distribution of building materials in Andhra Pradesh.
5. Conservation of commercial Rock deposits/ Monumental /Building Stones.

#### **BOOKS RECOMMENDED**

1. f.g.h. Blyth and M.A. Defreites. A Geology for Engineers.
2. D.P. Krymine and W.R. Judd: Principles of Engineering Geology.
3. Bell F.G. 1999. Geological Hazards. Rontiege, London.
4. k. Vikram: Directory of Dimensional Stones (1986).
5. Mineral Resources of Andhra Pradesh by P.K. Ramam.
6. Information Dossier on Regional evaluation of Dimension stone granite in Andhra Pradesh, India 1999, by Geological Survey of India, OPAP.

### SEMESTER: IV (CORE SUBJECTS):

#### GEO 401: ECONOMIC GEOLOGY

#### Unit: I

Processes of formation of mineral deposits – magmatic concentration, metasomatism, hydrothermal process, sedimentation, residual and mechanical concentration, oxidation supergene enrichment, sublimation, evaporation.

#### Unit : II

Ore deposition, physical and chemical controls of ore fluids and their migration. Metallogenic epochs and provinces with special reference to India. Classification of mineral deposits, UNFC Classifications Mineralization through geological time scale.

#### Unit : III

Geology, nature of occurrence, mineralogy, genesis and distribution of the following with case studies. a. Iron ore deposits, b. Chromite deposits, c. Manganese deposits, d. Copper deposits, e. Pb-Zn deposits, f. Bauxite deposits.

#### Unit : IV

Geology, nature of occurrence, genesis and distribution of coal and petroleum deposits, (b) Magnesite deposits, (c) Bauxite deposits, (d) Mica deposits, (e) Baryte deposits, (f) asbestos deposits, (g) mineral resources of Andhra Pradesh.

## **ECONOMIC GEOLOGY (PRACTICAL)**

Megascopic study of structures and fabrics of different ore minerals and industrial minerals.  
Mineralogical and textural studies of common ore minerals Under ore microscope and their paragenetic significance.

Microchemical techniques for identification of ores.

Excercises on mine sampling and determination of tenor and estimation of ore reserves.

### **BOOKS RECOMMENDED**

1. Bateman A.M. and Jenson M.C. – Economic Mineral deposits Walker W. \_\_Metallogeny and global tectonics.
2. Krishna Swamy \_\_ Indian Mineral resources
3. Gokhale and Rao \_\_ Ore deposits of India
4. R.K. Sinha & N.L. Sharma \_\_ Mineral Economics
5. Cameron E.C. \_\_ Ore minerals and their intergrowth
6. R.L. Stanton \_Ore petrology
7. Park Jr. C.F. and Mac Diamid \_ Ore deposits
8. Lindgre. W. \_ Ore deposits Strata bound Stratiform ore deposits \_ Mc Graw hill scientific company
9. Anthony. M. Evans \_ An introduction to the Ore geology.
- 10.Singh M.P. Coal and organic petrology
11. Tissot B.P. and Wette, D.H.: Petroleum formations and occurrences Selley R.C. : Elements of petroleum geology
- 12.Holoson G.D. and Turantsoo E.N.: Introduction to petroleum geology.

## **GEO 402: MINERAL EXPLORATION AND MINING**

### **UNIT: I**

Definition – mining lease and regulations in brief. National mineral policy. Conservation of minerals. Renewable and non-renewable resources.

### **UNIT:II**

Guides to locate ore bodies: Physiographic guides, lithologic and stratigraphic guides; mineralogical guides, structural guides.

### **UNIT:III**

Methods of sampling, terms and definitions of mining. Open cast mining and underground mining methods.

### **UNIT: IV**

Mineral processing principles: crushing – grinding and sizing. Concentration techniques, Gravity methods of separation viz: Jigging, tabling, heavy media separation, magnetic methods and floatation.

