

M Phil., GEOLOGY

CBCS 2019 Onwards

GEOMORPHOLOGY

PAPER CODE: 18MPAG03

GUIDE PAPER SYLLABUS

UNIT I

Geomorphology: Definition, Scope of Geomorphology, Fundamental concept or Principles of geomorphology. Geomorphic Processes: Exogenic, Endogenic and extraterrestrial processes. Tectonic Landforms: Tectonic scarps, fault scarps, fault-line scarps, landforms associated with strike-slip fault, fault valleys, fault block mountains, landforms made by folding.

UNIT II

Weathering: Mechanical weathering and chemical weathering. Mass wasting and hill slope development. Fluvial Geomorphic System: overland flow and development of rills and gullies, channeled flow- processes and geometry, Flooding-frequency and magnitude, Sediment erosion and transport. Drainage basin evolution, deltas and alluvial fans.

UNIT III

Contrast between arid and humid regions - Origin of deserts-arid erosion cycle. eolian processes and landforms: erosional landforms, eolian deposits and landforms. Shore-zone processes and landforms: wind waves, breakers and surf, tides and currents, wind. Shore platforms, coastal cliffs, coral reef morphology and classifications, Beaches.

UNIT IV

Karst topography features: Terra rossa, lapies, sinkholes and associated features, natural tunnels and bridges, erosion remnants, caverns and associated features. Karst geomorphic cycle. Glaciers: types of glaciers, Glacier erosional features: Cirque, glacial troughs, hanging valleys, serrate ridges, truncated spurs, Fjords. Depositional landforms: glacial forms, glacial-fluviatile forms, glacial-lacustrine features.

UNIT V

Geomorphic subdivisions of Indian subcontinent, Himalayan landscape, Indo-Gangetic plains, Deccan Plateau, Coastal low lands. Applied Geomorphology:

hydrological applications, exploratory tool for economic geology and applications in engineering projects.

REFERENCE BOOKS:

1. Bloom, A.L., 2003 *Geomorphology: A systematic Analysis of Late Cenozoic Landforms*, Printice Hall,
2. Thornbury, W.D., 2004 *Principles of Geomorphology*. 2nd edition. Wiley Eastern Ltd. New Delhi.
3. Richard Huggett 2007. *Fundamentals of Geomorphology*, 2nd Edition. Routledge N. Y.
4. Ritter, D.F., Kochel, R.C., Miller, J.R., *Process Geomorphology*, Waveland press, 2002.
5. H.S. Sharma (1990) *Indian Geomorphology*. Concept Pubpublication. Co., New Delhi.

M Phil., GEOLOGY**CBCS 2019 Onwards****STRUCTURAL GEOLOGY AND GEOTECTONICS****PAPER CODE: 18MPAG03****GUIDE PAPER SYLLABUS****UNIT I**

Concept of stress and strain: Stress-strain relationships of elastic, plastic and viscous materials, measurement of strain in deformed rocks, behaviour of minerals and rocks under deformation conditions. Folds: classification and causes of folding, diapirs and salt domes.

UNIT II

Shear zones: Recognition of shear zones and faults in field, mechanics of shearing and faulting. Geometry of thrust sheets: Block faulted and rifted regions. Wrench faults and associated structures. Tectonic melanges, Dome and basin structures, Structural behavior of igneous rocks.

UNIT III

Foliations and Lineation's: classification, origin and significance. Petrofabric analysis (microfabrics): Data collection, plotting, symmetry and interpretation, concept of symmetry of fabric of tectonites. Geotectonics: Introduction, tectonic framework of earth's crust, interior of earth. isostasy, convection currents, Wilson Cycle.

UNIT IV

Plate tectonics: Concept of plate and plate movements, plate model of Morgan, nature of convergent, divergent and conservative plate margins, transpression and transtension.

UNIT V

Plate tectonics in relation to igneous, sedimentary and metamorphic processes and mineralization. Triple junctions, aulocogens, plume theory, island arcs. Nature and origin of earth's magnetic field.

