Geology B.Sc.

OFFICE OF THE
DEAN OF THE FACULTY OF SCIENCE
PATNA UNIVERSITY,
PATNA - 800 005 (INDIA)

29/10/15

Ref. : D.F.Sc.290

Date : 04.08.2015

NOTIFICATION

The Board of Courses and Studies for the subject of Geology is constituted with the following members as per decision of the meeting of the Faculty of Science held on 03.08.2015 in the Department of Chemistry, Patna University

Chairman

Prof. M.N.Sinha
Prof. & Head of the Department of Geology, P.U.

External Members

1. Dr. Jageshwar Pd. Singh
   Retd. Prof of Geology, Ranchi University, Ranchi.
2. Dr. Mallikarjun Joshi
   Prof of Geology, BHU, Varanasi

Internal Members

1. Dr. B.K.Mishra
   Univ. Professor of Geology,
   Patna University
2. Dr. Ramesh Shukla
   Univ. Professor of Geology,
   Patna University.
3. Dr. Anil Kumar
   Associate Professor & Head of Geology,
   Patna Science College, Patna
4. Dr. A.A.Pandey
   Associate Professor of Geology,
   Patna Science College, Patna
5. Dr. Rabindra Kumar
   Associate Professor of Geology, Patna Science College, Patna
6. Dr. Rambali Singh, Associate Professor of Geology & HOD,
   B.N.College
7. Dr. Akhileshwar Tiwari, Associate Professor of Geology
   B.N.College

copy to
Chairman: Prof. M.N. Sinha
HOD, Geology, P.U.

Ramjatan Sinha

(Dr. Ram Jatan Sinha)
Dean Faculty of Science,
Patna University, Patna

- Joints – Definition, types & classification
- Lineation, Foliation – Definition and types.
- Criteria for the recognition of top and bottom of bed

THEORY PAPER-II

Full marks – 75

Time – 3 hours

In all ***Ten*** questions are to be set (***Five*** from each group) and the students are required to answer ***five*** questions selecting ***at least two*** from each group

Group – A
MINERALOGY

- Minerals – Definition and physical properties – form, colour, streak, luster, cleavage, fracture, hardness, and specific gravity
- Isomorphism, Polymorphism and Pseudomorphism
- Structure of silicates
- A detailed study of following rock forming mineral groups with reference to their *composition, structure, physical* and *optical properties* and *paragenesis:*

  Quartz, Feldspar, Pyroxene, Amphibole, Mica

- *Detailed study of the following minerals* – Garnet, Olivine, Nepheline, Talc, Gypsum, Calcite, Fluorite, Apatite, Beryl, Topaz, Corundum, Barite, Kyanite, Sillimanite, Tourmaline.

Group – B
CRYSTALLOGRAPHY

- Definition and morphology of crystal, crystal notations,
- Brief idea of space lattice,
- Symmetry elements : Plane-, Axis- and Centre of symmetry
- Parameter, indices and symbols
- Laws of crystallography
- Contact Goniometer
- Stereographic Projections
- Study of the following Crystal systems:
  - Isometric system,
  - Tetragonal system,
  - Hexagonal system,
  - Orthorhombic system,
  - Monoclinic system,
  - Triclinic system
- Crystal habits and twinning, laws of twinning

OPTICAL MINERALOGY

- Elementary concepts of light, Propagation of light through minerals.
- Polarization, Double refraction.
- Construction of Nicol Prism,
- Petrological Microscope and its function.
- Isotropism and Anisotropism, Optical indicatrix

- Important optical properties – R.I., Pleochroism, Pleochroic haloes, Extinction and extinction angle, Birefringence, Interference colours
- Behaviour of convergent polarized light in Uniaxial and Biaxial minerals.
- Optical Accessories – Mica plate, Gypsum plate and Quartz wed

PRACTICAL

Full Marks – 50 (Practical – 40 marks, Sessional and viva – 10 marks)

- Study of geological maps, drawing of geological section and description of their geological history.
- Clinographic Projection of :

  Isometric System – Cube, Octahedron, Rhombdodecahedron, Pyritohedron, Trapezohedron and Tetrahedron (+ve and –ve)