### **BOOKS RECOMMENDED**

1. Mineral Economics, 1970, Sinha R.K., and Sharma, N.D.
2. Exploration Geology, Peters
3. Mining Geology \_ McKNISTRY
4. Cources in mining geology – AROGYASWAMY
5. Principles and Field Mining \_ forester J.D.
6. Introduction to Mining, Hartman, U.L.
7. Mineral processing technology, Wills, B.A.

## (INTERNAL ELECTIVES)

### GEO 403 : HYDROGEOLOGY

#### UNIT I:

Hydrological cycle – precipitation, runoff, infiltration, evaporation, transpiration. Hydrological properties of rocks – Porosity, permeability, strativity, specific yield and specific retention. Hydraulic conductivity. Hydrographs water table contour maps. Ground water:- Origin occurrence, vertical distribution of ground water.

#### UNIT II:

Classification of aquifers: Confined, unconfined leaky and coastal aquifers: Geological formations as aquifers, springs. Ground water movement: Darcy's Law, determinators of hydraulic conductivity. Dispersion of ground water tracers.

#### UNIT:III

Quality of ground water: Measures of water quality, physical analysis, biological analysis. Chemical analysis, graphic representations. Interpretation of chemical analysis. Classification of waters, pollution of ground water, pollution in relation to water use.

#### UNIT IV:

Groundwater exploration: Surface and subsurface geological, and geophysical methods of groundwater exploration. Hydrogeomorphic mapping using various remote sensing techniques. Artificial recharge of groundwater, consumptive and conjunctive use of surface and ground water.

#### BOOKS RECOMMENDED:

1. Groundwater Hydrology – David Keith Todd.
2. Groundwater \_ H.M. Raghunath
3. Groundwater Assessment, Development and Management \_ K.R. Karanth.
4. Hydrogeology \_ Davies, S.N./ De wiest, R.J.M.

### GEO 404: NATURAL HAZARDS AND RISK MANAGEMENT

#### Unit – I Earthquakes and seismic hazards .

- \_\_\_ Toll of Human lite.
- \_\_\_ Origin and severiaty of earthquakes
- \_\_\_ Effects of earthquakes.
- \_\_\_ Stability of structures and risk evaluation.
- \_\_\_ Seismicity conditions in India
- \_\_\_ Coping with seismic hazards.

#### Unit: II Landslids and hillslopes.

- \_\_\_ Landslide Prone areas.
- \_\_\_ Destabilizing forces and mass movements.
- \_\_\_ Types of mass movements
- \_\_\_ Identification of land slide zones .
- \_\_\_ Controlling of land slides.
- \_\_\_ Subsidence and swelling of ground.

#### Unit: III Floods, Cyclones\_ and Tsunamies.

- \_\_\_ Causes of floods
- \_\_\_ Flood hazards in India
- \_\_\_ Cyclones and their genesis.
- \_\_\_ Tsunamis and dimension of hazards.



- Unit: IV** Volcanic Hazards.  
\_\_ Volcanic belt gridling in Indian sub – Continent .  
\_\_ Origin and types of Volcanic activity  
\_\_ Nature of Volcanic Hazards.  
\_\_ Prediction of Volcanic eruptions .  
\_\_ Mitigation of volcanic hazards.

### **BOOKS RECOMMENDED**

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. Montgomeny (1989)
7. Environmental Geology \_ D.R. Coats (1981)
8. All you wanted to know about Disasters – (Brig) B.K. Khanna (2005)

### **(EXTERNAL ELECTIVES)**

#### **GEO 405: WATERSHED MANAGEMENT**

##### **UNIT I: WATERSHED MANAGEMENT:**

Introduction: Definition – Basic unit for development classification of watershed – The principles behind watershed management – Watershed delineation – Watershed characterization – Watershed prioritization.

##### **UNIT II: NATURAL RESOURCES:**

Land resources – Water resources – Soil resources – Artificial recharge – Analysis of rainfall data. Application of Remote Sensing technology over conventional methodology in Ground water exploration, Ground water balance studies, Management of groundwater and Land capability studies.

