

School Of Studies in Earth Science

Choice Based Credit System Syllabus of M.Sc. Geology

Vikram University Ujjain, M.P.

SESSION-2016-17 (ONWARD)

Semester – I (All courses compulsory)

Nature of Paper	Paper Code	Paper Name	Marks Theory	Internal Marks	Credits of Theory	Credits of Internal	Total Credits
Hard Core	T-101	Geodynamics	40	10	1	1	5
Hard Core	T-102	Structural - Geology	40	10	1	1	5
Hard Core	T-103	Mineralogy & Geochemistry	40	10	1	1	5
Elective	T-104	Geomorphology	40	10	1	1	5
Practical	P-101	Based on T-101 & T-102	50	-	-	-	5
Practical	P-102	Based on T-103 & T-104	50	-	-	-	5
Total Credits							30

Semester – II (All courses compulsory)

Nature of Paper	Paper Code	Paper Name	Marks Theory	Internal Marks	Credits of Theory	Credits of Internal	Total Credits
Hard Core	T-201	Igneous & Metamorphic Petrology	40	10	4	1	5
Hard Core	T-202	Sedimentology	40	10	4	1	5
Hard Core	T-203	Stratigraphy	40	10	4	1	5
Elective	T-204	Palaeobiology	40	10	4	1	5
Practical/Field Work	P-201	Based on T-201 & T-202	50	-	-	-	5
Practical	P-202	Based on T-203 & T-204	50	-	-	-	5
Total Credits							30

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SESSION- 2017-18 (ONWARD)

Semester – III (All courses compulsory)

Nature of Paper	Paper Code	Paper Name	Marks Theory	Internal Marks	Credits of Theory	Credits of Internal	Total Credits
Hard Core	T-301	Engineering Geology	40	10	4	1	5
Hard Core	T-302	Ore Geology	40	10	4	1	5
Hard Core	T-303	Mineral Exploration	40	10	4	1	5
Elective	T-304	photo geology & Remote. See Sir's	40	10	4	1	5
Practical	P-301	Based on T-301 & T-302	50	-	-	-	5
Practical	P-302	Based on T-303 & T-304	50	-	-	-	5
Total Credits							30

Semester – IV (All courses compulsory)

Nature of Paper	Paper Code	Paper Name	Marks Theory	Internal Marks	Credits of Theory	Credits of Internal	Total Credits
Hard Core	T-401	Fuel Geology	40	10	4	1	5
Hard Core	T-402	Mining and Mineral Dressing	40	10	4	1	5
Hard Core	T-403	Hydrogeology	40	10	4	1	5
Elective	T-404	Project Work (Subject Based)	20	-	-	-	2
Practical	P-401	Based on T-401 & T-402	50	-	-	-	5
Practical	P-402	Based on T-403 & T-404 (Comprehensive Viva Voce)	50	-	-	-	5
Open Elective	T-405	Fundamentals of Geology	20	10	2	1	3
Total Credits							30

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CHOICE BASED CREDIT SYSTEM SYLLABUS OF M.SC. GEOLOGY

CLASS: M.Sc. PREVIOUS
SUBJECT: - GEOLOGY
PAPER TITLE: FIRST: GEODYNAMICS (T-101)
SEMESTER: FIRST
DATE: 05.03.2016

Unit – 1

Earth's surface features. Seismology: seismic waves, Intensity and isoseismic lines, earthquake belts, Earthquake zone of India, Seismograph, causes of Earthquake. Internal Structure of the Earth.

Unit – 2

Volcanism: types and causes of volcanic eruptions. World distribution of volcanoes, Migration of volcanoes, Palaeomagnetism and its application for determining palaeoposition of continents.

Unit – 3

Isostasy: Development of the concept, Isostatic anomalies, Isostatic models, evidence. Geosynclines: Classification and evolution of Geosyncline, causes of subsidence and upliftment. Principles of Geodesy.

Unit – 4

Continental drift: development of the concept, Taylor's theories of continental drift. Evidences of continental drift and polar wandering. Sea floor spreading. topography of mid-ocean ridges, Morphological features of ocean floor.