  Tetragonal System – 1st and 2nd order Prism with Basal pinacoids, 1st and 2nd order Pyramids

  Zircon, Vesuvianite, Cassiterite

- Stereographic Projection of : Zircon, Vesuvianite, Cassiterite and Barite
- Megascopic study of ores and common rock forming minerals
- Microscopic study of common rock forming minerals

Books recommended :

1. *Holmes, A.* : Principles of Physical Geology.
2. *Longwell and Flint* : Introduction to Physical Geology
3. *Dutta, A.K.* : An Introduction to Physical Geology
4. *Singh, S.* : Physical Geography
5. *Singh, Praveen* : Textbook of Engineering and General Geology
6. *Siddarth, K.* : Earth's Dynamic Surface
7. *De Sitter, L.U.* : Structural Geology
8. *Billings, M.P.* : Structural Geology
9. *Platt and Challinov* : Simple Geological Structure
10. *Chiplonkar, G.N.* : Geological Maps
11. *Lahee, F.H.* : Field Geology
12. *Turner, F.J. and Weiss, L.E.* : Structural Analysis of Metamorphic Tectonics

B.Sc. Geology Subsidiary Part -I

Theory Paper – I

Full Marks – 75

Time – 3 hours

In all ***Ten*** questions are to be set (***Five*** from each group) and the students are required to answer ***five*** questions selecting ***at least two*** from each group.

Group – A

PHYSICAL GEOLOGY

- Aim, application and various branches of Geology
- Earth as a planet - Its size, shape, origin and age,
- Internal structure of the earth.
- Earthquake – Causes, distribution and effects.
- Elementary idea ofthe earth - Atmosphere, Hydrosphere, Lithosphere & Biosphere.
- Surface processes : Weathering and Erosion,
- Geological work of : River, Glaciers, Underground water and Wind.
- Volcanoes : types, products and distribution

STRUCTURAL GEOLOGY

- Elementary concepts of stratification and bedding
- Dip and strike
- Clinometer Compass
- Fold – definition, classification & types
- Fault – definition, classification
- Unconformity – definition, types
- Joints - definition, types

Group – B

MINERALOGY

- Minerals – Definition and physical properties – forms, colour, streak, luster, cleavage, fracture, hardness, specific gravity etc.
- Moh's scale of hardness
- Isomorphism and Polymorphism,
- Structural Classification of silicates
- Mineralogy of important group of rock forming minerals with reference to *composition, structure, physical and optical properties* –

  Feldspar, Pyroxene, Amphibole, Mica

- Study of physical and optical properties, chemical composition of following minerals-
- Quartz, Olivine, Garnet, Talc, Gypsum, Calcite, Fluorite, Apatite, Topaz, Corundum.

CRYSTALLOGRAPHY

- Crystal – Definition, faces, edges & solid angles
- Crystallographic axis, crystallographic planes, Crystal notations.
- Symmetry elements : axis-, plane- and centre of symmetry
- Contact goniometer and its use
- Laws of crystallography
- Crystal System, Study of the normal class of the following crystal systems:

  Isometric system, Tetragonal system, Orthorhombic system

OPTICAL MINERALOGY

- Propagation of light through minerals
- Double refraction and polarization
- Construction of Nicol Prism
- Petrological Microscope and its function
- *Study of important optical properties* – R.I., Relief, Birefringence, Pleochroism, Interference colour and Extinction.

PRACTICAL

Full Marks – 25 (Practical – 20 Marks and Sessional & Viva – 5 Marks)

- Study of simple geological maps, drawing of geological section and description of their geological history.
- *Crystal drawing of the following forms* : Cube, Octahedron, Rhombdodecahedron, 1st and 2nd order Prisms and Pyramids of Tetragonal System, Zircon
- *Study of Physical properties of the following minerals* : Quartz, Orthoclase, Microcline, Feldpars, Muscovite, Biotite, Hornblende, Tremolite, Actinolite, Olivine, Calcite, Gypsum, Talc, Fluorite, Apatite, Topaz, Corundum, Baryte, Kyanite, Tourmaline, Garnet, Magnetite, Hematite, Chalcopyrite, Pyrite, Bauxite, Chromite, Pyrolusite, Psilomelane.
- Microscopic Study of the common rock forming minerals.

