

Dr.Babasaheb Ambedkar Marathwada University, Aurangabad.
Syllabus of B.Sc. First Year 2009-10
Subject : Geology
Semester - I, Paper I : Mineralogy and Crystallography

Sr.No.	Syllabus	
1.	Introduction : Definition, branches and scope of mineralogy. Importance and conservation of minerals.	(2)
2.	Formation of minerals : Introduction and description of geological processes of mineral formation. a) Crystallizations from melt b) Crystallization from Solution (Evaporation and precipitation) c) Crystallization from Vapour (Sublimation) d) Metamorphic processes and metamorphic minerals	(5)
3.	Crystal Chemistry a) Bonding forces in crystals : Ionic, Covalent, Vander Waal's and metallic bonds, crystals with more than one type of bond. b) Major element constituents of minerals c) Geochemical affinity & classification of element d) Geometrical and electrical stability of minerals (concept of relative size of ions, radius, ratios, co-ordination number & ionic substitution) e) Isomorphism, polymorphism, pseudomorphism. f) Silicate structures	(12)
4.	Physical properties of minerals a) Colour, streak, luster, cleavage, fracture, hardness, form, magnetism, electrical property, radio activity, specific gravity & luminescence (Phosphorescence and Fluorescence) b) Methods of determining specific gravity – Chemical balance, Walker's steelyard, Jolly's spring balance, pycnometer, heavy liquids.	(7)
5.	Crystallography a. Definition and conditions conducive for the formation of crystals, crystal habits and aggregates. b. Crystal morphology – faces, forms, edges, solid angles, interfacial angle and its measurement by contact Goniometer, law of constancy of interfacial angle. c. Symmetry of crystals – Plane, axis and centre of symmetry, crystallographic and geometric symmetry. Crystallographic axes, lettering and order of crystallographic axes, parameters, axial ratio, indices, parameter system of Weiss, index system of Miller, Law of rational indices d. Classification of crystals based on their elements of symmetry and crystallographic axes. The study of following crystal systems : i. Orthorhombic (Type : Barytes) ii. Tetragonal (Type : Zircon) iii. Cubic (Type : Galena) iv. Hexagonal (Type : Beryl) v. Monoclinic (Type : Gypsum) vi. Triclinic (Type : Axinite) Comparative studies of all the six crystallographic systems	(19)
Total Number of Lectures		(45)

Semester - I, Paper II : General Geology & Structural Geology

Sr.No.	Syllabus	
1	Introduction : Definition of geology, Its divisions, sub-divisions and scope	1
2	Planet Earth : Position of Earth in universe & solar system. a. Earth : Its origin size, shape and density. Temperature, pressure and magnetism within the earth, b. Age of the Earth : A brief account of the historical methods. Determination of age by the K/Ar and U/Th methods	(1) (4)
3	a. The Earth's Atmosphere, Hydrosphere, Lithosphere and Biosphere b. Earth's crust, mantle and core	(2)
4	Continental Drift : concept and evidence, Plate Tectonics a Broad out line	(3)
5	Weathering (mechanical and chemical) ; erosion, denudation, soil formation and soil profile.	(2)
6	The dynamics of erosional and depositional landforms resulting from the action of river, wind, and glaciers	(11)
7	Concept of Isostasy : Pratt's and Airy's model	(2)
8	Types of Mountains : Fold, fault block volcanic and residual mountains	(2)
9	Volcanoes : Genesis of volcanoes, Central and fissure type of eruptions. Products of volcanic, activity volcanic belts on the earth.	(3)
10	Earthquakes: Definition, terminology, causes, intensity and magnitude. Recording of earthquakes. Use of seismic waves in internal structure. Seismic zones. History and susceptibility of the Indian subcontinent to earthquakes.	(4)
11	Structural Geology : a. Definition, scope, study of outcrop, identification of bedding. Attitude of beds contour map and its interpretation b. Broad outline of fold, fault and unconformity. Study of different types of joints.	(10)
	Total Number of Lectures	45

Semester - I, Practical Paper – III

Sr.No.	Syllabus
1	<p>Mineralogy</p> <p>a. Physical properties of minerals colour, form, streak, luster, cleavage, fracture, hardness and specific gravity.</p> <p>b. Megascopic Identification of following mineral (with the help of physical properties) Quartz, Rock Crystal, Rose Quartz, Milky Quartz, Smoky quartz, Amethyst, Chalcedony, Agate, Jasper, Flint, Opal, Orthoclase, Plagioclase, Biotite, Muscovite, Garnet, Olivine, Hornblende, Apophyllite, Stilbite, Kyanite, Talc, Calcite, Fluorite, Gypsum, Barytes, Magnetite, Haematite, Chromite, Chalcopyrite, Galena, Pyrolusite, Bauxite, Graphite.</p>
2	<p>Experiment :</p> <p>To find out the specific gravity of minerals using Walker's Steel Yard</p>
3	<p>Crystallography :</p> <p>Study of elements of symmetry, crystallographic axes and forms with Miller indices in the crystal models belonging to the following crystal systems (Minimum 3 models of each system)</p> <p>a. Orthorhombic System (Type : Baryte)</p> <p>b. Tetragonal System (Type : Zircon)</p> <p>c. Cubic system (Type : Galena)</p> <p>d. Hexagonal System (Type : Beryl)</p> <p>e. Monoclinic System (Gypsum)</p> <p>f. Triclinic System (Type : Axinite)</p>

