

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
DATE: 08.01.2008

MM: 35/10

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

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Semester wise Syllabus for Postgraduates
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CLASS : M.Sc. PREVIOUS
SUBJECT: GEOLOGY
PAPER TITLE: SECOND : STRUCTURAL GEOLOGY
SEMESTER: FIRST
DATE: 08.01.2008

MM: 30 35/10

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**. Pergamon Press
Whitten E H T: **Structural Geology of Folding Rocks**.
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Pranendra Singh

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CLASS : M.Sc. PREVIOUS
SUBJECT: GEOLOGY
PAPER TITLE: THIRD : GEOMORPHOLOGY
SEMESTER: FIRST
DATE: 08.01.2008

MM: ~~31~~ 35-40

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

Thournbury, W D: **Geomorphology**. Wiley

Small, R J: **Study of Landforms**. Cambridge

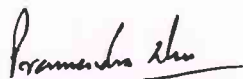
Von Engelen, O D: **Geomorphology Systematic and Regional**. MacMillan

Savinder Singh: **Geomorphology**

Mathew Fontaine Maury: **The Physical Geography of the Sea**. Harvard Univ Press

David Lang: **The Earth System**. Brown Publishers

Harris, J R: **Applied Geomorphology**.



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CLASS : M.Sc. PREVIOUS
SUBJECT: GEOLOGY
PAPER TITLE: FOURTH : MINERALOGY AND GEOCHEMISTRY
SEMESTER: FIRST
DATE: 08.01.2008

MM:50 35/40

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 Aluminosilicates (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 Willey.
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. PREVIOUS
SUBJECT: GEOLOGY
PAPER TITLE: FIRST : IGNEOUS AND METAMORPHIC PETROLOGY
SEMESTER: SECOND
DATE: 08.01.2008

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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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Semester wise Syllabus for Postgraduates
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CLASS : M.Sc. PREVIOUS
SUBJECT: GEOLOGY
PAPER TITLE: SECOND : SEDIMENTALOGY
SEMESTER: SECOND
DATE: 08.01.2008

MM-50 3-40

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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As recommended by Central Board of Studies and
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CLASS : M.Sc. PREVIOUS
SUBJECT: GEOLOGY
PAPER TITLE: THIRD: STRATIGRAPHY OF INDIA
SEMESTER: SECOND
DATE: 08.01.2008

MM: 50 - 3540

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 (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.

References :

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- 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**.
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CLASS : M.Sc. PREVIOUS
SUBJECT: GEOLOGY
PAPER TITLE: FOURTH : PALAEOBIOLOGY
SEMESTER: SECOND
DATE: 08.01.2008

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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**.
Clarksen 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 F T 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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Department of Higher Education, Govt. of M.P.
Under Graduate Semester wise Syllabus
as recommended by Central Board of Studies and approved by the Governor of M.P.
उच्च शिक्षा विभाग, म.प्र. शासन
स्नातक कक्षाओं के लिये सेमेस्टर अनुसार पाठ्यक्रम
केंद्रीय अध्ययन मण्डल द्वारा अनुशंसित तथा म. प्र. के राज्यपाल द्वारा अनुमोदित
Session 2010-11

Class / कक्षा	: M.Sc.
Semester / सेमेस्टर	: III
Subject / विषय	: GEOLOGY
Title of Subject Group	: PHOTOGEOLOGY AND REMOTE SENSING
Paper No. / प्रश्नपत्र क्रमांक	: FIRST
Compulsory / अनिवार्य या Optional / वैकल्पिक अनिवार्य	: Compulsory
Max. Marks अधिकतम अंक	: 35 40

Particulars / विवरण

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: Scales, 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	Application of Photo Geology and Remote sensing in the study of Geomorphology, Lithology and Structural Features and Hydrogeologic Studies.

Suggested Readings :

Curran PJ, 1985: Principles of Remote Sensing. ELBS/Longman
Drury SA, 1987: Image Interpretation in Geology. Allen and Unwin
Lend DR: Principles and Interpretation of Aerial Photographs.

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Session 2010-11

Class / कक्षा	: M.Sc.
Semester / सेमेस्टर	: III
Subject / विषय	: GEOLOGY
Title of Subject Group	: ENGINEERING GEOLOGY
Paper No. / प्रश्नपत्र क्रमांक	: Second
Compulsory / अनिवार्य या Optional / वैकल्पिक अनिवार्य	: Compulsory
Max. Marks अधिकतम अंक	: 35 40

Particulars / विवरण

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 Tunnelling in different Grounds. Lining of Tunnels. Highways-Geological considerations for construction of highways.
Unit-3	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-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.