Books recommended :

1. *Holmes, A.* : Principles of Physical Geology.
2. *Dutta, A.K.* : An Introduction to Physical Geology
3. *Singh, S.* : Physical Geography
4. *Singh, Praveen* : Textbook of Engineering and General Geology
5. *Siddarth, K.* : Earth's Dynamic Surface
6. *De Sitter, L.U.* : Structural Geology
7. *Billings, M.P.* : Structural Geology
8. *Platt and Challinov* : Simple Geological Structure
9. *Lahee, F.H.* : Field Geology
10. *Mukherjee, P.K.*: Text Book of Geology
11. *Dana & Ford* : Textbook of Mineralogy
12. *H.H.Read* : Rutley's Mineralogy
13. *Berry Mason* – Elements of Mineralogy
14. *Kerr, P.F.*– Optical Mineralogy

COURSES OF STUDY
(Three Year Degree Course)
B.Sc. Geology Honours Part –II
THEORY PAPER –III

Full Marks – 75
Time-3 hours

In all ***Ten*** questions are to be set and the students are required to answer ***five*** questions.

IGNEOUS PETROLOGY

- Introduction to Petrology-distinguishing features of three types of rocks
- Igneous Petrology : Definition. Form Texture and Structure of Igneous rocks and their petrological significance
- Magma : Definition, generation and crystallization of magma, Elementary idea of relationship between magma generation and Tectonic setting
- Bowen's Reaction Principle & its petrological significance
- Classification of Igneous rocks
- Diversity of Igneous Rocks.
- Introduction to Phase Rule, Study of the following Phase diagrams :

  Binary : Ab –An ; Ternary : Ab – An – Di.
- *Petrographic description of the following rock types* :

  Granite Rhyolite, Syenite, Nepheline-syenite, Monzonite, Granodiorite, Diorite, Pegmatite, Anorthosite, Gabbro, Dolerite, Basalt, Peridotite, Pyroxenite, Norite, Dunite, Trachyte and Andesite.

THEORY PAPER –IV

Full Marks – 75

Time-3 hours

In all ***Ten*** questions are to be set (***five*** from each group) and the students are required to answer ***five*** questions selecting **at least two** from each group.

Group-A

SEDIMENTARY PETROLOGY

- Introduction
- Processes of formation of sedimentary rocks
- Lithification and Diagenesis
- Textures of clastic and non-clastic sedimentary rocks
- Structures of sedimentary rocks -- Primary, Secondary, Biological
- Classification of sedimentary rocks
- Provenance
- *Petrographic description of the following rock types :*

  Conglomerate, Breccia, Sandstones – Orthoquartzite, Arkose, Greywacke, Limestone, Dolomite, Shale.

Group-B

METAMORPHIC PETROLOGY

- Introduction to metamorphism : Definition, aims and scope of study of metamorphic rocks
- Limitations of metamorphism- Diagenesis, metamorphism, anataxis, palingenesis
- Preliminary ideas of metamorphic differentiation, Prograde, Retrograde, and Poly-metamorphism, paired metamorphic belts, Index minerals
- Agents and kinds of metamorphism
- Textures and structures of metamorphic rocks
- Classification of metamorphic rocks
- Concept of Zones, Facies, Facies series, Grades and Isograds
- Plate tectonics and metamorphism
- Thermal metamorphism of argillaceous and calcareous rocks
- Regional metamorphism of argillaceous and calcareous rocks
- *Petrographic notes on the following metamorphic rocks :*

  Slate, Phyllite, Schists, Gneisses, Amphibolites, Marble, Quartzites, Hornfels, Charnockite, Khondalite, Eclogite, Kodurite and Skarns.