##### **UNIT III: AGRICULTURE AND DEMOGRAPHY:**

Crop pattern, water use efficiency crops, Social forestry and Afforestation, Sprinkler irrigation, Drip irrigation, Distribution of population, Population Density, Scheduled caste/ Tribe population, Literacy, Number of workers in different categories etc.

##### **UNIT IV: PLANNING FOR SUSTAINABLE DEVELOPMENT:**

Development planning: analysis and integration, Action Plans-local, regional and national level – Monitoring impact in watersheds – Conservation and watershed management.

##### **BOOKS:**

1. Hand book of Applied Geology – Ven Te chow(ed)
2. Groundwater resource evaluation – W.C Walton
3. Groundwater – H.M Raghunath
4. Hydrogeology – Devis & De wiest
5. Watershed management-JVS Murthy
6. Watershed development-VVJ Sharma C. Subba Rao and NVBSS Prasad.

**GEO-406: HUMAN VALUES AND PROFESSIONAL ETHICS-II**  
**(With effect from 2015-2016) (Compulsory)**

**(Effective from the batch of Students admitted from the academic year 2014-15)**

- I. Value Education- Definition – relevance to present day – Concept of Human Values – self introspection – Self esteem. Family values-Components, Structure and responsibilities of family-Neutralization of anger – Adjustability – Threats of family life – Status of women in family and society - Caring for needy and elderly – Time allotment for sharing ideas and concerns
- II. Medical ethics – Views of Charaka, Sushruta and Hippocrates on moral responsibility of medical practitioners. Code of ethics for medical and healthcare professionals. Euthanasia. Ethical obligation to animals Ethical issues in relation to health care professionals and patients. Social justice in health care, human cloning, problems of abortion. Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.
- III. Business ethics – Ethical stands of business – Immoral and illegal practices and their solutions. Characterizes of ethical problem in management, ethical theories, causes of unethical behavior, ethical abuses and work ethics.
- IV. Environmental ethics- Ethical theory, man and nature- Ecological crisis, Pest control, Pollution and waste. Climate change, Energy and population, Justice and environmental health.
- V. Social ethics – Organ trade, Human trafficking, Human rights violation and social disparities, Feminist ethics, Surrogacy/pregnancy, Ethics of media- Impact of Newspapers, Television, Movies and Internet.

**Books for Study:**

1. Join S Mackenjie: A manual of ethics.
2. “The Ethics of Management” by Larue Tone Hosmer, Richard D Irwin Inc.
3. “Management Ethics – Integrity at work” by Joseph A. Petrick and John F. Quinn, Response Books: New Delhi.
4. “Ethics in Management” by S.A. Sherlekar, Himalaya Publishing House.
5. Harold H Titus: Ethics for Today
6. Maitra. S.K. Hindu Ethics
7. William. Lilly: Introduction of Ethics
8. Sinha: A Manual of Ethics
9. Manu: Manava Dhjarama Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil(ed.) G.C. Haughton.
10. Susruta Samhita: Tr.Kaviraj Kunjanlal, Kunjalal Brishagratha, Chowkamba Sanskrit Series, Vol I, II & III, Varansi, Vol 100, 16-20, 21-32 and 74-77 only.
11. Caraka Samhita: Tr. Dr. Ram Karam Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I, II, III Vol I PP 183-191.
12. Ethics: Theory and Contemporary Issues, Barbara Mackinnon, Wadsworth/Thomson Learning 2001.
13. Analyzing Moral Issue, Judith, A Boss, Mayfield, Publishing Company, 1999.
14. An Introduction to Applied Ethics (Ed) John H Piet and Ayodha Prasad, Cosmo Publications.
15. Text Book for Intermediate logic, Ethics and Human Values, board of Intermediate Education & Telugu Academic Hyderabad.
16. I.C Sharma Ethical Philosophy of India Nagin&Co Julundhar.

# MODEL QUESTION PAPERS

M.Sc. DEGREE EXAMINATION - 2015

GEO 101 : CRYSTALLOGRAPHY AND MINERALOGY

Time: 3 hours

Max.Marks:70

## SECTION – A

Answer any FOUR Questions.