Suggested Readings :

Bell F G, 1999: Geological Hazards. Rout ledge
Blyth FCH: Geology for Engineers. Arnold Ltd.
Kesavulu NC: Text Book of Engineering Geology. McMillan
Khurmi RS: Fundamental of Engineering Geology. Dhanpat Rai & Sons
Krynine and Judd WR: Principles of Engineering Geology and Geotechnics. McGraw
Parbin Singh: Engineering and General Geology. KatsonPubl House
Ramnathan RM: Engineering Geology. Anuradha Agency T N
Richey JE: Elements of Engineering Geology. Sir Issac Pitman & Sons
Sumit K 1992: Environmental Hazards. Routledge
Trefethen NC: T B of Geology and Engineering Geology. McMillan

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Session 2010-11

Class / कक्षा	: M.Sc.
Semester / सेमेस्टर	: III
Subject / विषय	: GEOLOGY
Title of Subject Group	: ORE GEOLOGY
Paper No. / प्रश्नपत्र क्रमांक	: THIRD
Compulsory / अनिवार्य या Optional / वैकल्पिक अनिवार्य	: Compulsory
Max. Marks अधिकतम अंक	: 35-40

Particulars / विवरण

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 & 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.

Suggested Readings :

Bateman, 1981: Economic Mineral Deposits. Wiley
 Deb, S. Industrial Minerals
 Evans, JM 1993: Ore Geology and Industrial Minerals. Blackwell
 Krishnaswamy, : Mineral Resources 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, RL 1972: Ore Petrology. McGraw Hills
 Umeshwar Prasad 2000: Economic Geology. CBS

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केंद्रीय अध्ययन मण्डल द्वारा अनुशंसित तथा म. प्र. के राज्यपाल द्वारा अनुमोदित
Session 2010-11

Class / कक्षा	: M.Sc.
Semester / सेमेस्टर	: III
Subject / विषय	: GEOLOGY
Title of Subject Group	: MINERAL EXPLORATION
Paper No. / प्रश्नपत्र क्रमांक	: FORTH
Compulsory / अनिवार्य या Optional / वैकल्पिक अनिवार्य	: Compulsory
Max. Marks अधिकतम अंक	: 35-40

Particulars / विवरण

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. Classification of 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.

Suggested Readings :

Arogyaswamy RNP, 1996: Courses in Mining Geology. IV ed. 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 J S: Geochemistry in Mineral Exploration. Harper NY
Holson GD and Tiratsoo EN, 1985: Introduction to Petroleum Geology. Gulf Publ.

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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 PV, 1986: Geophysical Methods in Geology. Elsevier

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उच्च शिक्षा विभाग, म.प्र. शासन
स्नातक कक्षाओं के लिये सेमेस्टर अनुसार पाठ्यक्रम
केंद्रीय अध्ययन मण्डल द्वारा अनुशंसित तथा म. प्र. के राज्यपाल द्वारा अनुमोदित
Session 2010-11

Class : M.Sc. THIRD SEMESTER

Subject: GEOLOGY

PRACTICAL – 1 : Photogeology, Remote Sensing and Engineering Geology

Max. Marks: 50

PRACTICAL – 2 : Ore Geology and Mineral Exploration

Max. Marks: 50

Class : M.Sc. THIRD SEMESTER

Subject: GEOLOGY

PROJECT:

Max. Marks: 50

The following topics are suggested for project work :-

- Geomorphologic analysis of a selected area in a river basin.
- Study of structural features of a geologic area.
- Petrographic analysis of a hard rock / soft rock terrain.
- Study of economic mineral resources of a particular area.
- Mineral economics of Madhya Pradesh.
- Groundwater exploration of a geographic area.
- Groundwater pollution and control.
- Sustainable development and management of ground water Resource.
- Watershed management.
- Environmental analysis – of pollution of water resources and urban areas.
- Study of engineering projects – dam, tunnels, canals and Bridges.
- Geological study of base metal mines.
- Environmental pollution in mining areas.
- Remote sensing applications in various fields.
- Project work allotted as per the necessity and facilities available at the local level.

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Session 2010-11

Class / कक्षा	: M.Sc.
Semester / सेमेस्टर	: IV
Subject / विषय	: GEOLOGY
Title of Subject Group	: FUEL GEOLOGY
Paper No. / प्रश्नपत्र क्रमांक	: FIRST
Compulsory / अनिवार्य या Optional / वैकल्पिक अनिवार्य	: Compulsory
Max. Marks अधिकतम अंक	: 35/10

Particulars / विवरण

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 .

