

Swami Vivekanand University, Sagar (M.P.)

As per model syllabus of U.G.C. New Delhi, drafted by
Central Board of Studies and Approved by Higher
Education and the Governor of M.P.



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Faculty of Science

Syllabus & Prescribed Books

Subject- Geology

M.Sc. Semester Examination

2016-18

I to IV Semester

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COURSEWISE SCHEME

Ist SEMESTER

1. Course Code	: MSCGEO	5. Total Practical	: 2
2. Course Name	: M.Sc. Geology	6. Total Practical Marks	: 100
3. Total Theory Subject	: 4	7. Total Marks	: 300
4. Total Theory Marks	: 200	8. Minimum Passing Percentage	: 36

Sub. Code	Subject Name	Theory										Practical		Total	
		Paper					CCE		Total Marks			Max.	Min.	Max.	Min.
		1st	2nd	3rd	Max.	Min.	Max.	Min.	Max.	Min.					
Compulsory															
MSCGEO 101	Geodynamics	42	0	0	42	15	8	3	50	18	0	0	50	18	
MSCGEO 102	Structural Geology	42	0	0	42	15	8	3	50	18	0	0	50	18	
MSCGEO 103	Geomorphology	42	0	0	42	15	8	3	50	18	0	0	50	18	
MSCGEO 104	Mineralogy & Geochemics	42	0	0	42	15	8	3	50	18	0	0	50	18	
MSCGEO 105	Practical-I Structural Geology	0	0	0	0	0	0	0	0	0	50	18	50	18	
MSCGEO 106	Practical-II Mineralogy and Geomorphology	0	0	0	0	0	0	0	0	0	50	18	50	18	



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**Department of Higher Education, Govt. of M.P.
Semester wise Syllabus for Postgraduates
As recommended by Central Board of Studies and
Approved by HH the Governor of M.P.**

CLASS : M.Sc. PREVIOUS
SUBJECT : GEOLOGY
PAPER TITLE: FIRST : GEODYNAMICS
SEMESTER: FIRST

Unit-1

Earth's surface features. Seismology: seismic waves, intensity and isoseismic lines, earthquake belts, Earthquake zones 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, Palaeo-magnetism.

Unit-3

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

Unit-4

Continental drift: Development of the concept, Taylor's and Wegner's theories of continental drift. Evidences of continental drift and polar wandering. Sea floor spreading. Morphological features of ocean floor.

Unit-5

Concept of plate tectonics. Types of plate boundaries, features of convergent and divergent boundaries. Ophiolite suites, Arc-Trench system, volcanic mountain chain. Triple junctions and their stability. Causes of plate motion. Origin of the Himalayas

References:

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



**Department of Higher Education, Govt. of M.P.
Semester wise Syllabus for Postgraduates
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CLASS : M.Sc. PREVIUOS
SUBJECT : GEOLOGY
PAPER TITLE: SECOND : STRUCTURAL GEOLOGY
SEMESTER: FIRST

UNIT-1

Rock failure: Mechanical principles of rock deformation, factors controlling behavior of material. Concept of stress and strain analysis in two and three dimensions. Progressive deformation. Mohr circles. Symmetry concept in deformation. Unconformities: types and recognition .

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.

UNIT-4

Origin, kinds 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 Rocks and Region.** John Wiley
Ghosh S K 1995: **Structural Geology Fundamentals of Modern Developments.**
Hubert MK 1972: **Structural Geology.** Hafner Publ Co. New York
Moore E and Twiss RJ 1995: **Tectonics.** Freeman Pergamon Press
Price NJ and Cosgrove JW 1990: **Analysis of Geological Structure.** Cambridge University Press
Hobbs, Means and Williams: **An Outline of Structural Geology.**
Badgeley P C: **Structural Geology for the Exploration Geology.**
Fairhurst: **Rock Mechanics.** Pergamen Press
Whitten E H T: **Structural Geology of Folding Rocks.**



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Semester wise Syllabus for Postgraduates
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CLASS : M.Sc. PREVIOUS
SUBJECT : GEOLOGY
PAPER TITLE: THIRD : GEOMORPHOLOGY
SEMESTER: FIRST

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 varieties, graded streams, Cross profiles of valleys. Classifications of valleys. Drainage Patterns and their significance. Erosion landforms and depositional landforms of streams.