REFERENCE AND TEXT BOOKS:

1. An outline of Structural Geology By John Wiley: Hobbs, Means and Williams,
2. Outline of Structural Geology By Mathuen, London: E S Hills,
3. Structural Geology of rocks and regions By John Wiley: H. davis,
4. Foundations of structural geology By Blakie: R.G.Park,
5. Structural Geology By McGraw Hill: L.U.De Sitter,
6. Structural Geology By P.H.I.: M.P.Billings,
7. Fundamentals of modern structural geology By S.K. Ghosh., Elsevier Publication,
8. T.M.H. Aspects of tectonics of SE Asia: K.S.valdiya Understanding the earth By Artemis Press: Gass, Smith and Wilson,
9. Physical Geology By P.H.I. Judson, Deffeyes & Hargraves,
10. Plate tectonics and crustal evolution By K.C.Condie Pergomon press,
11. Holmes principles of Physical Geology. By D.Duff Chapman& Hall,
12. The evolving continents: By B. F. Windley J.W.,
13. Crustal evolution and orogeny By S.P.h.Sychanthavong. Oxford & IBH.,
14. The evolving earth By Sawkins and others. Mac Millan,
15. The evolving Earth By L A M Cocks. Cambridge University Press,
16. Plate tectonics and magnetic reversals. Allan Cox. Freeman,
17. Basic problems in Geotectonics. V V Belousov. McGraw Hill,
18. Development in Geotectonics. Series from Vol.1 to 6. Elsevier,
19. Continental deformation By Paul Hancock. Oxford Publication House.

M Phil., GEOLOGY**CBCS 2019 Onwards****PALAEONTOLOGY AND MICRO PALAEONTOLOGY****PAPER CODE: 18MPAG03****GUIDE PAPER SYLLABUS****UNIT I**

Definition of palaeontology. Theories on the origin and evolutionary history of Life. Fossilization process and the nature of fossil record. Definition for Species, index fossil, cosmopolitan species, fossil assemblage, fossil diversity, phylogeny. Types of biozones. Geological times scale. Morphological classification and Nomenclature. Cladistics. Species evolution, proliferation and extinction through time.

UNIT II

Morphology, taxonomy, age, distribution and ecological niches of Anthozoa, Trilobita, Graptoloidea, Porifera, Bryozoa. Brachiopoda, Bivalvia, Gastropoda, Cephalopoda, and Echinoidea.

UNIT III

Evolutionary history of Reptilian, Avian, Piscean, and Amphibian fauna. Evolution of mammals. Evolution of horse, elephant and human. Functional morphology.

UNIT IV

A brief introduction to morphology, classification and evolution of foraminifera, dinoflagellates, spore and pollen, green and blue-green algae, acritarchs; basic concepts in molecular micropaleontology. Reconstruction of paleoenvironment and past sea level changes using microfossils. Microfossil assemblages and stable isotopes in calcareous microfossils for paleoclimate interpretation.

UNIT V

Palynofacies and paleoenvironmental interpretation. Cenozoic plankton biostratigraphy, larger foraminiferal zones and resolution of the stratigraphic records; Sequence biostratigraphy. Organic geochemistry of palynomorphs. Micropalaeontology in mineral and hydrocarbon exploration.

REFERENCE AND TEXT BOOKS:

