

**B.Sc – I
GEOLOGY
Syllabus**

The examination in geology at the end of every semester shall comprise of two theory papers, practicals and internal assessment as follows:-

Semester I and II

Paper-I	Theory.....	50 marks
	Internal assessment.....	10 marks
Paper-II	Theory.....	50 marks
	Internal assessment.....	10 marks
	Practicals.....	30 marks

Candidate must pass separately in practicals and total of theory papers and Internal Assessment .

Semester-I

Paper-1

(Physical Geology)

UNIT-I Geology: - Definition, branches, scope and relation to other sciences. Earth as a member of solar system: its size, shape, mass, density, rotational and revolutional parameters. Formation of core, mantle, crust, hydrosphere, biosphere and atmosphere.

UNIT-II Volcanoes:-Definition, structure of a typical volcano,active,dormant and extinct volcanoes,types of volcanic eruptions, product of volcano. Distribution and origin of volcanoes.

Earthquakes-Definition,Earthquake waves,causes and measurement of earthquake,effects of earthquake,tsunamis and earthquake belts.

UNIT-III Rock weathering, soil:-definition,formation, soil profile and types, geological work done by Underground water and oceanic currents.

UNIT-IV Geological work done by the wind ,river and glaciers.

Semester-I

Paper - II

Mineralogy and elementary mineral optics

Unit-I Definition of mineral, rock forming and ore minerals. Chemical bonding and compound formation. Mineral composition of the earth's crust, chemistry of mineral (polymorphism, Isomorphism and pseudomorphism). various physical properties of minerals: Form, colour, cleavage, Lustre, Fracture, streak, hardness, specific gravity and its determination by walker's steel yard balance.

Unit-II Properties dependant on magnetism, electricity and radioactivity. Silicate structure. Rock forming minerals-silicates, oxides and sulphides. Chemical and physical properties and geological occurrences of the mineral groups such as quartz, Feldspars, feldspathoids (Pyroxene) and zeolites.

Unit-III Chemical and physical properties and geological occurrences of the mineral groups such as amphiboles, micas, olivine, garnet and aluminous silicates.

Unit-IV Petrological microscope: Its parts and functioning.

Elementary mineral optics: Nature of light, ordinary and plane polarized light, Reflection and Refraction, critical angle, refractive index by 1) Becke line method and 2) Abbe refractometer and Nicol prism.

Practical:

Study of physical properties in hand specimen of following rock forming minerals-

Quartz and its varieties,
orthoclase, microcline, albite, labradorite, nepheline, leucite, sodalite, natrolite, stilbite,
apophyllite, muscovite, biotite, chlorite, hypersthene, augite, diopside, hornblende, tremolite,
actinolite, asbestos, olivine, garnet, kyanite, sillimanite, topaz, staurolite, tourmaline, epidote,
serpentine, talc, rhodonite, aragonite, calcite, dolomite, magnesite, siderite, rhodocrosite,
barites, gypsum, apatite, beryl, fluorite, corundum, kaolinite, zircon, halite.

SEMESTER II

Paper I

GENERAL GEOLOGY

UNIT-I Concepts regarding origin of the earth, Radiometric methods of determination of the age of the earth: Uranium method, Rb-Sr method, K-Ar method and Carbon 14 method.

UNIT-II Application of geophysics in understanding the dynamics of the earth: Internal structure of the Earth on the basis of seismological evidences. Concepts and theories of isostasy. Palaeoclimates: Indicators, glacial periods – causes of glacial ages and glacioeustasy.

UNIT- III Diastrophism – Epeirogenic and orogenic movements, evidences of elevation and depression of land, eustatic changes. Geosynclines: Origin and types, Mountains: Types and Formation. Evolution of continents and ocean basins.

UNIT- IV Continental drift theory: evidences and causes, Evolution of plate tectonic theory: nature and types of plate margins, sea floor spreading, origin and significance of mid-oceanic-ridges and trenches, origin and distribution of island arcs.

PAPER- II Crystallography and Optical

Mineralogy

UNIT-I Definition of crystal, space lattice and unit cell, Crystal structure by X-rays considering unit cell of NaCl. Crystallography and Geometric symmetry. Laws of Crystallography : Constancy of Interfacial angle, rationality of indices and symmetry, Contact goniometer and measurement of interfacial angle. Elementary ideas about crystal structure, crystal faces, edges, solid, angles and zones. Crystallographic axes and axial angles. Crystal notations: Miller indices and Weiss parameters.