UNIT 3

Glaciers: Types of Glaciers, Regimen of Glaciers, nourishment of glaciers, wastage of glaciers. Major features resulting from glacial erosion and glacial deposition. Glacio-fluvial features. Eolian 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 L and 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**.



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CLASS : M.Sc. PREVIOUS
SUBJECT : GEOLOGY
PAPER TITLE: FOURTH : MINERALOGY AND GEOCHEMISTRY
SEMESTER: FIRST

UNIT-1

Atomic structure, mineralogical properties and mode of occurrence of the following : -i. Sulfides: (AX, A₂X, and AX₂ Types), Oxides (XO, X₂O, XO₂ X₂O₃ and XY₂O₄ types) ii. Sulfates (anhydrous and hydrous) and, iii. Carbonates (calcite, aragonite, and dolomite groups). Classification of silicate structures. Isomorphism, Polymorphism, Exsolution .

UNIT-2

Atomic structure, chemistry, physical, and optical properties of the following rocks forming mineral groups: Feldspar, Feldspathoid, Pyroxene, Amphibole, Mica and Zeolite.

UNIT-3

Atomic structure, chemistry, physical and optical properties of the following rock forming mineral groups: Garnets, Olivine, Quartz and its varieties, Epidote, Chlorite, and Alumino-silicates (Kyanite, Sillimanite and Andalusite), Precious and Semi-Precious Stones .

UNIT-4

Principles of optics, Double refraction, Optical classification of minerals, Birefringence, Determination of Refractive Index, Uniaxial and Biaxial Indicatrix, Determination of interference colours and interference figures, Optic Sign .

UNIT-5

Geochemical classification of elements, Radioactive decay scheme of U-Pb, Rb-Sr, K-Ar, & Sm-Nb, Laws of Thermodynamics, Concept of geochemical cycle, Principles of ionic substitutions in mineral, Composition of the Earth .

Reference: -

Gribble, CD.1993: Rutley's **Elements of Mineralogy**.
Deer, WA; Howie, RA and Zussman, J 1996: **Rock forming minerals**. Longman
Henderson, P. 1987: **Inorganic Chemistry**, Pergamon press.
Phillips, WR and Griffin DT; 1986: **Optical mineralogy**.
CBS
Klein, C and Hurlbut, CS. 1993 **Manual of mineralogy**. John
Wiley. Mason, B 1991: **Principles of Geochemistry**.
Hoefs, j 1980: **Stable Isotope Geochemistry**. Springer Verlag
Brian Mason: **Principles of Geochemistry**.
Anderson: **Geochemistry**
Dana : **Textbook of Mineralogy**



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CLASS : M.Sc. PREVIUOS
SUBJECT : GEOLOGY
SEMESTER : Ist
PAPER TITLE: PRACTICAL – 1 : STRUCTURAL GEOLOGY
PRACTICAL – 2 : MINERALOGY AND GEOMORPHOLOGY



COURSEWISE SCHEME

IInd SEMESTER

1. Course Code	: MSCGEO	5. Total Practical	: 2
2. Course Name	: M.Sc. Geology	6. Total Practical Marks	: 100
3. Total Theory Subject	: 4	7. Total Marks	: 300
4. Total Theory Marks	: 200	8. Minimum Passing Percentage	: 36