1. Arnold.R (1947), An Introduction to Palaeobotany, McGraw Hill, New York
2. Arumugam (1989), Organic evolution, Sara Publication, Kanyakumari
3. Benton, M.J. and Harper, D.A.T., (2009) Introduction to Paleobiology and the fossil record. Wiley-Blackwell. London.
4. Clarkson E.N.K. (1986). Invertebrate paleontology and evolution. George Allen & Unwin.
5. Colbert, E. (1955), The Evolution of Vertebrates, John Wiley, New York.
6. Jain, P.C &Anantharaman, M.S (1996), Palaeontology, Evolution and Animal Distribution, Vishal Publications.
7. Moore R.C., Lalicker & Fisher (1952). Invertebrate fossil. McGraw Hill Book Co., San Francisco.
8. Murray, J.W., (1985) Atlas of invertebrate microfossils. Longman. London.
9. Nield, E.W. and Tucker, V.C.T., (1985) Palaeontology: An introduction. Pergamon Press Ltd., Oxford.
10. Raup D.M. & Stanley (1985). Principles of paleontology. CBS Publ. & Distributors, New Delhi.
11. Romer, A.S (1959), The Vertebrate Story, University of Chicago Press 4thEdt. Chicago
12. Sherlock, R.R &Twenohofel, W.H (1953), Principles of Invertebrate Palaeontology,New York
13. Swinnerton, H.H (1961), Outlines of Palaeontology, Edward Arnold Publ. Ltd., London.
14. Armstrong, H.A. and Brasier, M.D. Microfossils, 2nd Edn., Blackwell Publishing, 2005
15. Travers, A. Paleopalynology, 2nd Edn., Springer, 2007
16. Jansonius, J. and McGregor, D.C. (Eds.) Palynology: Principles and Applications. AASP foundation, 1996
17. Bou Dagher-Fadel, M.K. Evolution and Geological Significance of Larger Benthic Foraminifera. Elsevier, The Netherlands, 2008

M Phil., GEOLOGY**CBCS 2019 Onwards****STRATIGRAPHY AND SEDIMENTOLOGY****PAPER CODE: 18MPAG03****GUIDE PAPER SYLLABUS****UNIT I**

Principles of Stratigraphy: Stratigraphic Principles and approaches to measurement of geological time. Recent developments in stratigraphic classification and Geological Time Scale. Categories of Stratigraphic Classification and concept of Litho, Bio and Chrono Stratigraphy. Stratigraphic correlations. Approaches to paleogeography.

Precambrian stratigraphic succession of and economic importance of Dharwar Supergroup, Aravalli Supergroups. Proterozoic stratigraphy of Cuddapah, Vindhyan, Delhi Supergroups and their equivalents. Precambrian-Cambrian boundary.

UNIT II

Paleozoic stratigraphy: History, tectonics, life and paleogeography during the Paleozoic Era. Stratigraphic frame work and fossil contents of the Paleozoic rocks of India with special reference to Kashmir and Spiti. Permian-Triassic boundary. Gondwana stratigraphy: Concept, classification, sedimentation and paleoclimates, fauna, flora, age and economic potential of Gondwana Supergroup.

UNIT III

Mesozoic stratigraphy: Classification, geographic distribution, lithologic characteristics, fauna and flora economic potential of Triassic, Jurassic and Cretaceous systems in principal basins of India with special reference to Triassic of Spiti, Jurassic of Kutch and Cretaceous of Tiruchirappalli. Deccan traps. Cretaceous-Tertiary boundary. Cenozoic stratigraphy: Classification, depositional characteristics, fauna and flora and economic potential of the Palaeogene, Neogene and Quaternary Systems with special reference to Siwalik Group, Assam-Arakan region, Andaman-Nicobar Islands and its equivalents. Himalayan orogeny. Quaternary deposits and their significance. Paleogene- Neogene and Neogene-Quaternary boundary.

UNIT IV

Principles and Development of Sedimentology. Time and space in Sedimentology. Completeness of sedimentary record. Primary and indirect modes of data acquisition in Sedimentology. Rock cycle, Processes of sediment genesis, transport and deposition. Physical, chemical and biological sedimentary structures. Sediment textures and classification of sediments. Controlling factors of sedimentation. Facies concepts. Facies association, facies succession. Facies successions formed under various environments.

UNIT V

Classification of sedimentary basins. Diagenesis of sediments – Stages, zones and environments of diagenesis. Compaction, Porosity types and evolution, cementation, neomorphism, dissolution-recrystallization, dolomitization, and silicification. Palaeocurrent, heavy mineral and clay mineral analyses for provenance and basin analysis. An overview on Sedimentary basins of India. Applications of Sedimentology for palaeoclimatic and palaeoenvironmental interpretation. Study of sedimentary geochemistry for understanding depositional and diagenetic processes.

