R.K.D.F. UNIVERSITY, BHOPAL

M.Sc.(GEOLOGY)

SCHEME

Semester – I

No	Subject Code	Subject Title	Marks Allotted						
			Assignment Marks		Theory Marks		Practical Marks		Total Marks
			Max	Min	Max	Min	Max	Min	
1	MSG- 511	GEODYNAMICS	20	8	80	32	-	-	100
2	MSG- 512	GEOMORPHOLOGY	20	8	80	32	-	-	100
3	MSG- 513	STRUCTURAL GEOLOGY	20	8	80	32	-	-	100
4	MSG- 514	ENGINEERING GEOLOGY	20	8	80	32	-	-	100
5	MSG- 515	PRACTICAL-I (BASED ON MSG-511 & MSG-512)	-	-	-	-	50	20	50
6	MSG- 516	PRACTICAL-II (BASED ON MSG-513 & MSG-514)	-	-	-	-	50	20	50
Total			**80**	**32**	**320**	**128**	**100**	**40**	**500**

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M.Sc.(GEOLOGY)

Syllabus

Semester – I

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.SC	GEODYNAMICS	MSG-511

Unit-I

Earth's surface features. Seismology: seismic waves, intensity and magnitude. Earthquake belts/Earthquake zones of India, Seismograph, Causes & Effect of Earthquake.

Unit-II

Seismic waves as probes of Earth's Interior. Internal structure of the Earth, Seismic Tomography. Volcanism: Types of causes of Volcanic Erruption, Volcanic products. Global distribution of volcanoes, volcanism in India.

Unit-III

Geosynclines: Classification and evolution of Geosyncline, cause of subsidence and upliftment. Classification & origin of mountain. Isostasy: Development of the concept, Isostatic adjustment, Isostatic models, Evidence.

Unit-IV

Continental drift : Development of the concept, Taylor's and Wegner's theories of continental drift. Evidence of continental drift and Polar wandering. Palaeomagnetism & Sea floor spreading.

Unit-V

Concept of plate tectonics : Types of plate boundaries, features of convergent divergent boundaries. Triple junctions and Transform plate Boundary. Causes of plate motion, Island Arcs. General features, origin and evolution of Island Arcs.

REFERENCES:

- Holmes, Doris L and Arthur : Holmes' Principles of Physical Geology, Wiley
- Wyllie, Peter J : The Dynamic Earth, Wiley
- Wylie, 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 Science
- Gutenburg Beno : Internal Constitution of the Earth,
- Dover W.Kenneth :Earth's Dynamic System
- Patwardhan, AM: The Dynamic Earth System
- Mallery and Cargo:Physical Geology

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Syllabus
Semester – I

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc. (Geology)	GEOMORPHOLOGY	MSG-512

Unit-I

Concept of Geomorphoiogy principles and their significance. Cycle of erosion, Davis' and Plank' cycle of erosion. Slope forming processes: Landslides, Soil creep and Solifluction

Unit-II

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. Erosional and depositional landforms of streams.

Unit-III

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. Arid cycle of erosion.

Unit-IV

Karst Topography: Important areas of Karst. Conditions essential tor 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-V

Morphometric Analysis of Terrain and its significance. Morphometric analysis of drainage basin and its significance.

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,: 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
- Balis, J R: Applied Geomorphology.

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Syllabus

Semester – I

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc. (Geology)	STRUCTURAL GEOLOGY	MSG-513

Unit-I

Rock failure: Mechanical principles of rock deformation, factors controlling behaviour of material. Concept of stress and strain analysis, Mohr circles. Unconformities: types and recognition. Stratigraphic sequence Indicators.

Unit-II

Ductile deformations, Geometry of folds surface: Single and multi-layered. Fold scale & attitude, The elements of fold style, Super- imposed folding. Classification of Folds. Types of folds. Recognition of folds. Effects of folds on outcrops

Unit-III

Brittle deformation, Geometry of faults. Classification and types of faults. Slips, Separation, Recognition of faults. Causes of faulting.

Unit-IV

Origin, kinds and their relation to other structures: Fractures and joints, Types & geomorphological classification of Lineation, Foliation.