Dahlkamp FJ 1993: Uranium Ore Deposits. Springer Verlag
Durance EM, 1986: Radioactivity in Geology: Principles and Applications. Ellis H
Holson GD and Tiratsoo E N, 1985: Introduction of petroleum Geology. Gulf Pub
Netleton 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

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Scheme of marks
Geology
M.Sc. Semester – III
Session 2010-11

Paper	Theory	CCE	Total
I	35	15	50
II	35	15	50
III	35	15	50
IV	35	15	50
Practical – I Paper – I & II	---	---	50
Practical – II Paper – III & IV	---	---	50
Project	---	---	50
Internship	---	---	100

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Session 2010-11

Class / कक्षा : M.Sc.
Semester / सेमेस्टर : IV
Subject / विषय : **GEOLOGY**
Title of Subject Group : **HYDROGEOLOGY**
Paper No. / प्रश्नपत्र क्रमांक : **THIRD**
Compulsory / अनिवार्य या Optional / वैकल्पिक अनिवार्य : **Compulsory**
Max. Marks अधिकतम अंक : **35/40**

Particulars / विवरण

Unit-1	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-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 fluctuations: causative factors and their measurements. Methods of pumping test and analysis of test data.
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.
Unit-5	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 SN and De Wiest RJM, 1966: Hydrogeology. John Wiley
Felter CW, 1990: Applied hydrogeology. Merrill
Freeze RA & Cherry JA, 1979: Ground Water. Prentice Hall

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Session 2010-11

Class / कक्षा	: M.Sc.
Semester / सेमेस्टर	: IV
Subject / विषय	: GEOLOGY
Title of Subject Group	: HYDROGEOLOGY
Paper No. / प्रश्नपत्र क्रमांक	: THIRD
Compulsory / अनिवार्य या Optional / वैकल्पिक अनिवार्य	: Compulsory
Max. Marks अधिकतम अंक	: 35/40

Particulars / विवरण

Unit-1	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-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 fluctuations: causative factors and their measurements. Methods of pumping test and analysis of test data.
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.
Unit-5	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 :

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Felter CW, 1990: Applied hydrogeology. Merrill
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Class / कक्षा : M.Sc.
Semester / सेमेस्टर : IV
Subject / विषय : GEOLOGY
Title of Subject Group : MINING AND MINERAL DRESSING
Paper No. / प्रश्नपत्र क्रमांक : SECOND
Compulsory / अनिवार्य या Optional / वैकल्पिक अनिवार्य : Compulsory
Max. Marks अधिकतम अंक : 35/10

Particulars / विवरण

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) : Stoping 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 / कक्षा : M.Sc.
 Semester / सेमेस्टर : IV
 Subject / विषय : GEOLOGY
 Title of Subject Group : HYDROGEOLOGY
 Paper No. / प्रश्नपत्र क्रमांक : THIRD
 Compulsory / अनिवार्य या Optional / वैकल्पिक अनिवार्य : Compulsory
 Max. Marks अधिकतम अंक : 35/40

Particulars / विवरण

Unit-1	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-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 fluctuations: causative factors and their measurements. Methods of pumping test and analysis of test data.
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.
Unit-5	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 SN and De Wiest RJM, 1966: Hydrogeology. John Wiley
 Felter CW, 1990: Applied hydrogeology. Merrill
 Freeze RA & Cherry JA, 1979: Ground Water. Prentice Hall

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Class / कक्षा	: M.Sc.
Semester / सेमेस्टर	: IV
Subject / विषय	: GEOLOGY
Title of Subject Group	: ENVIRONMENTAL GEOLOGY
Paper No. / प्रश्नपत्र क्रमांक	: FOURTH
Compulsory / अनिवार्य या Optional / वैकल्पिक अनिवार्य	: Optional 1
Max. Marks अधिकतम अंक	: 35-40

Particulars / विवरण

Unit-1	Concept of Environmental geology. Classification of environment. Ecological perspectives of the environment. Global warming.
Unit-2	Impact assessment of degradation and contamination of surface water and ground water quality due to industrialization and urbanization. Soil profiles, soil types and soil quality degradation due to irrigation, use of fertilizer and pesticides.
Unit-3	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-4	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-5	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
T.E. Graedel & P.J. Crutzen, 1993: Atmospheric Change, Freeman and Co
Valdiya K S 1987: Environmental Geology- Indian context. Tata-McGraw

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Goutham Mahajan: Groundwater survey and Investigation.

Gulman: Hydrogeology and Wetland Conservation.

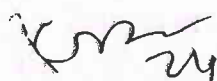
Karanth KR 1987: Ground Water Assessments - Development and managements.