REFERENCE AND TEXT BOOKS:

1. Dunbar, C.O. and Rodgers, J. (1957) Principles of Stratigraphy. John Wiley & Sons.
2. Doyle, P. & Bennett. M.R. (1996) Unlocking the Stratigraphic Record (John Willey).
3. GSI Misc. Publ. No. 30. (2006) Geology and Mineral Resources of the States of India
4. Krishnan, M.S. (1982) Geology of India and Burma. CBS Publishers, Delhi
Naqvi, S.M. and Rogers, J.J.W. (1987) Precambrian Geology of India. Oxford University Press.
5. Pascoe, E.H. (1968) A Manual of the Geology of India & Burma (Vols. I-IV) Govt. of India Press, Delhi
6. Ramkrishnan, M. and Vaidhyathan, R. (2008) Geology of India, Volume I and II, Geological Society of India, Bangalore

7. Ravindra kumar. (1985) Fundamentals of Historical Geology and Stratigraphy of India. Wiley Eastern Ltd., New Delhi.
8. Robert, M. S. (1989) Stratigraphy: Principles and Methods, Van Nostrand Reinhold, New York. ,
9. Wadia, D.N. (1998) Geology of India. Tata McGraw Hill, India
10. Collins J.D. and D.B. Thompson (1982) Sedimentary Structures. George Allen & Unwin, London.
11. Flugel, E.V., (2002) Microfacies analysis of limestones. Elsevier.
12. Leeder, M., 1999. Sedimentology and Sedimentary Basins. From Turbulence to Tectonics. Blackwell, Oxford, 592 pp
13. Lindholm, R., (1988) A practical approach to Sedimentology. Blackwell Publication.
15. Nicholls, G. (1999) Sedimentology and Stratigraphy. Wiley-Blackwell.
16. Pettijohn F.J. (1975) Sedimentary rocks. Harper and Row Publ., New Delhi.
17. Selley, R.C., (2000) Applied sedimentology, 2nd Edn., Academic Press,.
18. Sengupta.S.M, (2007), Introduction to Sedimentology, CBS Publishers & Distributors, New Delhi.
19. Tucker M.E. and V.P.Wright (1990) Carbonate Sedimentology. Blackwell Publication.

M Phil., GEOLOGY**CBCS 2019 Onwards****IGNEOUS AND METAMORPHIC PETROLOGY****PAPER CODE: 18MPAG03****GUIDE PAPER SYLLABUS****UNIT I**

Magmas - types - physical properties - chemical properties of igneous rocks. Generation of magmas - causes of melting - tectonic - physical and chemical environments of melting in the lithosphere. Mantle plumes. Phase rule and practical and petrological importance of synthetic igneous systems of rocks.

UNIT II

Magmatic differentiation - definition - mechanisms - applications - assimilations - field evidences and recognition. Bowen's reaction principle - petrological and field significance - classification of igneous rocks - IUGS schemes - TAS schemes - CIPW normative scheme - practical field applications. Petrography - nomenclature and classification.

UNIT III

Petrography - nomenclature - classification - petrogenesis and field presence of various rock groups. Basalts - Alkaline rocks - Ultra mafic rocks - important basic and acid rocks. Variation diagrams and their usefulness in field studies.

UNIT IV

General - basic concepts of metamorphism and metamorphic petrology. Properties of protoliths before metamorphic changes. Distribution - presence of metamorphic rocks on the surface and near surface environments. Causes and interpretation studies - megascopic _ microscopic of metamorphic rocks.

UNIT V

Classification - schemes - nomenclature studies of metamorphic rocks. Metamorphic reactions - stabilisation reaction. Phase rule - applications - metamorphic systems. Understanding - mechanisms - applications of pressure - temperature and time - metamorphic systems. Metamorphic facies - metamorphic phase diagrams and

their applications. Petrography - genesis - classification and nomenclature of various metamorphic rock groups.