PRACTICALS
Full marks – 50
(Practial – 40 ; Sessional & Viva-voce-10)

- Megascopic study of the following rocks :
  - Granite, Syenite, Pegmatite, Diorite, Gabbro, Basalt, Rhyolite, Dunite, Trachyte, Obsidian, Pumice, Peridotite, Pyroxenite, Anorthosite, Norite, Schists, Gneisses, Marble, Charnockite, Phyllite, Amphibolite, Quartzite, Shale, Sandstone, Limestone, Conglomerate, Breccia.

- Microscopic study of the following rocks :
  - Granite, Syenite, Nepheline–syenite, Granodiorite, Diorite, Gabbro Dolerite, Basalt, Peridotite, Anorthosite, Charnockite, Schists, Gneisses, Amphibolite, Marble, Quartzite, Sandstone, Orthoquartzite, Arkose, Greywacke, Limestone, Shale.

Books Recommended :

1. *Tyrell, G.W.* : Principles of Petrology
2. *Huang* : Petrology
3. *Nockolds, Chinner and Kinox* : Petrology for students
4. *Harker* : Petrology for students
5. *Blatt, Ehler* : Petrology (Igneous, Sedimentary and Metamorphic)
6. *Bose, M.K.* : Igneous Petrology
7. *Mc Birney* : Igneous Petrology
8. *Hall* : Igneous Petrology
9. *Best, M.G.* : Igneous and Metamorphic Petrology
10. *Hyndman, W.D.* : Petrology of Igneous and Metamorphic Rocks
11. *Turner and Verhoogen* : Igneous and Metamorphic Petrology
12. *Hatch and Wells* : Petrology of the Igneous Rocks
13. *Philpotts* : Principles of Igneous and Metamorphic Petrology
14. *Yardley* : Introduction to Metamorphic Petrology
15. *Mason, Roger* : Petrology of the Metamorphic Rocks
16. *Pettijohn, F.* : Sedimentary Rocks
17. *Greensmith* : Petrology of the sedimentary Rocks
18. *Tucker* : Sedimentary Petrology
19. *William, Turner and Gilbert* : Petrography
20. *Sengupta, S.* : Introduction to Sedimentology
21. *Moorehouse* : The Study of Rocks in Thin Section
22. *Winkler, HGF* : Petrogenesis of Metamorphic Rocks
23. *Blatt, Tracy and Owens* : Petrology (Igneous, Sedimentary and Metamorphic) W.H. Freeman and Company, New York
24. *V.K. Verma* : Sedimentary Petrology

B.Sc. (SUBSIDIARY) Part –II

THEORY PAPER –II

Full Marks – 75
Time-3 hours

In all ***Ten*** questions are to be set (***five*** from each group) and the students are required to answer ***five*** questions selecting **at least two** from each group.

Group-A

IGNEOUS PETROLOGY

- Petrology-Definition, three-fold classification of rocks and their distinction.
- Igneous Petrology-Elementary knowledge about Magma, Magma types and its composition.
- Bowen's Reaction Principle
- Forms, Texture and Structure of Igneous Rocks.
- Classification of Igneous Rocks.
- Petrographic description of the following rock types :
    - Granite, Granodiorite, Syenite, Diorite, Gabbro, Dolerite, Basalt, Rhyolite.

METAMORPHIC PETROLOGY

- Metamorphism – Definition, agents and types.
- Textures and structures of Metamorphic rocks.
- Classification of Metamorphic rocks.
- *Petrographic study of the following metamorphic rocks* :
  Slate, Phyllite, Schist, Gneiss, Augen Gneiss, Amphibolite, Granulite, Charnockite, Marble, Quartzite.

SEDIMENTARY PETROLOGY

- Definition and formation of sedimentary rocks
- Textures of sedimentary rocks
- Study of important primary sedimentary structures
- Classification of sedimentary rocks
- Petrographic study of sandstone, limestone, shale, conglomerate, breccia

Group-B

ECONOMIC GEOLOGY

- Concept of ore, ore mineral, Gangue, Tenor of ores.
- An elementary idea of the processes of formation of mineral deposit with special reference to
  - magmatic concentration,
  - supergene suplhide enrichment,
  - placer deposits.
- *Study of the physical properties, chemical composition, distribution and uses of the following economic minerals :*

  Talc, Gypsum, Calcite, Fluorite, Apatite, Orthoclase, Quartz, Topaz, Corundum,Chromite, Beryl, Barite, Kyanite, Pyrolusite, Psilomelane, Mica, Hematite, Magnetite, Chalcopyrite, Bauxite, Graphite, Galena.