Unit – 5

Concept of plate tectonics. Types of Plate boundary, feature of convergent and divergent boundaries. Palaeoposition of India and Geodynamics of the Indian plate. Ophiolite suites, Arc – Trench system, Volcanic Mountain chain. Triple Junctions and their stability. Causes of Plate Motion. Origin of the Himalayas. Seismic belts of the earth.

References:

Holmes, Doris L and Arthur: **Holmes' principles of Physical Geology**. Wiley
Wyllie, Peter J: **The Dynamic Earth**. Wiley
Hodgson, J H: **Earthquake and Earth Structures**. Prentice Hall
Martin H P Bott: **The interior of the Earth**. Edward Arnold
Condie K C: **Plate Tectonics and Crustal Evolution**.
Strahler: **Earth Science**.
Gutenberg Beno: **Internal Constitution of the Earth**. Dover

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CLASS: M.Sc. PREVIOUS
SUBJECT: - GEOLOGY
PAPER TITLE: SECOND: STRUCTURAL GEOLOGY (T-102)
SEMESTER: FIRST
DATE: 05.03.2016

Unit – 1

Rock failure: Mechanical principles of rock deformation, factors controlling behavior of material. Concept of stress and strain in two and three dimension, progressive deformation. Mohr circles. Symmetry concept in deformation. Unconformities: types and recognition. Progressive deformation – simple and pure shear.

Unit – 2

Geometry of folds surface: single and multi – layered. Super – imposed folding. Classification of folds. Types of folds. Recognition of folds. Effects of folds on outcrops.

Unit – 3

Geometry of faults. Classification and types of faults. Slips, separation, Recognition of faults. Causes of faulting. Mechanics of faulting.

Unit – 4

Origin , kind and their relation to other structures: fractures and joints, lineation, Foliation, Rock cleavages and schistosity.

Unit – 5

Mechanics of folding and faulting. Tectonic Fabrics. Magma Tectonics: emplacement of plutons, origin of Ring Dykes and Cone Sheets.

Reference:

- Bayly B 1992: **Mechanics in Structural Geology**. Springer-Verlag
Davis G H 1984: **Structural Geology of Rock & Region**. John Wiley
Ghosh S K 1995: **Structural Geology of Fundamental of Modern Developments**.
Hubert M K 1972: **Structural Geology**. Hafner Publications co. New York
Moore E & Twiss R J 1995: **Tectonics**. Freeman Pergamon Press
Price NJ and Cosgrove J W 1990: **Analysis of Geological Structure**. Cambriage University Press
Hobbs, Means & Williams: **An Outline of Structural Geology**
Fairhurst: **Rock Mechanics**. Pergamen Press
Whitten E H T: **Structural Geology of folding Rocks**
Ramsey J.G. & Huber M.I. 1987: **Modern Structura Geology**, Academic Press
Valdiya K.S. 1998 : **Tectonics and Sedimentation**, University Press
Billings M.P. 2000: **Structural Geology**

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CLASS: M.Sc. PREVIOUS
SUBJECT: - GEOLOGY
PAPER TITLE: THIRD: Mineralogy & Geochemistry (T-103)
SEMESTER: FIRST
DATE: 05.03.2016

Unit – 1

Classification of Silicate structure. Polymorphism, isomorphism & Exsolution. Atomic structure & mineralogical properties of the following: Sulfides (AX, A₂X & AX₂), Oxides (XO, X₂O, XO₂ & X₂O₃) types; Sulfates (Hydrous & anhydrous); Carbonates (Calcite, aragonite & dolomite).

Unit – 2

Atomic structure, chemistry, physical - optical properties & paragenesis of olivine, garnet, pyroxene, amphibole, mica, epidote & chlorite group minerals.

Unit – 3

Atomic structure, chemistry, physical & optical properties of feldspar, feldspathoid, quartz, zeolite & aluminum silicate (Kyanite, sillimanite & andalucite) group minerals. Precious & semiprecious stones occurrences & distributions.

Unit- 4

Principles of optics, double refraction, optical classification of minerals, optic sign, determination of refractive index, determination of interference color & indicatrices.