Unit-V

Kinematics of folding:- Single & multiple layers, Formation of kink & chevron folds, Kinematics of faulting, Magma Tectonics: Emplacement of Pluton,

REFERENCES:

- 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,
- Billing MP- Structural Geology III Edition
- Twiss and Moore, Structural Geology

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Syllabus

Semester – I

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc. (Geology)	ENGINEERING GEOLOGY	MSG-514

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.
- Anderson: Geochemistry
- Dana: Textbook of Miner

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SCHEME

Semester – II

No	Subject Code	Subject Title	Marks Allotted						
			Assignment Marks		Theory Marks		Practical Marks		Total Marks
			Max	Min	Max	Min	Max	Min	
1	MSG- 521	PALEOBIOLOGY	20	8	80	32	-	-	100
2	MSG- 522	GEOCHEMISTRY	20	8	80	32	-	-	100
3	MSG- 523	ENVIRONMENTAL GEOLOGY	20	8	80	32	-	-	100
4	MSG- 524	MINEROLOGY	20	8	80	32	-	-	100
5	MSG- 525	PRACTICAL III (BASED ON MSG 521 & MSG 522)	-	-	-	-	50	20	50
6	MSG- 526	PRACTICAL IV (BASED ON MSG 523 & MSG 524)	-	-	-	-	50	20	50
Total			**80**	**32**	**320**	**128**	**100**	**40**	**500**

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Syllabus
Semester – II

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc. (Geology)	PALAEOBIOLOGY	MSG-521

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, applications of microfossils in fossilfuel exploration. Morphology and geological history of 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.

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Syllabus

Semester – II

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc. (Geology)	GEOCHEMISTRY	MSG-522

UNIT I

Introduction of Geochemistry and Cosmochemistry. Chemical composition and properties of Earth's layers. Atmosphere: its layers, chemical composition and evolution of Atmosphere. Meteorites. GoldSchmidt geochemical classification.

UNIT II

Isotope geochemistry; kinds of isotopes; Radiogenic isotopes. Decay scheme of K-Ar, U-Pb ,V-Pb, SmNd and Rb-Sr; Radioactive dating of single minerals and whole rocks; Stable isotope geochemistry of Carbon and Oxygen and its application in Geology. Geochemistry of Uranium and Lithium.

UNIT III

Concept of enthalpy, free energy; chemical potential; fugacity,Structure and types of atoms. Internal structure of atoms, atomic weights. Types of chemical bonding. Ionic radii. Coordination number. Lattice energy. Ionization potential. Electronegativity. Pauling's rule. Isomorphism and polymorphism. Principles of ionic substitution in minerals. (8 Periods)

UNIT IV

Eh and pH diagrams , limits of Eh and pH in nature;; oxidation and reduction in sedimentation. Geochemical cycle; Minor cycle and Major cycle.Geochemical classification of elements. distribution of elements in igneous, metamorphic and sedimentary rocks. Periodic table with special reference to rare earth elements and transition elements. (

UNIT V

Concept of geochemical- biogeochemical cycling and global climate;Hydrosphere: the hydrological cycle, composition of natural waters, some characteristics of river waters and ground water; Biosphere: Introduction: the mass of the biosphere: composition of the biosphere: biogenic deposits; geochemical cycle of carbon.

PRACTICAL Preparation and interpretation of geochemical maps; Rock/ sediments/ water/ soil analysis; Preparation of classificatory and variation diagrams, REE normalized plots and their interpretation

BOOKS RECOMMENDED

1.Mason, B.and Moore, and C.B.: - Introduction to Geochemistry 2.Faure, G.: -Principles of Isotope Geology 3.Hoefs, J.: -Stable Isotope Geochemistry 4.Marshal, C.P. and Fairbridge, R.W.: -Encyclopedia of Geochemistry 5.Govett, G. J.S.: -Handbook of Exploration Geochemistry 6.Kraustopf, K.B.: - Introduction to Geochemistry

Pettijohn, Potter and Seiver: Sand and Sandstones.

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M.Sc.(GEOLOGY)

Syllabus
Semester – II

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc. (Geology)	ENVIRONMENTAL GEOLOGY	MSG-523

Unit - I

Concept of Environmental Geology. Classification of Environment. Ecological Perspectives of the Environment. Global Warming.