STRATIGRAPHY

- Definition, Principles of stratigraphy,
- Methods of stratigraphic correlation,
- Geological Time Scale,
- An outline of Indian stratigraphy with special reference to:
  - Precambrian of Singhbhum
  - Vindhyan supergroup
  - Gondwana supergroup
  - Siwaliks

PALAEONTOLOGY

- Definition- fossils, index fossils, trace fossils
- Conditions of fossilisation and Modes of Preservation,
- *Morphology and Geological History of the following* :

  Gastropoda, Lamellibranchia, Brachiopoda, Cephalopoda and Trilobita.

PRACTICAL

- Observation of the following economic minerals with reference to their physical properties :

  Talc, Gypsum, Calcite, Fluorite, Apatite, Topaz, Corundum, Beryl, Barite, Kyanite, Sillimanite, Hematite, Magnetite, Chromite, Chalcopyrite, Malachite, Azurite, Bauxite, Galena, Pyrite.
- *Megascopic study of the following Rocks :*

  Granite, Syenite, Pegmatite, Gabbro, Dolerite, Basalt, Rhyolite, Schist, Gneiss, Marble, Charnockite, Sandstone, Limestone, Shale, Phyllite, Conglomerate, Breccia.
- *Microscopic study of the following rocks :*

  Granite, Gabbro, Dolerite, Basalt, Charnockite, Schist, Gneiss, Sandstone, Limestone, Quartzite.

- *Morphological identification and drawing of the following Fossils :*
  Micraster, Productus, Spirifer, Terebratula, Rhynchonella, Turritella, Conus, Murex, Physa, Voluta, Arca, Pecten, Ostrea, Gryphea, Cardita, Nautilus, Orthoceras, Glossopteris, Gangamopteris, Ptilophylum, Vertebraria.

Books Recommended :

1. *Tyrell, G.W.* : Principles of Petrology
2. *Mukherji, P.K. :* Text Book Of Geology
3. *Hatch and Wells* : Petrology of the Igneous Rocks
4. *Mason, Roger* : Petrology of the Metamorphic Rocks
5. *Pettijohn, F.* : Sedimentary Rocks
6. *Sengupta, S.* : Introduction to Sedimentology
7. *Moorehouse* : The Study of Rocks in Thin Section
8. *Woods, Henry* : Invertebrate Palaeontology
9. *Wadia, D.*N.: Geology of India and Burma
10. *Prasad, U.* : Economic Geology
11. *A.K.Sen* : Practical Geology

COURSES OF STUDY
(Three Year Degree Course)
B.Sc. Geology Honours Part – III

THEORY PAPER – V

Full Marks – 100

Time – 3 hours

In all ***Ten*** questions are to be set (***five*** from Group A. ***three*** from Group B and ***two*** from Group C) and the students are required to answer ***five*** questions selecting ***at least one*** from each group.

GROUP – A

ECONOMIC GEOLOGY

- Introduction to ore minerals, gangue, ore, tenor, cut-off grade.
- Classification of ore deposits

- *Processes of formation of mineral deposits with special reference to :*
  - Magmatic Concentration,
  - Supergene Sulphide enrichment,
  - Hydrothermal and
  - Placer deposits.
- Brief idea of relationship between Plate Tectonics and mineral deposits.
- Prospecting – Geological, Geophysical and Geochemical.
- Elementary knowledge of Porphyry Copper.