Unit – 5

Concept of geochemistry & geochemical cycle, geochemical classification of elements, composition of Earth, Law of thermodynamics, principle of ionic substitution in minerals & radioactivity.

Reference books:

Deer, WA; Howie, RA & Zussman J. (1996): Rock Forming Minerals.

Mason B. (1991): Principle of Geochemistry.

Dana: Text book of Mineralogy.

Phillips WR: Optical Mineralogy.

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CLASS: M.Sc. PREVIOUS
SUBJECT: - GEOLOGY
PAPER TITLE: FOURTH: GEOMORPHOLOGY (T-104)
SEMESTER: FIRST
DATE: 05.03.2016

Unit – 1

Concept of Geomorphology principles and their significance. Cycle of Erosion, Davis' and Plank' Cycle of Erosion. Slope Forming Processes: Landslides, Soil Creep and Solifluction.

Unit – 2

Fluvial Agency: Types Of Rivers, Valley Development – Base Level And Its Verities, Graded Streams, Cross Profiles Of Valleys. Classification of Valleys. Drainage Patterns and Their Significance. Erosion Landforms and Depositional Landforms Of Streams.

Unit – 3

Glaciers: Types of Glaciers, Regime of Glaciers, Nourishment of Glaciers, Wastage of Glaciers. Major features resulting from Glacial Erosion and Glacial Deposition. Glacio-Fluvial Features. Aeolian Agency, Topographic Effects of Wind Erosion. Landforms of Aeolian Deposition. Piedmonts and Piedmont Problems. Arid Cycle of Erosion.

Unit – 4

Karst Topography: Important Areas Of Karst. Conditions Essential for Development Of Karst, Features Characteristic Of Karst Region. Origin of Limestone Caverns. Karst Geomorphic Cycle. Marine Erosion. Topographic Feature Resulting From Marine Erosion and Marine Depositions. Classification of Coasts.

Unit – 5

Morphometric Analysis of Terrain and Its Significance. Morphometric Analysis of Drainage Basin And Its Significance. Statistical Correlation Methods For Interpretation. The Organization of Drainage System.

References:

Holmes, Doris Land Arthur: Holmes' Principles of Physical Geology. Wiley
Thornbury, W D: Geomorphology. Wiley
Small, R J: Study of Landforms. Cambridge
Von Engelen, O D: Geomorphology Systematic and regional. MacMillan
Savinder Singh: Geomorphology
Mathew Fontaine maury: The Physical geography of the Sea. Harvard Univ Press
David Lang: The Earth System. Brown Publishers
Halis, J R: Applied Geomorphology.

Sum
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CLASS: M.SC. PREVIOUS
SUBJECT: GEOLOGY
PAPER TITLE: FIRST :IGNEOUS AND METAMORPHIC PETROLOGY(T-201)
SEMESTER: SECOND
DATE: 05-03-2016

Unit-1

Origin of magma. Factors affecting Magma composition. Evolution of magma by Differentiation and Assimilation. Phase Equilibria of Monary (Silica), Binary (Mixed and Eutectic) and Tertiary (Ab – An – Fa – Silica) Silicate Systems.

Unit-2

Classification of igneous rocks including IUGS system. Reaction principle .Reaction Series. Textures of igneous rocks and interpretation of crystallisation history. Layered igneous structures. Petrographic provinces.

Unit-3

Origin of Granite: magmatic and Granitisation Process. Petrogenesis, Petrography and Indian Occurrences of Basalt, Andesite, Carbonatite, Alkaline and Ultra Mafic rocks.

Unit-4

Agents of metamorphism. Kinds of metamorphism. Types of metamorphism. Metamorphic differentiation. Structures and textures of metamorphic rocks. Concept of metamorphic zones, metamorphic zones in contact aureoles.

Unit-5

Metamorphic grades, facies and facies series. Facies classification. Metasomatism and their types. Origin and types of migmatites. Metamorphism of carbonates, Pelites, mafic rocks. Charnokites and Khondalites.