Each Question Carries 5 marks

(Marks: 4 X 5 = 20)

1. Parameters.
2. Axis of Symmetry
3. Uniaxial minerals
4. Pleochroism
5. Structure of Beryl.
6. Foresterite – Fayalite series.
7. Albite – Anorthite series
8. Paragenesis of Aluminum Silicate minerals.

## SECTION –B

Answer any ALL Questions.

Each Question Carries 12.5 marks

(Marks: 4 X 12.5 = 50)

9. (a) Write an essay on earth's interior, according to seismic Theory.  
Or  
(b) Describe the nature and origin of volcanoes.
10. (a) Discuss the factors influencing the mass wasting.  
Or  
(b) Describe in detail about Fletchers indicatrix.
11. (a) Write an essay on Structure and optical properties of mica group of minerals.  
Or  
(b) Discuss about classification, structure and physical properties of epidote group of minerals
- 12.. (a) Write an essay on structure and classification of garnet group of minerals.  
Or  
(b) Discuss in details about inter relationship of physical, chemical and optical Properties of Feldspar group of minerals.

# MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION - 2015

FIRST SEMESTER

GEO 102: SEDIMENTOLOGY

Time: 3 hours

Max.Marks:70

## SECTION – A

Answer any FOUR Questions.

Each Question Carries 5 marks

(Marks: 4 X 5 = 20)

1. Size classification Sediments.
2. Transportation methods of sediments
3. Oolitic lime stones
4. Shale
5. Arkose
6. Graded bedding importance
7. Characteristics of deep sea sediments
8. Barrier spit.

## SECTION –B

Answer any ALL Questions.

Each Question Carries 12.5 marks

(Marks: 4 X 12.5 = 50)

9. (a) What is physical weathering and write characters of physical weather product?  
Or  
(b) What are different energies influence the deposition of sediments in the river mouth?
10. (a) What is main difference between clastic and non-clastic deposits?  
Or  
(b) Write an essay on classification of sand stones.
11. (a) What are different types of ripple marks? How these are useful to determine top and bottom of beds ?  
Or  
(b) Write an essay on sole mark structures.
12. (a) Write an essay on delta and their sub-environments.  
Or  
(b) What are different depositional feature and their character of glacial environment?

## MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION - 2015

FIRST SEMESTER

GEO 103: GEOMORPHOLOGY

Time: 3 hours

Max.Marks:70

### SECTION – A

Answer any FOUR Questions.  
Each Question Carries 5 marks  
(Marks: 4 X 5 = 20)

1. Volcanic mitigation.
2. Causes of earthquakes
3. Types of movements
4. Origin of continents
5. Pedestal Rock.
6. Stalagmite and Stalactite
7. Point bars
8. Ox-bow lacks.

### SECTION –B

Answer any ALL Questions.  
Each Question Carries 12.5 marks  
(Marks: 4 X 12.5 = 50)

9. (a) Write an essay on Earth's interior, according to seismic Theory  
Or  
(b) Describe the nature and origin of Volcanoes.
10. (a) Discuss the factors influencing the mass wasting  
Or  
(b) Write an essay on plate tectonics.
11. (a) Give an account on land forms developed by the action of glaciations  
Or  
(b) Discuss the land forms developed by the Wind action.
12. (a) Write an essay on drainage patterns.  
Or  
(b) Describe the evolution of geomorphological features of the Indian Sub-continent.

# MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION - 2015

FIRST SEMESTER

GEO 104: STRATIGRAPHY AND INDIAN GEOLOGY

Time: 3 hours

Max.Marks:70

## SECTION – A

Answer any FOUR Questions.  
Each Question Carries 5 marks  
(Marks: 4 X 5 = 20)

1. Peninsular shield
2. Coastal Plain
3. A. P. Dharwars.
4. Post Dharwars.
5. Bhima Basin
6. Pakala Basin
7. Upper Gondwana
8. Lower Gondwana

## SECTION –B

Answer any ALL Questions.  
Each Question Carries 12.5 marks  
(Marks: 4 X 12.5 = 50)

9. (a) Write an easy on structure and tectonics of India.  
Or  
(b) Describe the physiographic divisions of India.
10. (a) Give an account on Eastern Ghats  
Or  
(b) Explain the Archaean stratigraphy.
11. (a) Write an easy on Geological History of Purana Basins  
or  
(b) Describe the Cuddapah super group.
12. (a) Explain in details the Cretaceous of Trichinapalli.  
Or  
(b) Write an easy on Deccan Traps.

# MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION - 2015

SECOND SEMESTER

GEO 201: STRUCTURAL GEOLOGY AND GEOTECTONIC

Time: 3 hours

Max.Marks:70

## SECTION – A

Answer any FOUR Questions.

Each Question Carries 5 marks

(Marks: 4 X 5 = 20)

1. Stress Ellipsoid
2. Behavior of materials
3. Anticlinal fold.
4. Disconformity
5. Destral and Senistral
6. Foliation
7. Salt Dome
8. Isostacy

## SECTION –B

Answer any ALL Questions.

Each Question Carries 12.5 marks

(Marks: 4 X 12.5 = 50)

9. (a) Write a detailed note on the concept of stress and strain.  
Or  
(b) What are the factors controlling the behavior of rocks, explain in detail.
10. (a) Write an essay on Unconformities.  
Or  
(b) Describe thrust fault, rivers fault, strike slip fault and normal fault.
11. (a) Write a descriptive note on the geometrical classification of plutonic  
Igneous rocks  
Or  
(b) Explain in detail, the metamorphic structures.
12. (a) Distinguish between orogeny and epiorogeny.  
Or  
(b) Write a note on the elevation of Himalayas.

## MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION - 2015

SECOND SEMESTER

GEO 202: PALEONTOLOGY

Time: 3 hours

Max.Marks:70

### SECTION – A

Answer any FOUR Questions.

Each Question Carries 5 marks

(Marks: 4 X 5 = 20)

1. Uses of micorfossils.
2. Classification of corals.
3. Morphology of Brachipod.
4. Plant life distribution.
5. Paleobotany
6. Evolution of Man
7. Evolution of Elephant.
8. Echinodemata.

### SECTION –B

Answer any ALL Questions.

Each Question Carries 12.5 marks

(Marks: 4 X 12.5 = 50)

9. (a) Explain in detail the origin and evolution of life.  
Or  
(b) Write a detailed note on the classification of fossils.
10. (a) Write about morphology, classification, evolution and geological distribution of Molluscs.  
Or  
(b) Write about morphology, classification, evolution and geological distribution of Trilobites.
11. (a) Describe briefly about the morphological study of different plant fossils.  
or  
(b) Write a descriptive note on the application of plant fossils with respect to paleoclimates.
12. (a) Write a descriptive note on the evolution of Horse.  
Or  
(b) Describe in detail, different micro fossil groups and their distribution in India.



## MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION - 2015

SECOND SEMESTER

GEO 203: REMOTE SENSING AND GIS

Time: 3 hours

Max.Marks:70

### SECTION – A

Answer any FOUR Questions.

Each Question Carries 5 marks

(Marks: 4 X 5 = 20)

1. Photogrametry in Earth Sciences
2. Landform analysis using Arial Photography
3. Basic concepts of Remote Sensing
4. Different spectral regions
5. Sensors and platforms
6. Satellite and payload
7. Data structure in GiS.
8. Hardware and software in GIS

### SECTION –B

Answer any ALL Questions.

Each Question Carries 12.5 marks

(Marks: 4 X 12.5 = 50)

9. (a) Discuss the elements of Arial Photo interpretation, add a note on vegetation and land use analysis using Arial Photos.

Or

(b) Answer the following.

- i) Stereo – model
- ii) Arial photo mosaic

10. (a) Discuss in detail the recent developments in Remote Sensing in India. Note on the latest Satellites of India.