Sub. Code	Subject Name	Theory									Practical		Total	
		Paper					CC E		Total Marks		Max.	Min.	Max.	Min.
		1st	2nd	3rd	Max.	Min.	Max.	Min.	Max.	Min.				
Compulsory														
MSCGEO 201	Igneous and Matamorphics Petrology	42	0	0	42	15	8	3	50	18	0	0	50	18
MSCGEO 202	Sedimentology	42	0	0	42	15	8	3	50	18	0	0	50	18
MSCGEO 203	Stratigraphy of India	42	0	0	42	15	8	3	50	18	0	0	50	18
MSCGEO 204	Plaeobilogy	42	0	0	42	15	8	3	50	18	0	0	50	18
MSCGEO 205	Practical-I Petrology	0	0	0	0	0	0	0	0	0	50	18	50	18
MSCGEO 206	Practical-II Palaeontology and Stratigraphy	0	0	0	0	0	0	0	0	0	50	18	50	18



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CLASS : M.Sc. PREVIOUS
SUBJECT : GEOLOGY
PAPER TITLE: FIRST : IGNEOUS AND METAMORPHIC PETROLOGY
SEMESTER: SECOND

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 Ternary (Ab – An – Di), (Fo – 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 processes. 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 . Charnockites and Khondalites .

References: -

- Best, M.G. 1986: **Igneous and Metamorphic Petrology**, CBS Publ.
Bose, M.K. 1997: **Igneous Petrology**, World Press
Bucher, K & Frey, M. 1994: **Petrogenesis of Metamorphic Rocks**, Springer-Verlag
Kretz, R. 1994: **Metamorphic crystallization**, 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, P.J: **Ultramafic Rocks**. P J Heffer
Baily, B: **Introduction to Petrology**. Prentice Hall
Huang, V J: **Petrology**.



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CLASS : M.Sc. PREVIOUS
SUBJECT : GEOLOGY
PAPER TITLE: SECOND : SEDIMENTALOGY
SEMESTER: SECOND

UNIT-1

Processes 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. Palaeocurrent significance in quality assessment. Classification of sandstone and limestone. Dolomite.

UNIT-3

Textures of sedimentary rocks and their genetic significance. Granulometric analyses 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, Evaporates, 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 analyses. Tectonic framework of sedimentation (Kay's classification of tectonic elements). Cyclothem .

Reference:-

- 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: **Principles of Sedimentary Basin Analysis**. Springer Verlag
Nichols, G. 1999: **Sedimentology and Stratigraphy**. Black well
Reading H G. 1996: **Sedimentary Environments**. Black well
Sengupta, S 1997: **Introductions of Sedimentology**. Oxford IBH
Pettijohn, F J: **Sedimentary Petrology**.
Thompson and Collison: **Sedimentary Structures**.
Pettijohn, Potter and Seiver: **Sand and Sandstones**.



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CLASS : M.Sc. PREVIUOS
SUBJECT : GEOLOGY
PAPER TITLE: THIRD: STRATIGRAPHY OF INDIA
SEMESTER: SECOND

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 the 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 Archaeans 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 : Distribution and stratigraphy of Triassic of Spiti, Jurassic of Cutch (Kachhh) 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 .

References :

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 H



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Semester wise Syllabus for Postgraduates
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CLASS : M.Sc. PREVIOUS
SUBJECT: GEOLOGY
PAPER TITLE: FOURTH : PALAEOBIOLOGY
SEMESTER: SECOND

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 geological time. Evolutionary history of Human, Elephant and Horse.

UNIT – 4

Micropaleontology: Classification, separation of microfossils. Application 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.

References:

- Moore, Lalicher and Fischer: **Invertebrate Palaeontology**.
Woods, Henry: **Invertebrate Palaeontology**.
Clarkeson ENK 1998: **Invertebrate Palaeontology and Evolution**. Blackwell
Stearn CW and Carrol RL 1989: **Palaeontology -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
Ananthraman and Jain: **Textbook of Palaeontology**.
Banner FT and Lord A R: **Aspects of Micropalaeontology**.
Roger A S: **Vertebrate Palaeontology**.
Jones D J: **Microfossils**.
Glassner M P: **Principles of Micropalaeontology**.
Haq B U and Boersma A: **Introduction to Marine Micropalaeontology**.
Andrew: **Palaeontology**.