Suggested Readings:

- Best, M.G. 1986:** Igneous and Metamorphic Petrology, CBS Publ.
Bose, M.K. 1997: Igneous Petrology, World Press
Butcher, K & Frey, M. 1994: Petrogenesis of Metamorphic Rocks, Springer – Verlag
Kretz, R. 1994: Metamorphic Crystallisation, John Wiley
Mc Birney, A.R. 1993: Igneous Petrology, Jones and Bartlet Publ.
Phillipots, A. 1992: Igneous and Metamorphic Petrology, Prentice Hall.
Turner, F.J. 1980: Metamorphic Petrology, Mc Graw Hills
Yardley, B.W. 1989: An Introduction to Metamorphic Petrology, Longman
Winkler, HGF: Petrogenesis of Metamorphic Rocks, Springer Verlag
Miyashiro, A: Metamorphism and Metamorphic rocks. George Allen and Unwin
Wyllie, PJ: Ultramafic Rocks. P J Heffer
Baily, B: Introduction to Petrology. Prentice Hall
Huang, V J: Petrology.
Chatterjee S.C.: Petrology

CLASS: M.SC. PREVIOUS
SUBJECT: GEOLOGY
PAPER TITLE: SECOND: SEDIMENTOLOGY (T-202)
SEMESTER: SECOND
DATE: 05-03-2016

Unit-1

Process of sedimentation, Fluid Flow, Origin of Sediments. Modes of Transport of Sediments. Stoke's Law of Sediments. Classification and Nomenclature of the Common Sediments (rudites, arenites and argillites). Classification of Sedimentary Rocks.

Unit-2

Origin, Classification and Significance of Primary, Secondary and Organic Sedimentary Structures. Paleo-current Significance in Quality Assessment. Classification of Sandstone, Limestone and Dolomite.

Unit-3

Textures of Sedimentary Rocks and Their Genetic Significance. Granulometric Analysis of Clastic Particles, Statistical Measure and Interpretation of Nature of Sediments. Diagenesis.

Unit-4

Elements and Types of Depositional Environments: Continental (Fluvial, Lacustrine, Aeolian and Glacial), Transitional and Marine Environments, Evaporites and Volcano - Clastic Sediments.

Unit-5

Provenance and Mineral Stability. Concept and Types of Sedimentary Provenance. Heavy minerals: Their separation and Utility in the Provenance Analysis. Tectonic Framework of Sedimentation (Kay's Classification of Tectonic Elements). Cyclotheme.

Suggested Readings:

Allen, P. 1997: **Earth Surface Processes**. Blackwell
Davis, R A, 1992: **Depositional Systems**. Prentice Hall
Einsels, G 1992: **Sedimentary Basins**. Springer Verlag
Miall AD, 2000: **Sedimentology and Stratigraphy**. Blackwell
Reading H G. 1996: **Sedimentary Environments**. Blackwell
Sengupta, S. 1997: **Introduction to Sedimentology**. Oxford IBH
Pettijohn, F J: **Sedimentary Petrology**.
Thompson and Collision: **Sedimentary Structures**.
Pettijohn, Potter and Seiver: **Sand and Sand stones**.
Sukhtankar RK (2004): **Applied Sedimentology**.

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CLASS: M.Sc. – PREVIOUS
SUBJECT: - GEOLOGY
PAPER TITLE: Third: Stratigraphy (T-203)
SEMESTER: Second
DATE: 05.03.2016

Unit – 1

Criteria for the Stratigraphic classification and correlation. Litho, Bio and Chrono - stratigraphic units. Magneto-stratigraphy. Sequence Stratigraphy. Geological time - Scale. Orogenic cycles in the Indian Stratigraphy. Tectonic framework of India. Geological column of Indian Stratigraphy.

Unit – 2

Ice-ages in the Indian Stratigraphy: Precambrian, Permo-Carboniferous and Pleistocene ice ages, their evidences. Archaean (Azoic) History of India: Distributions and stratigraphy of the Archeans of South India, Madhya Pradesh, Rajasthan, Jharkhand and Orissa.

Unit – 3

Precambrian (Proterozoic) History of India: Distribution and stratigraphy of the Cuddapah and Vindhyan Super Groups. Palaeozoic history: Distributions and stratigraphy of Salt Range and Spiti. Origin and age of Saline Formation. Precambrian – Cambrian Boundary problem.