Or

(b) Answer the following.

- i) Techniques of Remote Sensing
- ii) Electromagnetic Radiation

11. (a) Write an account on the application of remote sensing in ground water exploration.

or

(b) Answer the following.

- i) Remote Sensing and Gold Exploration
- ii) Microwave remote sensing

12. (a) Discuss in detail the development of GIS data base with different themes. Discuss the process by taking a geological example.

Or

(b) Answer the following.

- i) Spatial data base system.
- ii) GIS out put maps.

# MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION - 2015

SECOND SEMESTER

GEO 204: COMPUTER APPLICATIONS AND GEOSTATISTICS

Time: 3 hours

Max.Marks:70

## SECTION – A

Answer any FOUR Questions.

Each Question Carries 5 marks

(Marks: 4 X 5 = 20)

1. First generation Computers
2. Networking and Computers
3. Role of Operating System.
4. M.S Windows.
5. Data Representation.
6. Statistics in data analysis.
7. Arithmetic mean.
8. Stand division

## SECTION –B

Answer any ALL Questions.

Each Question Carries 12.5 marks

(Marks: 4 X 12.5 = 50)

9. (a) How the Computers can make a difference in scientific applications, elaborate Your answer with earth sciences perspective.  
Or  
(b) Answer the following.
  - i) Data and information
  - ii) Classification of Computers
10. (a) Discuss various operation systems introduced by micro soft under Windows concept, add note on their relative advantages and disadvantages.  
Or  
(b) Answer the following.
  - i) M.S. Word
  - ii) Animation options in power point.
11. (a) “the Earth Sciences generate huge quantum of data and the Computers will efficiently help to analysis this data”. Explain.  
or  
(b) Answer the following.
  - i) Techniques of data representation.
  - ii) Techniques of data redaction.
12. (a) Discuss the importance of statistics in Geology.  
Or  
(b) Answer the following.
  - i) ANOVA – Standard division.
  - ii) Mean, Mode and Medium.

# MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION - 2015

THIRD YEAR

GEO 301: IGNEOUS PETROLOGY

Time: 3 hours

Max.Marks:70

## SECTION – A

Answer any FOUR Questions.

Each Question Carries 5 marks

(Marks: 4 X 5 = 20)

1. Scope of igneous petrology.
2. Inequigranular Textures.
3. Assimilation of Magma.
4. Physical Properties of Magma.
5. Kimberlites.
6. Anorthosites.
7. Petrographic Provinces
8. Igneous rocks of convergent plate boundaries.

## SECTION –B

Answer any ALL Questions.

Each Question Carries 12.5 marks

(Marks: 4 X 12.5 = 50)

9. (a) Write an essay on classification of igneous rocks with a special mention on IUGS Classifications.

Or

(b) Describe various structures generally found in igneous rocks.

10. (a) Discuss various processes involved in magmatic differentiation.

Or

(b) Enumerate different factors influence the evolution of magma. Add a note their elemental and mineralogical composition.

11. (a) Demonstrate various petrographic and petrogenetic characters of granites.

or

(b) Write a detailed note on lamprophyres.

12. (a) Explain the role of trace elements and REE in magmatic crystallization.

Or

(b) Explain correlation between different tectonic settings and igneous rock suits.

# MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION - 2015

THIRD YEAR

GEO 302: METAMORPHIC PETROLOGY

Time: 3 hours

Max.Marks:70

## SECTION – A

Answer any FOUR Questions.

Each Question Carries 5 marks

(Marks: 4 X 5 = 20)

1. Agents of metamorphism
2. Prograde & Retrograde metamorphism
3. AFMI Diagram.
4. Cataclastic structure .
5. Lit-Par-Lit Injection
6. Stress & Antistress Minerals
7. Palingenesis
8. Anateexis

## SECTION –B

Answer any ALL Questions.