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Semester wise Syllabus for Postgraduates
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CLASS : M.Sc. PREVIOUS
SUBJECT : GEOLOGY
SEMESTER : IIND
PAPER TITLE: PRACTICAL – 1 : PETROLOGY
PRACTICAL – 2 : PALAEOLOGY AND STRATIGRAPHY



COURSEWISE SCHEME THIRD SEMESTER

1. Course Code	: MSCGEO	5. Total Practical	: 2
2. Course Name	: M.Sc. Geology	6. Total Practical Marks	: 100
3. Total Theory Subject	: 4	7. Total Marks	: 300
4. Total Theory Marks	: 200	8. Minimum Passing Percentage	: 36

Sub Code	Subject Name	Theory						Practical		Total		
		Paper			CCE		Total Marks		Max.	Min.	Max.	Min.
COMPULSORY		I st	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
MSCGEO 301	Photogeology And Remote Sensing	42	42	15	08	03	50	18	0	0	50	18
MSCGEO 302	Engineering Geology	42	42	15	08	03	50	18	0	0	50	18
MSCGEO 303	Ore Geology	42	42	15	08	03	50	18	0	0	50	18
MSCGEO 304	Mineral Exploration	42	42	15	08	03	50	18	0	0	50	18
MSCGEO 305	Pr. : (I) Photogeology, Remote Sensing And Engineering Geology	-	-	-	-	-	-	-	50	18	50	18
MSCGEO 306	Pr. : (II) Ore Geology And Mineral Exploration	-	-	-	-	-	-	-	50	18	50	18



CLASS : M.SC.
SEMESTER : THIRD
SUBJECT : GEOLOGY
PAPER NO. : FIRST (MSCGEO-301)
TITLE : PHOTO GEOLOGY AND REMOTE SENSING

UNIT - I Introduction to aerial photography. Types of aerial photos. Geometric principles of photographs- relief and tilt displacement, Vertical Exaggeration and distortions. Measurements from Aerial Photographs : Scales, Distance, Area and Height.

UNIT - II 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 - III Electro-Magnetic Spectrum. Space platforms. Reflectance of Minerals, vegetation, rocks and water. Elementary idea about active and passive sensors Introduction to IRS mission.

UNIT - IV Multispectral Scanners (MSS); Thematic Mappers (TM); Linear Imaging self scanning (LISS). Elementary idea about image processing. Concept and application of Geographic information system (GIS).

UNIT - V Application of Photo Geology and Remote Sensing in the study of Geomorphology, Lithology and Structural Features and Hydrogeologic studies.

SUGGESTED READINGS :

- Curra, P.J., 1985 : Principles of Remote Sensing, ELBS/Longman
- Drury, S.A., 1987 : Image Interpretation in Geology, Allen and Unwin.
- Lend, D.R. : Principles and Interpretation of Aerial Photographs.
- Miller, V.C., 1961 : Photo Geology, McGraw
- Pandey, S.N., 2001 : Principles and Applications of Photo Geology, New Age.
- Parry S. Seigal and Alan R : Remote Sensing in Geology.
- Patel, A.N. and Surendra Singh : Principle of Remote Sensing, Scientific Publishers
- Pratt, V.K. : Digital Image Processing.
- Tripathi and Bajpai ed. 2000 : Remote Sensing in Geosciences.
- Wolf : Introduction to Photogrammetry.
- Jenson : Environmental Remote Sensing



CLASS : M.SC.
SEMESTER : THIRD
SUBJECT : GEOLOGY
PAPER : SECOND (MSCGEO-302)
TITLE : ENGINEERING GEOLOGY

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

UNIT - III Dam and its Parts. Types of dam. Geological consideration for the selection of a dam site and Reservoir. Problems related to failure of Dams. Grouting.

UNIT - IV Bridge : Types and Geological considerations. Canals : Geological considerations and lining.

UNIT - V Landslide : Causes, Effects and Prevention. Consideration of civil engineering in seismic areas. Geo-hazards : Mitigation and Management.