Semester - I, Practical Paper – IV

Sr.No.	Syllabus
1	Toposheets : Reading of Toposheets – With reference to Toposheet number, Latitude and Longitude, State / District, Scale, Adjacent Toposheet numbers and Conventional Signs.
2	Introduction to topographic and geological maps.
3	Study of geomorphological models
	Total Number of Practical – 22

Semester - II, Paper V : Petrology

Sr.No.	Syllabus	
	PETROLOGY	
1.	Definition and major divisions : <ol style="list-style-type: none"> a. Definition of petrology, lithology, petrography, petrogenesis b. Major divisions and diagnostic characteristic of rocks : igneous, sedimentary and metamorphic c. Rock cycle. 	(3)
2.	Magma : <ol style="list-style-type: none"> a. Magma and its composition b. Pyrogenetic minerals c. Formation of crystals and glass 	(4)
3.	Forms of Igneous bodies: <ol style="list-style-type: none"> a. Intrusive : Concordant and discordant intrusions <ol style="list-style-type: none"> 1. Concordant : Sills, laccoliths, lopoliths, phaccoliths, concordant batholiths 2. Discordant : dykes and veins, cone sheets, ring dykes, stock boss conolith and discordant batholith. b. Extrusive : lava flows, Pahohoe' and 'aa' lava. 	(4)
4.	Textures and Structures of Igneous rocks <ol style="list-style-type: none"> a. Textures, Definition and factors controlling textures: Equigranular(granitic), Inequigranular (porphyritic), glassy. b. Structures: Vesicular, amygdaloidal, blocky, pillow, flow and columnar joints. c. Distinction between textures and structures. 	(4)
5.	Classification of Igneous Rocks <ol style="list-style-type: none"> a. Basic of classification : Chemical, mineralogical, mode of occurrence, silica percentage and type of feldspar. Tabular classification. b. Description of the following igneous rocks : <ol style="list-style-type: none"> 1. Plutonic : Granite, Syenite, Diorite, Gabbro, Dunite. 2. Hypabyssal : Pegmatite, Pitchstone, Dolerite. 3. Volcanic : Rhyotlite, Pumice, Bsalt, Trochyte, Andetite 	(4)
	SEDIMENTARY PETROLOGY	
6.	Products of weathering Sediments, sedimentation, and formation of sedimentary rocks: denudation, transportation, deposition and lithification	(5)
7.	Textures and structures of sedimentary rocks <ol style="list-style-type: none"> a. Clasitic and non-clastic textures b. Structures : Lamination, bedding (concordant and discordant), graded bedding and ripple marks. 	(3)

8.	Description and classification of the following secondary rocks : Laterite and Bauxite, Breccia, Conglomerate, Sandstones, shales, Mudstone, Limestones, coral limestone.	(2)
	METAMORPHIC PETROLOGY	
9.	Definition of metamorphism, agents of metamorphis, kinds of metamorphism.	(2)
10.	Structure of metamorphic rocks: maculose, slaty cleavage, Schistose, Granulose, Gneissose.	(4)
11.	Classification of metamorphic rocks (based on the original rock, agent/type of metamorphis) and description of following rocks. Slate, Marble, Quarzite, Mica Schist, hornblende Schist and Hornblencede Gneiss.	(10)
	Total Number of Lectures	45

Semester - II, Practical Paper – VII

1	<p>Petrology</p> <p>Megascopic study of the following rocks</p> <ul style="list-style-type: none">a. Igneous : Granite, gabbro, rhyolite, basalt (its varieties (Classification based on colour index, mineral composition and texture)b. Secondary : Laterite, bauxite, breccia, condglomerate, sandstones, shales, mudstone and limestones.c. Metamorphic : Slate, marble, quartzite, mica schist and hornblende schist, mica gneiss and hornblende gneiss.
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Semester - II, Practical Paper – VIII

Sr.No.	Syllabus
1	Palaeontology Study of at least two specimens from each Phylum/Class (Total number of specimens should not be less than 15) <ol style="list-style-type: none">Phylum Mollusca – Class Lamellibranchia, Class Gastropoda, Class Cephalopoda.Phylum BrachiopodaPhylum EchinodermataPhylum ArthropodaPhylum Coelenterata
2	Depiction of important stratigraphic units in the map of India Geological Fieldwork to be conducted in an area of geological interest for at least two days and geological report to be submitted for the same.

Reference Books :

1. Rutley's Elements of Mineralogy : H.H.Read
2. Text Books of Mineralogy : Dana and Ford
3. Rock Forming Minerals : Deer, Howie, Zussman
4. Manual of Mineralogy : Cornelius, S.Hurlbut and Cornel Klein
5. Principals of Mineralogy : W.H.Blackburn, W.H. Denman
6. Mineralogy : Berry Mason, Dietrich
7. Principles of Petrology: Tyrrel
8. Invertebrate Palaeontology : Henry Woods
9. General Geology : Radhakrishnan
10. Holmes' Principles of Physical Geology : Edited by P. Mcl. D. Duff.