- *Detailed study of the following economic mineral deposits of India –*
  - Iron, Basemetals (Copper, lead and zinc), Bauxite, Manganese, Mica, Coal and Petroleum, Atomic minerals
- A brief study of the *physical properties, chemical composition, mode of occurrence, uses and distribution* of following economic minerals in India : Galena, Graphite, Gypsum, Talc, Calcite, Fluorite, Apatite, Feldspar, Quartz, Topaz, Corundum, Chromite, Barite, Ilmenite, Rutile, Monazite, Garnet, Beryl, Kyanite, Sillimanite, Asbestos, Diamond, Fire Clay and China Clay

GROUP – B

HYDROGEOLOGY

- Hydrogeology : concept and scope.
- Hydrologic Cycle : Distribution of water in the earth's crust; Components of hydrologic cycle – evaporation, evapo-transpiration, precipitation, Infiltration and run-off.
- Definition and classification of subsurface water; Vertical distribution of groundwater – zone of aeration and zone of saturation. Origin and age of groundwater; Importance of groundwater.
- Types of groundwater – juvenile water, magmatic water, connate water, metamorphic water.
- Aquifers : unconfined, confined and leaky aquifers; water table and piezometric surface;
- Geological formations serving as aquifers;
- Properties of water-bearing formations : porosity, permeability, specific yield, specific retention, storage coefficient, hydraulic gradient;
- Springs and their types; Thermal springs;
- Ground water exploration : Geological and hydrologic studies : Exploratory drilling; Electrical Resistivity Surveying; Seismic Refraction Surveying;
- Chemical character of Groundwater: hardness, electrical conductance, pH, dissolved minerals; water quality requirements; drinking water standards;
- Geological provinces : Groundwater resources of Bihar, Occurrence of groundwater in hard rock terrain;

GROUP – C

FIELD GEOLOGY

- Basic idea of Field Geology
- Methods and techniques of sampling and geological mapping
- Field equipments and their functions
- Interpretation of Topographical and Geological maps.

ENGINEERING GEOLOGY

- Engineering properties of rocks.
- Role of geology in Planning and construction of engineering projects – Dam site selection, Tunnels, Bridges & Road alignment.

THEORY PAPER – VI

Full Marks – 100
Time – 3 hours

In all ***Ten*** questions are to be set (***six*** from Group A and ***four*** from Group B) and the students are required to answer ***five*** questions selecting ***at least two*** from each group.

GROUP – A
GENERAL GEOLOGY AND TECTONICS

- Concept of Diastrophism – Orogeny and Epeirogeny ; Isostasy
- Continental Drift –Wegener's Hypothesis, Evidences
- Sea Floor Spreading
- Plate Tectonics – concept & causes of plate tectonics
- Brief idea of :
    - Palaeomagnetism
    - Polar wandering
    - Island – Arc
    - Rift Valley
    - Palaeoclimate
- Mountains – Type, characteristics, and origin,
- Structure and tectonic evolution of the Himalayas
- Seismology and the internal structure of the earth ; Thermal history of the earth.
- Plate movement and Seismicity; Seismograph
- Seismic Bells of the earth, Seismicity in India.
- Radioactivity and its application in Geology

GROUP – B
GEOMORPHOLOGY

- Nature and scope of Geomorphology
- Fundamental concepts of geomorphology
- Applications of geomorphology
- Classification of geomorphic processes – weathering, mass – wasting and erosion.
- Concept of geomorphic cycle and their interpretation
- Landforms resulting from various processes – Fluvial, Eolian, Marine, Tectonic, Volcanic, Karst Topography
- Brief introduction of –
    - causes of rejuvenation
    - peneplanation
    - soil profile and
    - relief of ocean floor
- Drainage patterns and their significance.
- Comparative account of drainage characteristics of Peninsular and Extra-Peninsular India.
- Geomorphology of Chhotanagpur Plateau

THEORY PAPER – VII

Full Marks – 100
Time – 3 hours

In all ***Ten*** questions are to be set (***six*** from Group A and ***four*** from Group B) and the students are required to answer ***five*** questions selecting ***at least two*** from each group.

GROUP – A
STRATIGRAPHY

- Principles of Stratigraphy
- Methods of Stratigraphic Correlation,
- Brief idea about Lithostratigraphy, Biostratigraphy, Chronostratigraphy, Magneto-stratigraphy, Seismic and Sequence stratigraphy.
- Geological Time Scale
- A brief account of the stratigraphy of India with special reference to the *classification, distribution, lithology, fossil content and economic importance* of the following geological formations of India – Precambrian of Dharwar and Singhbhum, Cuddapah, Vindhyan, Permo-carboniferous of Salt Range, Triassic of Spiti,Gondwana, Jurassic of Kutch, Cretaceous of South India, Siwaliks and Tertiary of Assam
- Palaeogeography of Permo – carboniferous and Cretaceous periods.