REFERENCE AND TEXT BOOKS:

1. Winter, J.D. 2010. Principles of Igneous and Metamorphic Petrology. PHI, New Delhi.
2. Haung, W.T. 1962. Petrology, McGraw Hill, New York.
3. Williams, H et al. 1982. Petrography, CBS, New Delhi.
4. McBirney, A.R. 1993. Igneous Petrology, CBS, New Delhi.
5. Best, M.G. 2003. Igneous And Metamorphic Petrology, Wiley, New Delhi.
6. Winkler, H.G.F. 1970. Petrology of the Metamorphic Rocks. Springer, New Delhi.
7. Chatterjee, S.C. 1974. Petrography of the Igneous and Metamorphic rocks of India. Macmillan, Delhi.

M Phil., GEOLOGY
CBCS 2019 Onwards
ECONOMIC GEOLOGY

PAPER CODE: 18MPAG03

GUIDE PAPER SYLLABUS

UNIT I

Advances in economic geology. Mode of occurrences and morphology of ore bodies and relationship with host rocks -Textures and Structures of ore and gangue minerals. Modern concepts of ore genesis. Fluid inclusions -Wall rock alteration. Geothermometry, and geobarometry.

UNIT II

Paragenesis and zoning in mineral deposits-Metallogenetic Epochs and Provinces. Structural, physico-chemical and stratigraphic controls of ore localization. Study of ore forming processes- Orthomagmatic processes- Sedimentary processes- Metamorphic processes- Hydrothermal processes. Ore deposits in relation to plate tectonics.

UNIT III

Mineralogy, mode of occurrences, uses and distribution in India of the following metalliferous deposits - Iron, Manganese, Aluminium, Copper, Gold, lead, Zinc - Chromium, Molybdenum, Rare Earth Group of metals(REE).

UNIT IV

The study of non- metallic mineral deposits with reference to geology, mode of occurrence, origin, uses and distribution in India of Mica, Asbestos, Barytes, Gypsum, Limestone, Garnet, Corundum, Calcite, Quartz, Feldspar, Clays, Kyanite, Sillimanite, Graphite, Talc, Fluorite, Beryl and Gem minerals.

UNIT V

Introduction to ore microscopy, techniques, methods, textures and microstructures of ores, interpretation of ore texture and optical properties of common sulphide, oxide ore minerals, Industrial application of ore microscopy.

TEXT/REFERENCE BOOKS

1. Anthony Evans, (1993) Ore Geology and Industrial Mineral, John Wiley & sons, USA,
2. Bateman Allan .M. (1962) Economic Mineral Deposits, Asian Publishing House, 2nd Edition.
3. Coggin, B. and Dey, A.K. (1955) India's Mineral Wealth, oup.
4. Craig, J.M. & Vaughan, D.J., (1981): ore Petrography and Mineralogy. John Wiley
5. Cuilbert, J.M. and Park, Jr. C.F.(1986): The Geology of Ore Deposits, Freidman.
6. Deb.S. (1980) Industrial Minerals and Rocks of India, Allied.
7. Edwards, R. and Atkinson, K. (1986) Ore deposit geology, Ist Edition, Chapman and Hall. New Delhi,.
8. Evans, A.M. (1993): Ore Geology and Industrial Minerals, Blackwell.
9. Gokhale, K.V.G.K. and Rao , T.C (1978)- Ore deposits of India, their distribution and processing, Thosmson press,.
10. James R. Craig and David J.Vaughan (1994): Ore Microscopy and Petrography.
11. Jansen M.L. & Bateman A.M.: (1981), Economic Mineral Deposits, John Wiley & Sons, Singapore.
12. Klemm, D.D. and Schnieder, H.J. (1977): Time and Strata Bound Ore Deposits, Springer-Verlag.
13. Krishnaswamy ,s. - India's Mineral Resources, oxford and IBH.
14. Lindgren W. (1933)Mineral Deposits, MCGraw Hill,.
15. Mukherjee, A. (2000): Ore Genesis-A Holistic Approach, Allied Publishers.
16. Park, C.F. and Macdiarmid, R.A (1970) Ore deposits, Freeman,
17. R.M. Umathay, (2006)Mineral Deposits of India, Dattsons, New Delhi, India,

18. Ramdhor, P. (1969): The Ore Minerals and their Intergrowths, Pergamon Press.
19. Robb, L. (2005) Introduction to ore-forming processes, Blackwell publishing, U.K.,.
20. Stanton, R.L. (1972): Ore Petrology, McGraw Hill.
21. Wolf, K.H. (1976-1981): Hand Book of Stratabound and Stratiform Ore Deposits,
Elsevier Publ
22. Meher, D.N. Wadia, (1994), Mineral of India, National Book Trust, New Delhi.
23. Sinha, R.K and Sharma, N.L. (1970), Mineral Economics, Oxford IBH Publishing Co., New Delhi.