SUGGESTED READINGS :

- Bell, F.G., 1999 : Geological Hazards, Rout ledge.
- Blyth, F.C.H. : Geology for Engineers, Arnold Ltd.
- Kesavulu, N.C. : Text Book of Engineering Geology, McMillan.
- Khurmi, R.S. : Fundamental of Engineering Geology, Dhanpat Rai & Sons.
- Krynine and Judd, W.R. : Principles of Engineering Geology and Geotechnics, McGraw
- Parbin Singh : Engineering and General Geology, Katson Publ House.
- Ramnathan, R.M. : Engineering Geology, Anuradha Agency, T.N.
- Richey, J.E. : Elements of Engineering Geology, Sir Issac Pitman & Sons.
- Sumit, K. 1992 : Environmental Hazards, Rout ledge.
- Trefethen, N.C. : T.B. of Geology and Engineering Geology, McMillan.



CLASS : M.SC.
SEMESTER : THIRD
SUBJECT : GEOLOGY
PAPER : THIRD (MSCGEO-303)
TITLE : ORE GEOLOGY

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

UNIT - II Processes of Mineral Deposits : Magmatic concentration, Hydrothermal and Volcano-genetic deposits.

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

UNIT - IV Origin, mode of occurrence, association, uses and Indian occurrences of the ores of Iron, Manganese, Chromium, Copper, Lead, Zinc, Aluminium and Gold.

UNIT - V Origin, Mode of Occurrence, Association, Specification and Grade and distribution for non metallic minerals uses in Industries. Minerals used in Fertilizers and Cement Industries.

SUGGESTED READINGS :

- Bateman, 1981 : Economic Mineral Deposits, Wiley.
- Deb, S. Industrial Minerals.
- Evans, J.M., 1993 : Ore Geology and Industrial Minerals, Blackwell.
- Krishnaswamy : Mineral Resource of India.
- Lamey, Carl, A : Metallic and Industrial Minerals.
- Mookherjee, Ashok, 2000 : Ore Genesis - a holistic approach, Allied
- Mukerjee, 1999 : Non Fuel Mineral Deposits of India, Allied P.
- Stanton, R.L., 1972 : Ore Petrology, McGraw Hills
- Umeshwar Prasad, 2000 : Economic Geology, CBS



CLASS : M.SC.
SEMESTER : THIRD
SUBJECT : GEOLOGY
PAPER NO. : FOURTH (M.SCGEO-304)
TITLE : MINERAL EXPLORATION

UNIT - I Ore-guides for mineral prospecting. Methods of geological exploration : exploratory grids, pits, trenches. Well logging in evaluation of deposits.

UNIT - II Sampling types and methods and Assaying by sampling methods. Calculation and classification of ore reserves. Classification of reserves.

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

UNIT - IV Gravity methods : Earth's gravity fields, 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 - V Geochemical Exploration : Geochemical cycle, mobility of elements. Path finder elements. Primary dispersion patterns. Syngenetic and Epigenetic diffusion. Sampling technique for geochemical exploration.

SUGGESTED READINGS :

- Arogyaswamy, R.N.P., 1996 : Courses in Mining Geology. IV ed, Oxford/IBH.
- Dobrin, M.B. 1976 : Introduction to Geophysical Prospecting, McGraw Hills.
- Ginzburg, I.I. : Principles of Geochemical Prospecting, Pergamon London.
- Hawkes, H. and Wobb, J.S. : Geochemistry in Mineral Exploration, Harper NY
- Holson, G.D. and Tiratsoo, E.N., 1985 : Introduction to Petroleum Geology, Gulf Publ.
- Howel C.H. : Introduction to Geophysics.
- Milton and Dobrin : Introduction to Geophysical Prospecting, McGraw Hill
- Paransia, D.S. : Principles of Applied Geophysics.
- Rao, M.B.R. : Outline of Geophysical Prospecting.
- Sharma, P.V., 1986 : Geophysical Methods in Geology, Elsevier.