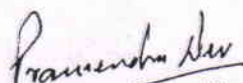
Pagunath NM, 1982: Ground Water. Wiley Eastern

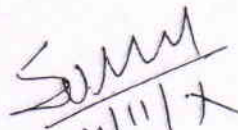
Subramaniam V, 2000: Water. Kingston Publ London Tata McGraw Hill

Todd DK 1980: Ground Water Hydrology. John Wiley

Tollman: Ground Water.

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Session 2010-11

Class / कक्षा	: M.Sc.
Semester / सेमेस्टर	: IV
Subject / विषय	: GEOLOGY
Title of Subject Group	: ADVANCED REMOTE SENSING AND GIS
Paper No. / प्रश्नपत्र क्रमांक	: FOURTH
Compulsory / अनिवार्य या Optional / वैकल्पिक अनिवार्य	: Optional 2
Max. Marks अधिकतम अंक	: 35

Particulars / विवरण

Unit-1	Introduction, development of Remote Sensing techniques; Aerial remote sensing versus satellite remote sensing. Stereoscopic and pseudoscopic vision, depth perception. Different types of viewing instruments. Vertical exaggeration, factors affecting vertical exaggeration, determination of vertical exaggeration.
Unit-2	Geometric elements of aerial photographs, Relief displacement, Image parallax. Parallax measurement – measurement of dip, height and thickness of strata. Stereoscopic plotting instruments. Recognition of various photointerpretation elements. Interpretation of aerial photographs for geology, geomorphology and structures
Unit-3	Radiation principles, Generation of Electromagnetic Radiation (EMR). Electromagnetic spectrum, interaction of EMR with atmosphere and earth material. Spectral signatures. Space platforms. Remote sensing sensors – Multi Spectral scanner (MSS), Thermal scanner, Passive and Active Microwave scanners, LISS, WIFS. Visual interpretation of MSS, TM, SPOT and IRS images.
Unit-4	Digital Image Processing (DIP). Sources of image degradation, Image rectification and restoration. Image enhancement techniques, Multi image manipulation – FCC generation, Band rationing, Pattern recognition and image classification. Geographic Information System (GIS), Components of GIS, data structures and data model in GIS. Functional elements of GIS. Projections.

Unit-5

Application of remote sensing and GIS for Mineral exploration, Groundwater exploration, Landuse/Landcover studies and Change detection. Engineering projects and Environmental planning.

Suggested Readings :

Curran PJ, 1985: Principles of Remote Sensing. ELBS/Longman

Drury SA, 1987: Image Interpretation in Geology. Allen and Unwin

Parry S Seigal and Alan R : Remote Sensing in Geology.

Patel AN Surendra Singh: Principle of Remote Sensing. Scientific Publishers

Pratt VK: Digital Image Processing.

Tripathi and Bajpai ed. 2000: Remote Sensing in Geosciences

Jenson : Environmental Remote Sensing

Lillesand & Kiefer: Remote Sensing and Image Interpretation: John Willey & Sons

F. Sabins: Remote Sensing

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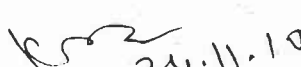
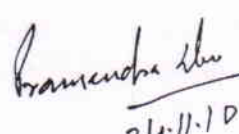
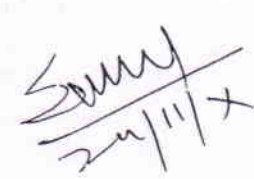

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Class / कक्षा : M.Sc.
Semester / सेमेस्टर : IV
Subject / विषय : GEOLOGY
Title of Subject Group : COMPUTER APPLICATIONS IN GEOLOGY
Paper No. / प्रश्नपत्र क्रमांक : FOURTH
Compulsory / अनिवार्य या Optional / वैकल्पिक अनिवार्य : Optional 3
Max. Marks अधिकतम अंक : 35

Particulars / विवरण

Unit-1	Introduction to computers. Structure of computer. Hardware and software components. Classification and types of computers. Capabilities and limitations of computer. Computer organization
Unit-2	General working of computer. Input and output devices, magnetic media devices, optical devices. Printer. Keyboard device. VDU, Scanner and digitizer, plotter. Types of Software.
Unit-3	Computer languages. Number system. ASCII. Machine language, high level language. Assembler. Interpreter. Compilers. Flowchart. Decision Table. Algorithms. MS-DOS, Windows, MS- Office.
Unit-4	Basic programming concept. Variable constants, procedures, conditional statements and loops. Visual Basic, C++, DBMS and Oracle.
Unit-5	Computer applications for various geological studies. Preparation of contour maps by Surfer. Graphical interpretations. GIS overview.