Unit - 4

Mesozoic history : Distributions and Triassic of Spiti, Jurassic of Cutch (Kachchh) and Cretaceous of South India. Bagh beds. Lameta beds. Deccan Traps. Permo - Triassic Boundary problem.

Unit – 5

Palaeoclimate, classification, distribution and stratigraphy of the Gondwana Super Group. Cenozoic history : Tertiary of Assam, its economic importance. Siwaliks and its vertebrate fossil record. K-T Boundary.

Reference books:

- Boggs Sam Jr 1995:** Principles of Sedimentary and Stratigraphy. Prentice Hall
Krishnan, M S: Geology of India and Burma. Higginbothams, Madras
Ravindra Kumar: Historical Geology and Stratigraphy of India. John Wiley
Wadia, D N : Geology of India. MacMillan & Co
Doyle and Brennet MR 1996: Unlocking the Stratigraphy: Concepts and Application. Prentice Hall.

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CLASS: M.Sc. – PREVIOUS
SUBJECT: - GEOLOGY
PAPER TITLE: Fourth : Palaeobiology (T-204)
SEMESTER: Second
DATE: 05.03.2016

UNIT – 1

Modes of fossilization, uses of fossils, Classification, evolution, geological history of: Trilobites, Graptolites, Echinoids and Corals.

UNIT – 2

Classification, evolution, geological history of the following: Brachiopoda, Gastropoda, Lamellibranchia and Cephalopoda.

UNIT - 3

Succession of the Vertebrate Life through the geologic time. Evolutionary history of Human, Elephant and Horse.

UNIT – 4

Micropaleontology : Classification, separation of microfossils. Applications of microfossils in fossil fuel exploration, Morphology and geological history of foraminifera.

UNIT – 5

Concept of Palaeobotany and Palynology. Plant life through ages. Characteristic features of Lower Gondwana flora. Characteristic features of Upper Gondwana flora.

Referenes:

Moore, Lalicher and Fischer: **Invertebrate Paleontology.**

Woods, Henry: **Invertebrate Paleontology.**

Clarkeson ENK 1998 : **Invertebrate Paleontology and Evolution.** Blackwell

Stearn CW and Carrol RL 1989: **Paleontology – the Record of Life.** John Wiley

Smith AB 1994: **Systematics and the Fossils Record- Documenting Evolutionary Patterns.** Blackwell

Prothero DR 1998: **Bringing Fossils to Life: An Introduction to Palaeobiology.** McGraw

Anantharaman and Jain: **Textbook of Paleontology.**

Banner F T and Lord A R: **Aspects of Micropalaeontology.**

Roger A S: **Vertebrate Palaeontology.**

Jones D J: **Microfossils.**

Glassner M P: **Principles of Micropalaeontology.**

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CLASS: M.Sc. – FINAL
SUBJECT: - GEOLOGY
PAPER TITLE: Second: ENGINEERING GEOLOGY (T- 301)
SEMESTER: Third
DATE: 05.03.2016

UNIT - 1

Importance of geology in civil engineering Projects. Merits and demerits of civil engineering in folds, faults and joints affected area. Engineering properties of rocks.

UNIT - 2

Tunnel: Terminology and Types, Geological Considerations for Tunneling in different Grounds. Lining of Tunnels. Highways- Geological considerations for construction of highways.

UNIT - 3

Dam and its parts: Types of dam. Geological considerations for the selection of a dam site and reservoir. Problems related to failure of Dams. Grouting.

UNIT - 4

Bridge: Types and Geological considerations. Canals: Geological considerations and lining.

UNIT - 5

Landslide : causes, effects and prevention. Consideration of civil engineering in seismic areas. Geo-hazards: mitigation and management.

References :

Bell F G, 1999 : **Geological Hazards**. Rout ledge
Blyth FCH : **Geology for Engineers**. Arnold Ltd.
Kesavulu NC : **Textbook of Engineering Geology**. Mc Millan
Khurmi RS : **Fundamental of Engineering Geology**. Dhanpat Rai and sons
Krynine & Judd, Principles of Engineering Geology

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CLASS: M.Sc. – FINAL
SUBJECT: - GEOLOGY
PAPER TITLE: Third: Ore Geology (T-302)
SEMESTER: Third
DATE: 05.03.2016

UNIT – 1

Relation of magma to mineral deposits. Geological thermometers. Ore genesis. Control of ore deposits. Paragenesis and zoning in mineral deposits.