M Phil., GEOLOGY

CBCS 2019 Onwards

HYDROGEOLOGY

PAPER CODE: 18MPAG03

GUIDE PAPER SYLLABUS

UNIT I

Hydrologic Cycle and Processes: Precipitation, Evaporation and transpiration, Runoff, Infiltration, Water balance. *Storage and conduit Functions of Rocks:* Water bearing properties of rocks, Retention of water in rocks, Yield of water from rocks. *Vertical distribution of groundwater:* Zones of aeration, Zones of saturation, Storage coefficient of aquifers, Fluctuation of the water table, Fluctuation of the piezometric surface, Recharge and discharge areas.

UNIT II

Groundwater Flow: Properties of water in relation to flow, Head distribution, Laminar and turbulent flow, Darcy's law, Base flow, Effluent stream flow, Influent stream flow. *Evaluation of Aquifer Properties:* Aquifer tests, Confined aquifers, Semi confined aquifers, Unconfined and Semi confined aquifers, Transition from artesian to water table conditions, A general layout of pumping test and its applications.

UNIT III

Quality of Groundwater: Bacteriological quality, Chemical quality, Salinization quality, Physical quality, Diagrammatic representation of geochemical data, Groundwater pollution and its contamination, Use of water quality in mineral prospecting. *Salt water Intrusion:* Salinity influx in estuaries, Ghyben-Herzberg's relation, Zone of diffusion, Slope, shape and movement of interface, Groundwater extraction and intrusion, Identification of salt water zone and interfaces, Prevention and control of salt water intrusion i. Observation wells and its functions.

UNIT IV

Construction, Design and Performance of Wells: Types of wells and methods of construction, Tube well design, Well development, Maintenance and revitalization of wells, Water yield in Dug well versus tube well. Geomorphic controls, Geologic controls, Groundwater provinces of India, Hydrogeochemical provinces of India. *Groundwater Exploration:* Geologic and hydrogeologic methods, Hydrogeologic well logging, Geophysical well logging, Tracers techniques.

UNIT V

Artificial Recharge: Spreading methods, Induced recharge method, Recharge well method, Subsurface dams, Waste water recharge, Recharge by urban storm runoff. *Groundwater Recharge, Discharge and Balance:* Parameters of groundwater balances, Estimation of recharge components, Estimation of groundwater discharge, Groundwater resources evaluation in India. Surface and subsurface groundwater exploration techniques.

REFERENCE AND TEXT BOOKS:

1. Todd, D.K. (1980): - Groundwater Hydrology
2. Davies, S.N and De Wiest, R.J.M (1966): - Hydrogeology
3. Freeze, R.A. and Cherry, J.A. (1971): -Groundwater
4. Fetter, C.W. (1990): -Applied Hydrology
5. Raghunath, N.M. (1982): -Groundwater
6. Karanth, K.R. (1987): - Groundwater assessment, Development and Management
7. Alley, W.M. (1983): -Regional groundwater quality
8. Subramanian, V. (2000) :- Water

M Phil., GEOLOGY**CBCS 2019 Onwards****ENVIRONMENTAL GEOLOGY****PAPER CODE: 18MPAG03****GUIDE PAPER SYLLABUS****UNIT I**

Concepts of Environmental Geology, Domains of Environmental Geology, Global changes in the ecosystem, Sea level changes, Ocean on climate and rainfall, Global warming, Ozone layers, Cosmic rays and its impact, Time scales of global changes in the ecosystem and climate, Levels of Present and past atmospheric carbon-dioxides, Geological hazards and planning, Risk assessment, Hazards mapping.