Each Question Carries 12.5 marks

(Marks: 4 X 12.5 = 50)

9. (a) Define Metamorphism. Explain types of metamorphism. Give a brief account of their controlling factors.  
Or  
(b) illustrate different textures and structures commonly found in metamorphic rocks.
10. (a) Describe various Zones and Grades of Metamorphism.  
Or  
(b) What is mineralogical Phase Rule? Explain different compositional ternary phase diagrams used in metamorphism.
11. (a) Explain the concept of metamorphic facies and their mineral assemblages proposed by Eskola.  
or  
(b) Discuss in detail the Thermal Metamorphism of basic igneous rocks.
12. (a) Give a detailed account of Regional Metamorphism of Pelitic Rocks,  
Or  
(b) Describe in detail 'Tectonism & Metamorphism' . Add a note on minerals associated with metamorphic processes.

# MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION - 2015

THIRD YEAR

GEO 303: GEOCHEMISTRY AND THERMODYNAMICS

Time: 3 hours

Max.Marks:70

## SECTION – A

Answer any FOUR Questions.

Each Question Carries 5 marks

(Marks: 4 X 5 = 20)

1. Lithophile elements
2. Chondrites
3. Structure of the Atmosphere
4. Hydrosphere
5. Radioactive decay
6. Carbon Isotopes
7. Entropy
8. Energy Cycle.

## SECTION –B

Answer any ALL Questions.

Each Question Carries 12.5 marks

(Marks: 4 X 12.5 = 50)

9. (a) Write an essay on classification of Meteorites. What is the use of studying meteorites?  
Or  
(b) Give a detailed note on the geochemical classification of elements.
10. (a) Write an essay on geochemical Cycle of carbon  
Or  
(b) Write an essay on geochemical evolution of oceans and seas.
11. (a) Write a note on the composition and evolution of the Atmosphere  
or  
(b) Define Geochronology. Explain different geochronological techniques used to estimate the age of the rocks.
12. (a) Explain different principles of thermodynamics. Add a brief note of Gibbs Phase Rule.  
Or  
(b) Explain the importance of Oxygen Fugacity in crystallization of magmas.

# MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION - 2015

THIRD YEAR

GEO 304: ENVIRONMENTAL GEOLOGY AND ENGINEERING GEOLOGY

Time: 3 hours

Max.Marks:70

## SECTION – A

Answer any FOUR Questions.

Each Question Carries 5 marks

(Marks: 4 X 5 = 20)

1. Objectives of Environmental Geology
2. Biogeochemical cycling
3. Ozone depletion
4. Groundwater pollutants
5. Zinic
6. Arch dams
7. Influence of joints in dam site.
8. Grouting.

## SECTION –B

Answer any ALL Questions.

Each Question Carries 12.5 marks

(Marks: 4 X 12.5 = 50)

9. (a) Write an essay on degradational history of the environment,  
Or  
(b) Explain the Scope of Environmental Geography
10. (a) Describe the pollutants of soil and land. Explain the measures to prevent the soil and land pollution.  
Or  
(b) Write an essay on air pollution and its preventive measures.
11. (a) Describe the principles of medical geology.  
or  
(b) What are trace elements? Describe the influence of trace elements on environment.
12. (a) Describe diverse geological conditions to be considered for the selection of a dam site.  
Or  
(b) Describe a range of geological criteria to study before laying a foundation and to design a building.

# MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION - 2015

FOURTH SEMESTER

GEO 401: ECONOMICS GEOLOGY

Time: 3 hours

Max.Marks:70

## SECTION – A

Answer any FOUR Questions.

Each Question Carries 5 marks

(Marks: 4 X 5 = 20)

1. Residual consecration
2. Hydrothermal Process
3. Migration of ore fluids.
4. Mineralization
5. Lead Deposits
6. Magnesite Deposits
7. Evaporates
8. Supergene enrichment

## SECTION –B

Answer any ALL Questions.