UNIT – 2

Processes of Mineral Deposits: Magmatic concentration, Contact Metasomatism, Hydrothermal and Volcano-genetic deposits.

UNIT – 3

Processes of Mineral Deposits: Sedimentary, Placer, Residual and Oxidation and Supergene Enrichment. Ore Microscopy : Textures and Structures of Ores.

UNIT – 4

Origin, mode of occurrence, association. Uses and Indian occurrences of the ores of Iron, Manganese, Chromium, Nickel, Copper, Lead, Zinc, Aluminium, Tin, Tungsten and Gold.

UNIT – 5

Origin, Mode of Occurrence, Association, Specification and grades for uses in Industries and Indian occurrences of the non-metallic minerals – Mica. Asbestos, Barite, Graphite, Gypsum. Minerals used in Fertilizers and Cement Industries.

References:

- Bateman, 1981: **Economic Mineral Deposits**. Wiley
Deb. S. : **Industrial Minerals**
Evans.JM 1993: **Ore Geology and industrial Minerals**. Blackwell
Krishnaswamy: Mineral Resources of India
Stanton R.L. 1972: Ore Petrology. Mc Graw Hill
Srivastava J.P. & Rani N. Ore Geology

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CLASS: M.Sc. – FINAL
SUBJECT: - GEOLOGY
PAPER TITLE: Fourth : MINERAL EXPLORATION (T-303)
SEMESTER: Third
DATE: 05.03.2016

UNIT – 1

Geological criteria (ore-guides) for mineral prospecting, Methods of geological exploration: exploratory grids pits, trenches, well logging in evaluation of deposits.

UNIT - 2

Sampling types and methods. Assaying by channel sampling and placer sampling underground mining sampling. Calculation of ore reserves.

UNIT – 3

Classification and principles of geophysical methods: - Electrical methods and Magnetic methods.

UNIT – 4

Gravity methods : Earth's gravity fields, regional and local gravity anomalies, Interpretation of gravity anomalies for mineral deposits. Seismic methods; Elastic properties of rocks, types of elastic waves (P, S, L waves), Refraction and reflection methods, Time-distance relation for horizontal interface.

UNIT - 5

Geochemical Exploration: Geochemical cycle, Mobility of elements, Path finder elements, Mode of occurrence of trace elements, Primary dispersion patterns, Syngenetic and Epigenetic diffusion. Sampling technique for geochemical exploration.

References:

Arogyaswamy RNP, 1996: **Courses in Mining Geology**. 4th Oxford IBH
Dobrin MB. 1976: **Introduction to Geophysical Prospecting**. Mc Graw Hills
Ginzburg i.I : **Principles of Geochemical Prospecting**. Pergamon London
Hawkes H and Wobb JS : **Geochemistry in mineral Exploration**. Harper NY
Holson GD and Tiratsoo EN, 1985: **Introduction to petroleum Geology**. Gulf Pubi

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CLASS: M.Sc. – FINAL
SUBJECT: - GEOLOGY
PAPER TITLE: First: Photogeology and Remote Sensing (T-304)
SEMESTER: THIRD
DATE: 05.03.2016

UNIT – 1

Introduction to aerial photography. Types of aerial photos. Geometric principles of photographs – relief and tilt displacement, Vertical Exaggeration and distortions. Measurements from Aerial Photographs. Scale, Distance, Area and Height.

UNIT – 2

Preparation of Photo-geologic Maps. Mosaic controlling factors of aerial photograph. Flight plan, area, purpose time and season of photography. Introduction to overlap, sidelap, drift, crab, fiducial marks. Elements of Interpretation of aerial photographs.

UNIT – 3

Electro-Magnetic spectrum. Space platforms. Reflectance of minerals. Vegetation, rocks and water. Elementary idea about active and passive sensors. Introduction to IRS mission.