Unit - II

Geologic Resources and Energy : Mineral Resources, Energy and Fossil Fuels, Alternative Energy Resources, Water Resources.

Unit - III

Earth Materials and Processes, Geologic Cycle, Minerals, Rocks, Soils , Water, Wind and Ice.

Unit - IV

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 fertilizers and pesticides.

Unit - V

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.

Books Recommended :

1. Environmental Geology - *Errol G. Kelly*
2. Environmental Geology - *Edward A. Keller*
3. Environmental Geology - *Carla W. Montgomery*
4. Introduction to Environmental Remote Sensing - *E. C. Barrett and L. F. Curtis*

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Syllabus

Semester – II

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc. (Geology)	Mineralogy	MSG-524

UNIT –I

Definition of mineral , Silicate structures of minerals; physical and chemical properties of minerals.

UNIT – II

Structural formulae, classification, atomic structure, polymorphs/structural states, chemistry, substitution of elements/solid solution and experimental work on pressure-temperature stability of the minerals, modes of occurrence and alterations. of the following group of rock- forming minerals - olivine,humite, garnet, kyanite, pyroxene, amphibole, talc, mica, chlorite, feldspar, cordierite, kaolinite, serpentinite feldspathoids, alumino-silicate and metallic oxides.

UNIT – III

Bonding in Minerals, Isomorphism, Polymorphism and Pseudomorphism, Solid solution

UNIT – IV

Birefringence, pleochroism and interference phenomena in minerals; extinction angles; optical indicatrix; concept of uniaxial and biaxial indicatrix; dispersion in minerals; optical anomalies; and optical accessories like quartz, mica and gypsum plate.

Unit – V

Study of Composition, physical and optical properties of the following mineral groups :

1. Olivine, Garnet and Mica
2. Pyroxenes
3. Amphiboles
4. Feldspars
5. Silica

Andrew: Palaeontology

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SCHEME

Semester – III

No	Subject Code	Subject Title	Marks Allotted						
			Assignment Marks		Theory Marks		Practical Marks		Total Marks
			Max	Min	Max	Min	Max	Min	
1	MSG- 531	HYDROGEOLOGY	20	8	80	32	-	-	100
2	MSG- 532	GEOPHYSICS	20	8	80	32	-	-	100
3	MSG- 533	APPLIED GEOLOGY	20	8	80	32	-	-	100
4	MSG- 534	ECONOMIC GEOLOGY	20	8	80	32	-	-	100
5	MSG- 535	PRACTICAL III (BASED ON MSG 531 & MSG 532)	-	-	-	-	50	20	50
6	MSG- 536	PRACTICAL IV (BASED ON MSG 533 & MSG 534)	-	-	-	-	50	20	50
Total			**80**	**32**	**320**	**128**	**100**	**40**	**500**

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Semester – III

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc. (Geology)	HYDROGEOLOGY	MSG-531

UNIT – I

Hydrological cycle and its applications. Determination of precipitation, Evaporation, Transportation. Infiltration, run-off, groundwater equation, subsurface water zone. Hydrological properties of water bearing materials, determination of porosity, permeability, transmissibility, coefficient of storage specific yield, specific retention.

UNIT - II

Occurrence of groundwater, confined and unconfined conditions, Perched water table conditions. Flow of groundwater and hydraulics. Darcy's law and range of validity.

UNIT - III

Measurement of discharge and water levels and preparation of water table Piezometric surface maps and their interpretation. Flow net analysis. Pumping test analysis. Interference of wells. Theory of Image wells. Leaky aquifer and partially artesian wells.

UNIT - IV

Fluctuation of water level. Natural recharge and discharge of groundwater. Methods of artificial recharge of ground water. Geomorphic, Geological and structural controls on ground water.

UNIT - V

Geological investigation. Preparation of Ground water maps and Hydrological properties of Rocks. water bearing qualities of rocks. Types of Aquifer and their functions.