CLASS : M.Sc.
SEMESTER : THIRD
SUBJECT : GEOLOGY
PAPER : PRACTICAL – 1 (M.SCGEO-305)
**TITLE : PHOTOGEOLOGY, REMOTESENSING AND
ENGINEERING GEOLOGY**

PAPER : PRACTICAL– 2 (M.SCGEO-306)
**TITLE : ORE GEOLOGY AND MINERAL
EXPLORATION**



COURSEWISE SCHEME FOURTH SEMESTER

1. Course Code	: MSCGEO	6. Total Practical Marks	: 100
2. Course Name	: M.Sc. Geology	7. Project Marks	: 50
3. Total Theory Subject	: 4	9. Total Marks	: 350
4. Total Theory Marks	: 200	10. Minimum Passing Percentage	: 36
5. Total Practical	: 2		

Sub Code	Subject Name	Theory						Practical		Total		
		Paper			CCE		Total Marks		Max.	Min.	Max.	Min.
COMPULSORY		I st	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
MSCGEO 401	Fuel Geology	42	42	15	08	03	50	18	0	0	50	18
MSCGEO 402	Mining And Mineral Dressing	42	42	15	08	03	50	18	0	0	50	18
MSCGEO 403	Hydrogeology	42	42	15	08	03	50	18	0	0	50	18
MSCGEO 404	Environmental Geology	42	42	15	08	03	50	18	0	0	50	18
MSCGEO 405	Pr. : (I) Fuel Geology, Mining And Mineral Dressing	-	-	-	-	-	-	-	50	18	50	18
MSCGEO 406	Pr. : (Ii) Hydrogeology/ Environmental Geology	-	-	-	-	-	-	-	50	18	50	18
MSCGEO 407	Project	-	-	-	-	-	-	-	50	18	50	18



CLASS : M.SC.
SEMESTER : FOURTH
SUBJECT : GEOLOGY
PAPER NO. : FIRST (MSCGEO-401)
TITLE : FUEL GEOLOGY

UNIT - I 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 - II Indian and International Classification of Coal. Preparation of Coal for Washing, Carbonization, Gasification and Hydrogenation, Briquette of Coal.

UNIT - III Geological features 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 - IV Origin, Migration and Accumulation (oil-traps) of Petroleum and Natural Gas. Kerozene. Geology of the Productive Oil Fields of India. Status of Oil and Natural Gas in India.

UNIT - V 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 :

- Dahlkamp, F.J., 1993 : Uranium Ore Deposits. Springer Verlag
- Durance, E.M., 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 F.K., 1985 : Petroleum Geology. Allen and Unwin
- Selley, R.C., 1998 : Elements of Petroleum Geology. Academic Press
- Singh, M.P.1998 : Coal and Organic Petrology. Hindustan Publications ND
- Tissot, B.P. and Welt, D.H., 1984 : Petroleum Formation and Occurrence. Springer Verlag



CLASS : M.SC.
SEMESTER : FOURTH
SUBJECT : GEOLOGY
PAPER NO. : SECOND (MSCGEO-402)
TITLE : MINING AND MINERAL DRESSING

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

UNIT - II 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 - III Coal mining methods : Board and Pillar methods, Long Wall methods, Strip mining. Haulage and winding.

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

UNIT - V Industrial screening : Types of screens. Gravity separation. Heavy - medium separation. Magnetic separation. Froth Floatation technique of separation of sulphide ores.

SUGGESTED READINGS :

- Arogyaswamy RNP : Courses of Mining Geology, Oxford & IBH
- Gaudin : Principles of Mineral Dressing, Mc Graw Hill
- Lewis : Elements of Mining
- Mc Kinstry HE : Mining Geology, Prentice Hall.
- Richards and Looke : Text Book of Ore Dressing, Mc Graw Hill
- Roberts : Elements of Ore Dressing.
- Taggart : Mineral Dressing.
- Young : Elements of Mining Geology.