UNIT – 4

Multispectral scanners (MSS). Thematic Mappers (TM). Linear imaging self scanning (LISS). Elementary idea about image processing concept of Geographic Information System (GIS).

UNIT – 5

Applications of photo Geology and Remote sensing in the study of Geomorphology, Lithology and Structural Features and Hydrogeologic studies.

References :

- Curran P J, 1985 : **Principles of Remote Sensing**. ELBS/Longman
Drury SA, 1987 : **Image Interpretation in Geology**. Allen and Unwin
Miller V.C. 1961 Photogeology
Pandey S.N. 2001 Principles and Applications of Photogeology.
Tripathi & Bajpai 2000. Remote Sensing In Geosciences.

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CLASS: M.Sc. - Final
Subject: GEOLOGY
Paper Title: FIRST: FUEL GEOLOGY (T-401)
Semester: FOURTH
DATE: 05.03.2016

Unit-1

Origin of Coal. Physico-Chemical Characterization: Proximate and Ultimate Analysis Rank and Varieties of coal. Macroscopic Ingredients and Microscopic Constituents (Lithotypes, Maceral, and Microlithotypes).

Unit-2

Indian and International Classification of Coal. Preparation of Coal for Industrial Purpose (Washing), Carbonization (Coke Manufacturing), Gasification and Hydrogenation, Briquetting of Coal.

Unit-3

Geological Features of Coal Seams. Geology of the productive coal fields of India. Methods of Coal Prospecting. Estimation of Coal Reserve. Elementary idea about Coal Mining Methods. Coal Bed Methane.

Unit-4

Origin, Migration and Accumulation (oil-traps) of Petroleum and Natural Gas. Kerogene. Geology of the Productive Oil Fields of India. Position of Oil and Natural Gas in India.

Unit-5

Atomic minerals: mode of occurrence, association and distribution in India. Methods of Prospecting, Productive Horizons in India, Nuclear Power Stations of the Country and Future Prospects.

Suggested Readings :

Durance EM, 1986: Radioactivity in Geology: Principles and Applications. Ellis H
Holson GD and Tiratsoo E N, 1985: Introduction of petroleum Geology. Gulf Pub
Nettleton L L: Geophysical Prospecting for Oil
North FK 1985: Petroleum Geology. Allen and Unwin
Selley RC, 1998: Elements of Petroleum Geology. Academic Press
Singh MP 1998: Coal and Organic Petrology. Hindustan Publications ND
Tissot BP and Welt DH 1984: Petroleum Formation and Occurrence. Springer Verlag
Stach et. al 1982. Textbook of Coal Petrology.
Thomas, L.: Coal Geology. Wiley & Sons.

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Class M.Sc.- FINAL
Semester IV
Subject GEOLOGY
Paper Title SECOND: MINING AND MINERAL DRESSING (T-402)
DATE: 05.03.2016

Unit-1

Mining terminology, mine supports, subsidence, shaft and shaft sinking. Breaking of rocks. Percussion and Rotary drilling methods. Classification of mining methods.

Unit-2

Alluvial mining, Open-cast mining & Underground mining (other than coal mining): Stopping methods-open stopes, timbered stopes, shrinkage stopes, slicing system and caving. Mine atmosphere: mine ventilation, pumping of mine water.

Unit-3

Coal mining methods: Board and Pillar methods, Long Wall methods. Strip mining. Haulage and winding.

Unit-4

Mineral Dressing: Physical properties of minerals utilized in mineral dressing. Crushers: Primary and secondary crushers. Grinding mills. Rod mills, ball mills, autogenous mills.

Unit-5

Industrial screening: Types of screens. Gravity separation. Heavy – medium separation. Magnetic separation. Froth Floatation technique of separation of sulfide ores.

Suggested Readings :

Arogyaswamy RNP: Courses of Mining Geology. Oxford & IBH

Gaudin: Principles of Mineral Dressing. McGraw Hill

Lewis: Elements of Mining.

Mc Kinstry HE: Mining Geology. Prentice Hall

Richards and Looke: Text Book of Ore Dressing. McGraw Hill

Roberts: Elements of Ore Dressing.

Taggart: Mineral Dressing.

Young: Elements of Mining Geology.