Books Recommended -

- Ground water Hydrology - *David Keith Todd*
- Applied Hydrology - *Mutreja*
- Hydrology - *Raghunath*
- Ground water and Tube Wells - *S. P. Garg*
- Hydrogeology - *K. R. Karanth*
- Introduction to Hydrology - *Warren Viessman Jr., Gary L. Lewis, John W.* Knapp.
- Applied Hydrogeology - *C. W. Fetter.*
- Hydrogeology - *S. N. Davies and De Wiest.*
- Ground water - *R. A. Freeze, J. A. Cherry.*
- Pratt, V.K. : Digital Image Processing.
- Tripathi and Bajpai ed. 2000 : Remote Sensing in Geosciences.
- Wolf : Introduction to Photogrammetry.
- Jenson : Environmental Remote Sensing

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Semester – III

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc. (Geology)	GEOPHYSICS	MSG-532

Unit - I

Interrelationship between geology and geophysics - Role of geological and geophysical data in explaining geodynamical features of the earth. General and Exploration geophysics- Different types of geophysical methods; Gravity, magnetic, Electrical, Seismic- their principles and applications. Concepts and Usage of corrections in geophysical data.

Unit - II

Geophysical field operations - Different types of surveys, grid and route surveys, profiling and sounding techniques, scales of survey, presentation of geophysical data.

Unit - III

Application of Geophysical methods - Regional geophysics, oil and gas geophysics, ore geophysics, groundwater geophysics, engineering geophysics.

Unit - IV

Geophysical anomalies : correction to measured quantities, geophysical, anomaly, regional and residual (local) anomalies, factors controlling anomaly, depth of exploration.

Unit - V

Integrated geophysical methods - Ambiguities in geophysical interpretation, Planning and execution of geophysical surveys.

Suggested Readings

1. Outlines of Geophysical Prospecting - A manual for geologists by Ramachandra Rao, M.B., Prasaranga, University of Mysore, Mysore, 1975.
2. Exploration Geophysics - An Outline by Bhimasarikaram V.L.S., Association of Exploration Geophysicists, Osmania University, Hyderabad, 1990.
3. An introduction to Geophysical Prospecting by Dobrin, M.B. McGraw Hill, New Delhi, 1984.
4. Applied Geophysics by Telford W.M. Geldart L.P., Sheriff, R.E. and Keys D.A. Oxford and IBH Publishing Co. Pvt., Ltd. New Delhi, 1976

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M.Sc.(GEOLOGY)

Syllabus

Semester – III

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc. (Geology)	APPLIED GEOLOGY	MSG-533

Unit - I

Geological principles of ore-search and ore appraisal. Guide to ore, Ringed targets ; Intersecting loci. Classification of guides - details about physiographic guides, mineralogical guides, stratigraphic, lithological guides and structural guides.

Unit - II

Geological prospecting and exploration. Sequences in mineral exploration - Reconnaissance and data recording, Airborne and satellite imagery. Mapping of surface geology. Detailed geological prospecting by Pits, Trenches, Shafts, Tunnels, Drilling. Prospecting for Placer deposits.

Unit - III

Geochemical prospecting for Matallic mineral deposits. Principles of dispersion of elements. Path-finder elements. Geochemical survey - soil, rock and vegetation surveys. Geobotanical methods. Geochemical techniques for petroleum and natural gas exploration. Some case studies related to Geochemical exploration.

Unit - IV

Geophysical practices in mineral exploration – Gravity, Magnetic, Electrical, Electromagnetic, Induced Polarization, Seismic, Radiometric and Thermal methods. Borehole Geophysics and Tomography. Well logging methods. Geophysical Mapping. Geophysical exploration for Basemetals, Radioactive Minerals, Groundwater etc.

Unit - V

Drilling in exploration. Types of Drilling - Churn drilling, diamond drilling. Deviation of bore holes. Geologist duties at drill site. Choice of a drilling method. Drill hole sampling and reduction. Drill hole patterns and sequences. Bore hole planning for exploration.