UNIT II

Soil and environment, Origin of soil, Soil horizons, Pedological soil types, Soil Capability studies, Soil erosion and controlling measures, Soil conservation practices, Desertification, Afforestation, Forest fire, Human interaction with environment, Conflict between human and wild animals, Geology with environmental health, Waste disposal, Energy and environment, Renewable and non-renewable resources, Ocean resources, Coastal erosion and preventive measures, Environmental law.

UNIT III

Mining and the environment: Surface mining, Waste materials from mining, Acid mine drainage, Coal mine effluent, Heap leaching, Spontaneous combustion, Gases, Mineral dust, Contamination due to mining. Domestic reuse and sanitary landfills, Hazardous waste, Radioactive waste and disposal, Industrial toxic material disposal, Energy and Environment, Renewable and non-renewable energy, Geothermal energy, Wind and tidal energy.

UNIT IV

Geology and construction material, Gravels and sand, Mud rocks and brick manufacturing, Special type of clay, Building and dimensional stone, Roofing and facade materials, Concretes, Road aggregates, Armor stone, Cement, Lime and plaster, Geology and construction, Tunnels and tunneling, Shaft and Raises, Highways, Embankments, Rail roads, Bridges, Foundation for buildings.

UNIT V

Natural geo hazards: Volcanic activity, Earthquakes, Slope measurement and stability, River erosion and flooding, Marine action, Wind action and arid regions, Glacial Hazards, Dissolution of rocks, Gases, Basic hydrology, Reservoirs, Dam sites, Water wells, Gas well and oil wells, Environmental legislation law.

REFERENCE AND TEXT BOOKS

1. Valdiya, K.S. (1987) Environmental Geology - Indian Context. Tata McGraw Hill
2. Keller, E.A. (1978) Environmental Geology, Bell and Howell, USA
3. Bryant, E. (1985) Natural Hazards, Cambridge University Press
4. Patwardhan, A.M. (1999) The Dynamic Earth System. Prentice Hall
5. Subramaniam, V. (2001) Textbook in Environmental Science, Narosa international
6. Bell, F.G. (1999) Geological Hazards, Routledge, London
7. Smith, K. (1992) Environmental Hazards. Routledge, London

M Phil., GEOLOGY**CBCS 2019 Onwards****GEOFYSICS AND GEOCHEMISTRY****PAPER CODE: 18MPAG03****GUIDE PAPER SYLLABUS****UNIT I**

Principles - concepts - instrumentation - field application - geophysics. Electrical Methods: Laws - definitions. Electrical properties of rocks - minerals. Equipments - methods - field - data acquisition - processing - interpretation. Application and limitations of electrical methods.

Geophysical well logging methods. Principles - concepts - instrumentation - field application - limitations. Types of logging. Equipments - methods - field - data acquisition - processing - interpretation.

UNIT II

Gravity methods: Laws - definitions. Gravity anomaly properties of rocks - minerals. Equipments - methods - field profiling - data acquisition - processing - interpretation. Application and limitations of gravity methods.

UNIT III

Magnetic Methods: Components of earth's magnetic field. Magnetic character of rocks and minerals. Equipments - methods - field - data acquisition - processing - interpretation. Magnetic contour maps - preparation and application. Aero magnetic data and its applications. Electromagnetic methods and their applications. Telluric and magneto telluric applications and limitations.

UNIT IV

Seismic Methods: General Principles. Methods - seismic properties of rocks. Laws - definitions - Equipments - methods - field - data acquisition - processing - interpretation. Application and limitations of seismic methods. Refraction and Reflection methods - differences - Equipments - methods - field - data acquisition - processing - interpretation.

UNIT V

Elemental abundance of earth materials. Geochemical classification. Concepts – geochemical cycles – dispersion – controls and mobility of elements – haloes – types and recognition – utility of path finder elements. Geochemical surveys – exploration – principles – instruments – sampling methods – types. Geochemical analysis – principles – methods – instrumentation – limitations – interpretations. Geobotanical methods and their applications.