Each Question Carries 12.5 marks

(Marks: 4 X 12.5 = 50)

9. (a) Describe in detail the structural controls of over deposits.  
Or  
(b) Write a brief notes on barites deposits of Andhra Pradesh.
10. (a) Write an essay on lime stone deposits with suitable examples.  
Or  
(b)Write a brief essay on occurrence of cold deposits.
11. (a) Write an essay on Zinc deposits with suitable examples.  
or  
(b) Briefly write an essay on manganese deposits.
12. (a) Write a brief essay on chromite deposits  
Or  
(b) Write a brief notes on the formation of mineral deposits through hydrothermal process.

# MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION - 2015

FOURTH SEMESTER

GEO 402: MINERAL EXPLORATION AND MINING

Time: 3 hours

Max.Marks:70

## SECTION – A

Answer any FOUR Questions.

Each Question Carries 5 marks

(Marks: 4 X 5 = 20)

1. Dead Rent
2. Maritime Act.
3. Physiographic guides for bauxite exploration .
4. Lithological guides
5. Froth flotation
6. Heavy media separation
7. Long wall advancing method
8. Glory hole mining.

## SECTION –B

Answer any ALL Questions.

Each Question Carries 12.5 marks

(Marks: 4 X 12.5 = 50)

9. (a) Write an essay on conservation of minerals.  
Or  
(b) Write an essay on renewable resources and their stats in India.
10. (a) Discuss in detail about structural guides to ore search.  
Or  
(b)What are stratigraphic guides and give a brief account on use of their in mineral exploration.
11. (a) Write an essay on advantages of under ground mining  
or  
(b) Discuss in detail about core drilling method and its advantages.
12. (a) Write an essay different grinding machines.  
Or  
(b) Explain in detail about tabling.



# MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION - 2015

FOURTH SEMESTER

GEO 403: HYDRO GEOLOGY

Time: 3 hours

Max.Marks:70

## SECTION – A

Answer any FOUR Questions.

Each Question Carries 5 marks

(Marks: 4 X 5 = 20)

1. Water cycle
2. Aquifer zone
3. Hybrid wells
4. Drainage basin
5. Well logging
6. TDS
7. Application of remote sensing in ground water prospecting
8. Check dam.

## SECTION –B

Answer any ALL Questions.

Each Question Carries 12.5 marks

(Marks: 4 X 12.5 = 50)

9. (a) Write an essay on the types and occurrence of ground water.  
Or  
(b) Give an account on specific yield and specific retention.
10. (a) Write an essay on Darcy's Law and its applications.  
Or  
(b) Describe the chemical quality of ground water.
11. (a) Explain in detail the ground water pollution.  
or  
(b) Write an essay on the saline water intrusion in coastal aquifer.
12. (a) Describe the different geophysical methods in ground water exploration.  
Or  
(b) Explain in detail artificial recharge of ground water

# MODEL QUESTION PAPER

M.Sc. DEGREE EXAMINATION - 2015

FOURTH SEMESTER

GEO 404: NATURE HAZARDS AND RISK MANAGEMENT

Time: 3 hours

Max.Marks:70

## SECTION – A

Answer any FOUR Questions.

Each Question Carries 5 marks

(Marks: 4 X 5 = 20)

1. Effects of Earthquakes
2. Seismic zones of India
3. Causes for landslides
4. Land subsidence
5. Impact of cyclones an coastal areas
6. Origin of volcanoes
7. Flood prone areas in India
8. Nature of volcanic hazards

## SECTION –B

Answer any ALL Questions.

Each Question Carries 12.5 marks

(Marks: 4 X 12.5 = 50)

9. (a) Give an account on organ, prediction of earth quacks and add a note on remedies to be taken for post effects of earth quacks.  
Or  
(b) Discuss about coping with seismic hazards.
10. (a) Write an essay on landslide prone areas in India and mention about forces causing for mass movements.  
Or  
(b) How land slides can be controlled and add a note on swelling of ground.
11. (a) Give an account of flood hazards in India.  
or  
(b) How the Tsunamis or formed and give a note on dimension of hazards.
12. (a) Write an essay on volcanic belt girdling in Indian Sub-continent.  
Or  
(b) Discuss about mitigation of volcanic hazards.