Books Recommended :

1. Introduction to Geophysical Prospecting - *M. B. Dobrin*
2. Principles of Applied Geophysics - *B. S. Parasnis.*
3. Exploration and Mining Geology - *William C. Peters*
4. Drilling Technology Hand book - *Chugh*
5. Encyclopedia of Applied Geology - *Finkal*
6. Geological Prospecting and Exploration - *B. M. Kreiter*
7. Geophysical Practice in Mineral Exploration and Mapping - *T. S. Ramakrishna*
8. Practical Manual of Exploration and Prospecting - *S. K. Babu, D. K. Sinha*
9. Handbook of Mineral Exploration and Ore Petrology : Techniques and Applications – *R. Dhana Raju*
10. Handbook of Geochemistry : Techniques and Applications in Mineral Exploration – *R. Dhana Raju*
11. Geophysical Mapping in Mineral Exploration and Mapping – *T. S. Ramakrishna*

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Semester – III

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc. (Geology)	ECONOMIC GEOLOGY	MSG-534

Unit - I

Introduction : Ore Gangue and mineral deposits physical and chemical behaviour of mineralising fluid. Migration and accumulation of minerals, Metals, Fuel Physical and chemical principles of ore deposition.

Unit - II

Processes of formation of mineral and ore deposits, classification of processes of ore deposition primary processes, magmatic processes, pegmatitic and pneumatolitic processes, contact metasomatism and ore deposition, Hydrothermal and zones of mineral deposits (Hydrothermal, Mesothermal and Epithermal). Form size, texture, structure and mineral assemblages of the above genetic groups of minerals.

Unit - III

Metallic ore deposits and their study with reference to (i) Mode of occurrence, (ii) Association, (iii) Distribution in India, (iv) Specification and uses of the following - Iron, Manganese, Chromium, Nickel, Copper, Lead, Zinc, Aluminium, Tin, Tungsten, Gold and Silver.

Unit - IV

Origin, mode of occurrence, association, specification and grades for uses in industries and Indian occurrences of the following Non metallic minerals :

Mica, Vermiculite, Asbetos, Barytes, Gypsum, Kyanite, Beryl, Magnesite, Talc, Graphite, Fluorite, Ochres, Corundum and Diamond.

Introduction to Coal, Types of Coal, Origin of coal, Indian and International classification of coal, Geology of productive Coal and Lignite fields of India. Distribution of coal in India. Coal Bed Methane.

Unit - V

Introduction to liquid and gaseous hydrocarbons. Origin, Migration and Accumulation (Oil traps) of petroleum and natural gas. Distribution of petroliferous basins of India. Geology of productive oil fields of India. Atomic minerals : mode of occurrence, association and distribution in India. Nuclear power stations of the country and future prospects.

Books Recommended :

1. Economic Mineral Deposits - *M. Bateman*
2. India's Mineral Resources - *S. Krishnaswamy*
3. Ore Geology and Industrial Minerals - *A. M. Evans*
4. Minerals of India - *D. N. Wadia*
5. Industrial Minerals and Rocks of India - *S. Deb*
6. Gold in India - *B. P. Radhakrishnan, L. C. Curtis*
7. Diamonds in India - *T. M. Babu*
8. Gems and Gem Industry in India - *R.V. Karanth*
9. Ore Deposits - *K.V. G. K. Gokhale, T. G. Rao*
10. Petroleum Geology - *F. K. North*
11. An Introduction to Coal Preparation Practice - *G. G. Sarkar*
12. Economic Geology - *Umeshwar Prasad*

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SCHEME

M.Sc. GEOLOGY

Semester – IV

No	Subject Code	Subject Title	Marks Allotted						
			Assignment Marks		Theory Marks		Practical Marks		Total Marks
			Max	Min	Max	Min	Max	Min	
1	MSG- 541	PHOTOGEOLOGY AND REMOTE SENSING	20	8	80	32	-	-	100
2	MSG- 542	SEDIMENTOLOGY AND SEDIMENTARY	20	8	80	32	-	-	100
3	MSG- 543	DISSERTATION	-	-	-	-	250	125	250
4	MSG- 544	PRACTICALS BASED ON MSG-541 & MSG-542	-	-	-	-	50	20	50
Total			**40**	**16**	**160**	**64**	**300**	**145**	**500**

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Semester – IV

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc. (Geology)	PHOTOGEOLOGY AND REMOTE SENSING	MSG-541

Unit - I

Definition of photogeology and aerial photography. Advantages and limitations of photogeology. Types of aerial photographs and their applications. Fundamental principles and techniques in aerial photography. Types of aerial cameras. Factors affecting aerial photography. Planning of aerial phtography and flight procedures. Scale of aerial photographs.