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Class: M.Sc. Final
Semester: Fourth
Subject: Geology
Paper Title: Third: Hydrogeology (T-403)
Date: 05.03.2016

Unit-1

Distribution of water: surface and subsurface, importance of ground water. Introductory idea to type of water. Hydrological cycle, Evaporation, Condensation, Precipitation and its types. Ground water: Origin, importance, occurrences. Infiltration and percolation, Groundwater provinces of India.

Unit-2

Geological factors governing the occurrence of ground water. Porosity, permeability, specific yield, specific retention, hydraulic conductivity, storage coefficient, aquifers and their classification.

Unit-3

Groundwater flow: confined, unconfined, steady, unsteady, and radial flow. Forces causing flow. Darcy's Law. Water level fluctuation: causative factors and their measurements. Elementary idea about pumping test.

Unit-4

Ground water quality: Physical characteristics: Turbidity, colour, taste, odour, temperature and specific conductivity. Chemical characters: TDS and suspended solids, pH value, hardness, heavy metals and dissolved gases. Biological characteristics. Water contaminants and pollutants. Radioisotopes in Hydrogeological Studies.

Unit-5

Geophysical methods of groundwater exploration- Wenner and Schlumberger methods, Salt water intrusion in coastal aquifers, remedial measures. Water harvesting & artificial recharge methods, elementary idea about groundwater development & conservation, conjunctive use of surface and ground water.

Suggested readings:

Davis S.N. and Dewiest R.J.M., 1966: Hydrogeology. John Wiley
Fetter CW, 1990: Applied Hydrogeology. Merrill
Freeze RA & Cherry JA, 1979: Ground water. Prentice Hall
Karanth, K.R., 1994 Groundwater Assessment, Development and Management.
Todd, D.K. 1980: Groundwater Hydrology. John Wiley and Sons.
Raghunath H.M. - Hydrology
Karanth- Hydrogeology
C.F. Tolman- Groundwater
Herman Bouver- Groundwater Hydrology
R.H. Brown and others - Groundwater Studies
Van te Chew- Hand book of Applied Hydrology
Gautham Mahajan- Groundwater Survey and Investigation

19/2/17

19/2/17

Sy 19/2/17
19/10/16

Class: M.Sc. - FINAL
Semester: IV
Subject: GEOLOGY
Title: FOURTH: PROJECT BASED ON FIELD WORK (T-404)
DATE: 05.03.2016

THE FIELD WORK INCLUDES

- SURVEYING
- MAPPING- STRUCTURAL
STRATIGRAPHY
ECONOMIC GEOLOGY
MINING
- SAMPLING
- SAMPLE ANALYSIS
- INTERPRITATION OF DATA

BASED ON ABOVE FIELD OBSERVATIONS A PROJECT REPORT WILL BE SUBMITTED FOLLOWED BY COMPREHENSIVE VIVA VOCE EXAMINATION.

SoS (52/10/17)

JS 19/10/16

KS 21/7/17

JS 21/7/17

Open Elective Paper T-405

Name: Fundamentals of Geology

Marks: 30 (20+10)

3 Credits

Unit - 1: Universe and Solar System
<ul style="list-style-type: none">- Universe and its origin- Galaxy, nebula and Solar System- Solar System and its Planets- Planet Earth – its origin and Structures
Unit - 2: Physiography of Earth
<ul style="list-style-type: none">- Physical Structure of earth- Earth Atmosphere- River, Lake and Ocean- Mountains, Plateaus, Valleys
Unit - 3: Rocks and Minerals
<ul style="list-style-type: none">- Rocks – type and their formation- Minerals – Silicate group, Non – Silicate Group- Precious and Semi -precious Stone- Industrial Uses
Unit - 4: Earth Natural Resources
<ul style="list-style-type: none">- Important Mineral and Metal Deposits- Atomic Minerals- Energy (Fuel) Minerals- Renewable/Non – renewable Minerals
Unit - 5: Applied Earth Science
<ul style="list-style-type: none">- Basics of applied Earth Science and its relation with other subjects- Geoarchaeology, Palaeobiology- Engineering and Military Science- Medical Geology

15/2
2/17/17

15/2
2/17/17