UNIT-II Crystal Symmetry and classification of Crystals into six systems. Study of Crystals of galena class of cubic system, zircon class of tetragonal system and Baryte class of orthorhombic system.

UNIT-III Study of Crystals of Beryl class of Hexagonal system, Gypsum class of Monoclinic system and Axinite class Triclinic system.

UNIT-IV Properties under plane polarized light and Crossed Nicol:- colour, cleavage, relief, form, pleochroism, twinkling, isotrophism and anisotrophism, extinction and extinction angle, twinning, birefringence, interference colours. Optical characters of the following rock forming minerals in ordinary and plane polarized light: Quartz,

microcline, orthoclase, albite, labradorite, muscovite, biotite, chlorite, hornblende, augite, olivine, garnet, calcite, kyanite, sillimanite, tourmaline, epidote, tremolite and actinolite.

Practical:

- I) Study of elements of symmetry and description of various forms of crystals from normal classes of six crystal systems.
- II) Study of the optical characters of minerals listed for theory course using polarizing microscope.

Geological field work:

Student will be required to carry out field work of a short duration in an area of geological interest to study the elementary aspects of field Geology (study of Topographic Features, reading of Topographical maps, use of compass clinometer, making location on toposheets) and submit a report thereon.

Books Recommended (For Field Work)

1. Mathur, S.M. (2001) Guide to Field Geology, Prentice-Hall, New Delhi.
2. Compton, R.R. (1962) Manual of Field Geology. John Wiley and Sons, Inc.
3. Lahi, F.H. (1987) Field Geology. CBS Publishers.
4. Gokhale, N.W. (2001) A Guide to Field Geology, CBS Publishers.

Books Recommended for Paper I of Semester I and II

1. Arthur Holmes (1978) Principles of Physical Geology, E.L.B.S. Nelson, Great Britain.
2. Emmons, Theil, Staffer and Allison: Geology principles and processes
3. Gulluly, Water and Woodford: Principles of Geology
4. Robinson, E. S. (1982) : Basic Physical geology, John Wiley and Sons
5. Judson, DeffeywS and Hargrave.R: Physical Geology
6. Sanders, J.E., Anderson (Jr.), A.Z. Caroloa: Physical Geology.
7. Cazen, Hatcher and Siemekowski: Physical Geology
8. Borges, S. M. Gwalani, L.G. and Veena Rao, G. (2000-2002) Fundamentals of

Geology, volume I and II Himalaya publishing House.

9. Patwardhan, A.M. (1999) The Dynamic Earth System, Prentice-Hall, New Delhi
10. Howell: Introduction to Geophysics.
11. Hamblin, W. Kenneth (1992) The Earths Dynamic System. MacMillan
12. Sawkins, F.M., Chase, C.G., Darby, D.G. and Rapp, G.(1978) The Evolving earth: A Text Book in Physical Geology, Collier Macmillan.
13. Mallory, B. F. and Cargo, D. N. (1979) Physical Geology. McGraw-Hill Book Co.
14. Judson, S., Kauffman, M.E. and Leet, L. Don (1987) Physical Geology. Prentice-hall
15. Skinner, B. J. and Porter, S.C. (1989) The Dynamic Earth: An Introduction to Physical Geology John Wiley and Sons
16. Tarbuck, E.J. and Lutgens, F.K. (1990) The Earth: An Introduction to Physical Geology. MacMillan.
17. Monroe, J.S. and Wicander, R. (2001) Physical Geology: Exploring the Earth. Books/ Cole, Thomson Learning.

Books Recommended for Paper II of Semester I and II

1. H.F. Read: Rutley's Elements of Mineralogy
2. Berry, L.G., Mason, Brian and Dietrich, R.V. (1985)
3. Danna, E. S. and Ford, W. E. (1949) A Textbook of mineralogy, CBS Publishers
4. Deer, W.A Howie, R. A. and Zussman J.(1992) : An Introduction to the Rock-forming Minerals, Longman Scientific and Technical
5. Smith: Minerals and Microscopes
6. Roger and Kerr: Optical Minerology