CLASS : M.SC.
SEMESTER : FOURTH
SUBJECT : GEOLOGY
PAPER NO. : THIRD (MSCGEO-403)
TITLE : HYDROGEOLOGY

UNIT - I Distribution of water: surface and subsurface. Introductory idea to type & age of water. Hydrological cycle, Precipitation and its types. Ground water: Origin, importance, occurrences and subsurface reservoirs. Hydrostratigraphic UNITS. Water table contour maps.

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

UNIT - III Groundwater flow: confined, unconfined, steady, unsteady, and radial flow. Forces causing flow. Darcy's Law. Water level fluctuations: causative factors and their measurements. Methods of pumping test and analysis of test data.

UNIT - IV 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.

UNIT - V Salt water intrusion in coastal aquifers, remedial measures. Radio isotopes in hydrogeological studies. Water harvesting. Wetland management. Consumptive and conjunctive use of surface and ground water. Concept of watershed management.
Natural and artificial recharge of ground water.

SUGGESTED READINGS :

- Davis S.N. and De Wiest R.J.M., 1966 : Hydrogeology, John Wiley
- Felter, C.W., 1990 : Applied Hydrogeology, Merrill.
- Freeze, R.A. and Cherry, J.A., 1979 : Ground Water, Prentice Hall.
- Gautam Mahajan : Groundwater survey and Investigation.
- Gulman : Hydrogeology and Wetland Conservation.
- Karanth, K.R. 1987 : Ground Water Assessment - Development and Management,
- Raghunath, N.M., 1982 : Ground Water, Wiley Eastern.
- Subramaniam, V. 2000 : Water. Kingston Publ. London, Tata McGraw Hill
- Todd, D.K. 1980 : Ground Water Hydrology, John Wiley.
- Tollman : Ground Water.



CLASS : M.SC.
SEMESTER : FOURTH
SUBJECT : GEOLOGY
PAPER NO. : FOURTH (MSCGEO-404)
TITLE : ENVIRONMENTAL GEOLOGY

UNIT - I Concept of Environmental geology. Ecological perspective of the environment. Global warming and its impact. Impact of mining activity on environment.

UNIT - II Impact assessment of degradation and contamination of surface water and ground water quality due to industrialization and urbanization. Soil profiles, types and soil quality degradation due to irrigation, use of fertilizer and pesticides. Environmental problems related to dam and reservoirs.

UNIT - III Wetlands: Classification, natural and artificial wetlands, problems of reclamation of wetlands, use of wetlands. Water logging problems. Desertification and Degradation of land. Anti-desertification measures.

UNIT - IV Causes of floods, flood hazards and management. Impacts of mining activities on the environment. Environmental management in mining. Effects of earthquakes, Seismic hazards and management. Environmental pollution due to industries, energy resources, urbanization.

UNIT - V Earth's natural hazardous processes and its impact on environment: volcanic activity, landslides and coastal hazards. Environmental problems related to dams and reservoirs.

SUGGESTED READINGS :

- Bell, F.G., 1999 : Geological hazards. Rout Ledge, London.
Hsai - Yang Fang, 1997 : Introduction to Environmental Geotechnology, CRC Press.
Patwardhan, A.M., 1999 : The Dynamic Earth System, Prentice Hall
Smith, K., 1992 : Geological Hazards, Rout Ledge, London.
Subramaniam, V. 2001: Textbook in Environmental Science, Narosa International
Narosa International T.E. Graedal & P.J. Crutzen, 1993.
Atmospheric change, Freeman and Co Valdiya, K.S., 1987.
Environmental Geology- Indian Context. Tata Mc Graw.
People and Environmental – ISS 310, Michigan State University.



Swami Vivekanand University, Sagar(M.P.)





CLASS : M.SC.
SEMESTER : FOURTH
SUBJECT : GEOLOGY
PAPER : PRACTICAL – 1 (MSCGEO-405)
TITLE : FUEL GEOLOGY, MINING AND
MINERAL DRESSING

PAPER : PRACTICAL– 2 : (MSCGEO-406)
TITLE : HYDROGEOLOGY AND
ENVIRONMENTAL GEOLOGY

Project Work : (M.SCGEO-407)