REFERENCE AND TEXT BOOKS:

1. Ramachandra Rao, M.B. 1993. Outlines of Geophysical Prospecting. EBD, Dhanbad.
2. Kearey, P., Brooks, M & Hill. I. 2002. An introduction to geophysical exploration, 3rd ed. Blackwell Science.
3. Telford, W.M., Geldart, L.P & Sheriff, R.E. 1990. Applied Geophysics. 2nd ed. Cambridge University Press, New Delhi.
4. Parasnis, D.S. 1975. Principles of applied Geophysics. Chapman & Hall. New York.
5. Dobrin, M.B. & Savit, C.H. 1988. Introduction to Geophysical Prospecting. 4th Ed. McGraw Hill, New Delhi.
6. Hawkes, H.E. 1959. Principles of Geochemical Prospecting. Bulletin 1000F. USGS.
7. Arogyasamy, R.N.P. 1980. Courses in Mining Geology. Oxford & IBH, New Delhi.
8. Moon, C.J., Whateley, M.K.G. & Evans, A.M. 2006. Introduction to Mineral Exploration. Wiley Blackwell. New Delhi.

M Phil., GEOLOGY

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REMOTE SENSING AND GIS IN GEOLOGY

PAPER CODE: 18MPAG03

GUIDE PAPER SYLLABUS

UNIT I

Electromagnetic radiation spectrum, EMR interaction with atmosphere, EMR interaction with earth objects, Spectra of rocks and Minerals, Landsat satellite programme, Indian Remote sensing satellite (IRS) programme, Introduction to hyperspectral remote sensing, Hyperspectral remote sensing data.

UNIT II

Digital image processing: Introduction, geometric and radiometric errors, geometric and radiometric corrections, image enhancement techniques, Band rationing techniques, principal component analysis, unsupervised classifications, supervised classifications and fuzzy classifications.

UNIT III

Definition of GIS, GIS components, Vector data model, raster data model, attribute data, Spatial data structure - non topology (spaghetti) structure, topology data structure, Raster data structure- Quad tree model, run-length encoding, Vector to Raster conversion, Data base management system.

UNIT IV

GIS data input - data sources, map projections, digitizing, coordinate conversion. Spatial data query- display, visualization, spatial query. Spatial data transformation, spatial data analysis- logical and arithmetic operations, Map overlay analysis, Remote sensing and GIS Applications: Geomorphology and landforms studies.

UNIT V

Remote sensing and GIS Applications: Petroleum and Mineral exploration, Groundwater exploration, artificial recharge and groundwater management, Engineering Geological investigations, Natural disaster mapping (landslide & flooding), structure and tectonic studies, coastal zone mapping and management.

REFERENCE BOOKS:

1. Lillisand, T.M., & P.W.Kiefer., (2000). Remote sensing and Image Interpretation, John Wiley & Sons, Inc. New York. P 724.
2. Gupta, R.P. (2000) Remote Sensing Geology. Springer-Verlag. 356pp.
3. Jensen.J.R., (2005) Introductory Digital image processing, 3rd edition, Pearson Prentice Hall, p526.
4. Anbazhagan .S, Subramanian.S.K, and Yang Xiaojun (2011) ed., al: Geoinformatics in Applied Geomorphology. CRC Press, Taylor & Francis Group, FL p383.
5. Campbell, J. B. (1996) Introduction to Remote Sensing.622pp.
6. Drury, S.A. 1987. Image interpretation in Geology. Chapman and Hall.
7. Chang. K T 2002. Introduction to Geographic Information Systems, Tata McGraw-Hill 348p
8. Burrough P.A., and McDonnell.R.A., (1998). Principles of Geographic Information System. Oxford University Press, P333.
9. Sabins,F.F.Jr (1978) Remote sensing Principles and Interpretation, Freeman,sanfrancisco sons, New York.
10. Tor Bernhardsen; Geographic Information Systems -An Introdutipon -John Wiley & Sons.
11. Bonham Carter, G.F. 1994. GIS for Geoscientists- Modelling with GIS, Elsevier, p 398.