Suggested Readings:

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Session 2010-11

Class : M.Sc. FOURTH SEMESTER

Subject: GEOLOGY

PRACTICAL – 1: Fuel Geology , Mining and Mineral Dressing

Max. Marks: 50

PRACTICAL – 2 : Hydrogeology + Optional paper

Max. Marks: 50

Class : M.Sc. FOURTH SEMESTER

Subject: GEOLOGY

PROJECT:

Marks 50

The following topics are suggested for project work :-

- Geomorphologic analysis of a selected area in a river basin.
- Study of structural features of a geologic area.
- Petrographic analysis of a hard rock / soft rock terrain.
- Study of economic mineral resources of a particular area.
- Mineral economics of Madhya Pradesh.
- Groundwater exploration of a geographic area.
- Groundwater pollution and control.
- Sustainable development and management of ground water Resource.
- Watershed management.
- Environmental analysis – of pollution of water resources and urban areas.
- Study of engineering projects – dam, tunnels, canals and Bridges.
- Geological study of base metal mines.
- Environmental pollution in mining areas.
- Remote sensing applications in various fields.
- Project work allotted as per the necessity and facilities available at the local level.

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उच्च शिक्षा विभाग, म.प्र. शासन
स्नातक कक्षाओं के लिये सेमेस्टर अनुसार पाठ्यक्रम
केंद्रीय अध्ययन मण्डल द्वारा अनुशंसित तथा म. प्र. के राज्यपाल द्वारा अनुमोदित
Session 2010-11

Class : M.Sc. FOURTH SEMESTER

Subject: GEOLOGY

PRACTICAL – 1: Fuel Geology , Mining and Mineral Dressing

Max. Marks: 50

PRACTICAL – 2 : Hydrogeology + Optional paper

Max. Marks: 50

Class : M.Sc. FOURTH SEMESTER

Subject: GEOLOGY

PROJECT:

Marks 50

The following topics are suggested for project work :-

- Geomorphologic analysis of a selected area in a river basin.
- Study of structural features of a geologic area.
- Petrographic analysis of a hard rock / soft rock terrain.
- Study of economic mineral resources of a particular area.
- Mineral economics of Madhya Pradesh.
- Groundwater exploration of a geographic area.
- Groundwater pollution and control.
- Sustainable development and management of ground water Resource.
- Watershed management.
- Environmental analysis – of pollution of water resources and urban areas.
- Study of engineering projects – dam, tunnels, canals and Bridges.
- Geological study of base metal mines.
- Environmental pollution in mining areas.
- Remote sensing applications in various fields.
- Project work allotted as per the necessity and facilities available at the local level.

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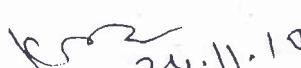
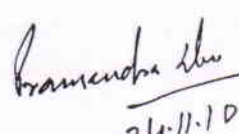
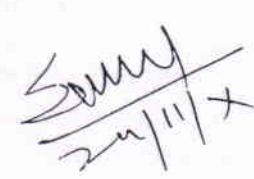
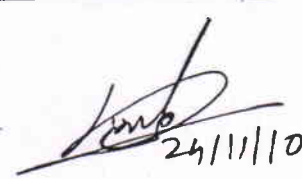
Department of Higher Education, Govt. of M.P.
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Session 2010-11

Class / कक्षा : M.Sc.
Semester / सेमेस्टर : IV
Subject / विषय : GEOLOGY
Title of Subject Group : COMPUTER APPLICATIONS IN GEOLOGY
Paper No. / प्रश्नपत्र क्रमांक : FOURTH
Compulsory / अनिवार्य या Optional / वैकल्पिक अनिवार्य : Optional 3
Max. Marks अधिकतम अंक : 35

Particulars / विवरण

Unit-1	Introduction to computers. Structure of computer. Hardware and software components. Classification and types of computers. Capabilities and limitations of computer. Computer organization
Unit-2	General working of computer. Input and output devices, magnetic media devices, optical devices. Printer. Keyboard device. VDU, Scanner and digitizer, plotter. Types of Software.
Unit-3	Computer languages. Number system. ASCII. Machine language, high level language. Assembler. Interpreter. Compilers. Flowchart. Decision Table. Algorithms. MS-DOS, Windows, MS- Office.
Unit-4	Basic programming concept. Variable constants, procedures, conditional statements and loops. Visual Basic, C++, DBMS and Oracle.
Unit-5	Computer applications for various geological studies. Preparation of contour maps by Surfer. Graphical interpretations. GIS overview.

Suggested Readings:

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