GROUP – B
PALAEONTOLOGY

- Definition and sub-disciplines : Fossils, index fossils
- Preservation of fossils
- Uses of Fossils ; Life through ages;
- Theory of Evolution; Evolution of Man and Horse
- Invertebrate Palaeontology – morphology, classification and geological history of following groups –
  Gastropoda, Lamellibranchia, Brachiopoda, Cephalopoda, Trilobita and Echinoidea
- Brief study of :
  - Suture line development of Ammonoids,
  - Dentition of Lamellibranchia,
  - Classification of Brachiopoda and
  - Evolutionary trends in Trilobita.
- Vertebrate Palaeontology – Stratigraphic distribution of Vertebrates in India; Siwalik vertebrate fauna.
- Palaeobotany – Fossil records of land plants and their stratigraphic distribution; Brief study of the Gondwana flora in India.
- Micropalaeontology ; Microfossils and their importance.

PAPER – VIII (PRACTICAL)
Full Marks – 100
(Practical – 80 and Field work - 20)

- Study and interpretation of geological maps, drawing of Geological sections.
- Completion of outcrops.
- Structural problems relating to dip and strike & thickness of beds, three-point problems.
- Prismatic compass and plane-table survey (Intersection & Closed Traverse methods)
- Megascopic study of important ore and economic minerals.
- Megascopic study of important Indian stratigraphic rocks.
- Preparation of stratigraphic maps of India showing distribution of Archaeans, Vindhyan, Gondwana and Tertiary
- Preparation of Palaeogeographic maps of Permo-carboniferous and Cretaceous periods.
- Morphological identification and drawing of the following fossils with special reference to their *morphological characters* and *geological age* – *Nummulites, Alveolina, Corals, Calceola, Zaphrentis, Cidaris, Hemicidaris, Micraster, Hemiaster, Productus, Spirifer, Terebratula, Rhynchonella, Cerithium, Turritella, Conus, Physa, Murex, Voluta, Arca, Pecten, Inoceramus, Spondylus, Ostrea, Gryphaea, Exogyra, Trigonia, Cardita, Perisphinctes, Gonatite. Ceratites, Nautilus, Orthoceras, Belemnites, Calemene, Phacops, Paradoxides, Glossopteris, Gangamopteris, Vertebraria, Senizoneura, Ptillophylum.*
- Geological Field work
- Sessional work

Book Recommended

1. *Jenson and Bateman* : Economic Mineral Deposits
2. *Prasad, U.* : Economic Geology
3. *Wadia* : Minerals of India
4. *Brown, C. and Dey, A.K.* : Indian Mineral Wealth
5. *Sinha and Sharma* : Mineral Economics
6. *Tarlings* : Economic Geology and Geotectonics
7. *Riley, Charles M.* : Our Mineral Resources
8. *Bagchi, Sengupta and Rao* : Elements of Prospecting and Exploration
9. *Kesler, Stephen E.* : Mineral Resources, Economics and the Environment
10. *Todd* : Groundwater Hydrology
11. *Karanth* : Hydrogeology
12. *Raghunath* : Hydrology
13. *Lahee, F.H.* : Field Geology
14. *Singh, Praveen* : Text Book of Engineering and General Geology
15. *Singh, S.* : Physical Geography
16. *Valdia, K.S.* : Aspects of Tectonics
17. *Wiley* : Dynamic Earth
18. *Steers, J.A.* : The Unstable Earth
19. *Worcester, P.G.* : A Text Book of Geomorphology
20. *Rice, R.J.* : Fundamentals of Geomorphology
21. *Thornbury, W.D.* : Principles of Geomorphology.

7/7/15 7/7/15 7/7/15 7/7/15 7/7/15 7.7.15