Unit - II

Annotations of aerial photographs. Flight strips and mosaics. Stereoscopic vision. Different types of viewing instruments. Vertical exaggeration. Elements of photogrammetry, relief displacement, image parallax, and parallax measurement. Measurement of height, dip and thickness of strata from the aerial photographs by parallax instrument. Orthophotographs.

Unit – III

Basic concepts of remote sensing. Advantages and limitations of remote sensing. Electromagnetic spectrum and radiation principles. Interaction of electromagnetic radiations with the atmosphere and the earth's surface. Spectral signatures, spectral bands and atmospheric windows. Remote Sensing systems - Active and Passive remote sensing.

Remote sensing sensors multi-spectrum scanners, thermal scanners and microwave scanners. Important characteristics of Indian remote sensing satellite (IRS series).

Unit - IV

Principles of Visual interpretation techniques of aerial photos and satellite imagery. Instruments required for visual interpretation of satellite imagery. Interpretation of Aerial photos and Multispectral, Thermal, SLAR and SAR imagery. Interpretation of geology, geomorphology and structures from aerial photographs and satellite imagery.

Unit - V

Applications of photogeology and Remote sensing in mineral exploration and ground water exploration, engineering project and land use / land cover mapping.

Books Recommended :

1. Principles and Applications of Photogeology - *S. M. Pandey.*
2. Text Book of Remote Sensing - *C. S. Agrawal and P. K. Garg.*
3. Elements of Photogrammetry - *P. R. Wolf.*
4. Photogeology and Regional Mapping - *J. A. E. Allum.*
5. Hand Book of Aerial Photography and Interpretation - *K. K. Rampal.*
6. Interpretation of Air photos and Remotely Sensed Imagery - *Robert H. Arnold.*
7. Fundamentals of Remote Sensing and Air Photo Interpretation - *Thomas Avery, Gradon Lennis.*
8. Remote Sensing and Image Interpretation - *Thomas M. Lillesand, R. W. Kiefer.*
9. Aerial Photography and Image Interpretation for Resource Management - *D. P. Paine.*
10. Photogeology - *V. C. Miller.*

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Syllabus

Semester – IV

BRANCH	SUBJECT TITLE	SUBJECT CODE
M.Sc. (Geology)	SEDIMENTOLOGY AND SEDIMENTARY	MSG-542

Unit – I

Process of Sedimentation, Sedimentation in relation to Geosyclines. Differentiation, Geochemistry of Sediments, Diagenesis and Lithification.

Unit – II

Significance of heavy minerals, light minerals and insolubles residue in determination of provenance. Sedimentary fecies and tectnoics. Depositional environment.

Unit – III

General idea about the types of sedimentary minerals. Classification of sedimentary rocks, sandstones and limestones. Study of important group of sedimentary rocks.

Unit – IV

Textures and structures of sedimentary rocks. Mechanical analysis of clastic sediments, representation and interpretation of the results.

Unit – V

Petrogenetic significance of important sedimentary rocks with reference to Indian occurrences - Sandstone, Limestone, Dolomite, Shale, Gypsum, Bauxite, Laterite.

Books Recommended :

1. Petrology of Sedimentary Rocks - *J. T. Greansmith.*
2. Sedimentary Petrology - *V.K. Verma and P. Prasad*
3. Sedimentary Rocks - *Pettijohn*
4. Sedimentary Structures - *J. D. Collinson and D. B.* Thompson
5. Origin of Sedimentary Rocks - *Harway Blatt*
6. Practical Manual of Sedimentary Petrology - *S. K. Babu, D. K. Sinha*
7. Procedures in Sedimentary Petrology - *R. V. Karver*
8. Principles of Sedimentology and Stratigraphy - *Sam Boggs Jr.*
9. Encyclopedia and Sediments and Sedimentary Rocks - *G. V. Middleton*
10. A Practical Approach to Sedimentology - *R. C. Lindholm*
11. Principles of Sedimentology - *Friedman, Sanders*
12. Applied Sedimentalogy - *Selley*
13. Introduction to Sedimentalogy - *S. Sengupta.*
14. Sedimentology and Stratigraphy - *G. Nichols.*
15. Principles of Physical Sedimentation - *J. R. L. Allen.*
16. Origin of Sedimentary Rocks - *H. Batt, G. V. Murray, R. C. Middleton.*