

UNIVERSITY OF PUNE

Circular No. 219 of 1996


In pursuance of the decision taken by the University authorities, it is hereby notified for the information of all concerned that the revised syllabus for the F.Y.B.Sc. in Geology is as given in appendix 'A'.

This revised syllabus will be implemented from the Academic year 1996-97.

The Principals of all affiliated Colleges in Science where Geology is taught are requested to bring the contents of this circular to the notice of all concerned teachers and students.

Ganeshkhind,
Pune-411 007
Ref.No.CB/S/Geology/573
Date : 12.3.1996

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for Registrar

Copy f.w.cs.to for information :-

- 1) The Dean faculty of Science.
- 2) The Principals of all affiliated Colleges in Science.
- 3) The members of the Boards of Studies in Geology
- 4) The Deputy Registrar (Examination 1,2,3,4)
- 5) The Asstt.Registrar(Exam-Co-ordination Unit)
- 6) The Asstt. Registrar (Exam.S & T Unit)
- 7) The Asstt.Registrar (Eligibility)
- 8) The Asstt. Registrar (Records & Meeting)
- 9) The Public Relation Officer
- 11) The Law Officer,Pune-7
- 12) The P.A. to Registrar
- 13) The University Sub-Centres at Ahmednagar,Dhule & Nasik
- 14) The General Secretary PUTA,PUCTO
- 15) The Data Processing Unit, Pune-7
- 16) The Dy.Registrar,Admission
- 17) The Asstt.Registrar (Admission)
- 18) The Section Officer, (External)
- 19) The Section Officer, (Affiliation)
- 20) The Section Officer (Recognition)
- 21) The Asstt. Registrar (Strong Room)

Authority : AC 71PA 71/96
371/96 dated 19.2.1996, 7/8.3.1996

F.Y.B.SC. GEOLOGY SYLLABUS (TO BE IMPLEMENTED FROM JULY 1986.)

PAPER 1 MINERALOGY AND PETROLOGY

MINERALOGY

UNIT	TOPICS	No of lect/unit
1.	INTRODUCTION: Definition of a mineral, Branches of mineralogy. Aims and objectives (History and Importance of mineralogy).	(2)
2.	FORMATION OF MINERALS: Introduction and description of geological processes of mineral formation - crystallisation from melt, solidification, sublimation, precipitation, metamorphic processes, weathering, evaporation; oxidation and pergene enrichment.	(4)
3.	CRYSTAL CHEMISTRY AND CHEMICAL COMPOSITION OF MINERALS: <ol style="list-style-type: none">Atoms, Ions and the Periodic Table.Principles of crystal chemistry.Bonding forces in crystals - Ionic, covalent, Vender waal's and metallic bond, crystals with more than one bond type.Role of the chemical affinity of elements and the relative sizes of ions, in the formation of minerals.Isomorphism, Polymorphism, Pseudomorphism.Major elements constituting minerals.Silicate structures.	(12)
4.	CRYSTALLOGRAPHY: <ol style="list-style-type: none">Definition, and the conditions conducive for the formation of crystals. Crystal habits and aggregates.Crystal morphology - faces, form, edges solid angles. Interfacial angle and its measurement by contact goniometer, Law of Constancy of Interfacial Angle.	

- c. Symmetry of crystals - Plane of symmetry, Axis of symmetry, Centre of symmetry. Crystallographic and Geometrical 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 crystallographic axes and symmetry elements of normal types of the orthorhombic, Monoclinic, Triclinic, Cubic, Tetragonal and Hexagonal systems. (8)

5. Physical properties of minerals.

Color, Streak, Lustre, Cleavage, Fracture, Hardness, Form Magnetism, Electrical property, Radioactivity, Specific Gravity. Methods of determining Specific Gravity - Use of chemical balance, Walker's steel yard, Jolly's spring balance, Pycnometer, Heavy liquid, by displacement of water. (8)

6. OPTICAL MINERALOGY

- a. Nature of light, plane polarized light, Nicol's prism and polaroids.
- b. Double refraction of light (with the help of calcite crystal)
- c. Petrological Microscope
- d. Introduction to properties: In plane polarised light: colour, shape, cleavage, relief, twinkling, pleochroism.
Between crossed polaroids: Isotropism, Anisotropism, Extinction position, Interference colours, Twinning. (8)

7. STUDY OF THE FOLLOWING MINERAL GROUPS:

With reference to their silicate structure, Chemistry, Physical and Optical properties.

- a. OLIVINE b. PYROXENE c. AMPHIBOLE d. FELDSPAR
- e. MICA f. SILICA. (12)

PETROLOGY

8. **DEFINITION AND MAJOR DIVISIONS** : Definitions of Petrology. Lithology, Petrography, Petrogenesis. Major Divisions and diagnostic characteristics of the igneous, Sedimentary and Metamorphic rocks. The rock cycle. (2)

IGNEOUS PETROLOGY

9. a. **MAGMA** : Magma and its Composition. Pyrogenetic minerals (Common minerals of igneous rocks as mentioned in unit 7). formation of crystals and glass. (3)

- b. **FORMS OF IGNEOUS BODIES** :
I. **Intrusives**: Concordant and discordant intrusions.

- i) **Concordant**: Sills, Laccoliths, Lopoliths, Phacoliths, Concordant - batholiths.
ii) **Discordant**: Dykes and veins, cone sheets, ring dykes, stock, Boss, conoliths and discordant batholiths.

- II. **Extrusives**: Lava flows, Puy. (3)

10. **STRUCTURES AND TEXTURES**:

- a. **TEXTURES**: - Equigranular (granitic). Inequigranular (Porphyritic), Glassy.
b. **STRUCTURES**: - Vesicular, Amygdaloidal, Blocky, Ropy, Pillow, Flow and Columnar Joints. (2)

11. **CLASSIFICATION OF IGNEOUS ROCKS**:

- a. Bases of classification :- Colour Index, Mode of occurrence, Quartz and feldspar contents.
b. Tabular classification of igneous rocks indicating positions of the following rocks.

PLUTONIC:
a. Granite. b. Syenite c. Diorite d. Gabbro. e. Dunite.
HYPABYSSAL: f. Pegmatite g. Pitchstone h. Dolerite
VOLCANIC: i. Rhyolite j. Pumice k. Basalt. (2)

SEDIMENTARY PETROLOGY:

12. **DERIVATION OF THE PRODUCTS OF WEATHERING:**
Mechanical (disintegration) and Chemical (decomposition) Weathering. Transportation - Mechanical and Chemical modes. Deposition - Causes and mode of deposition.
13. **COMMON TEXTURES AND STRUCTURES:**
Clastic and Non-clastic textures - Definitions (with examples)
14. **TABULAR CLASSIFICATION OF SEDIMENTARY ROCKS:**
Classification of secondary rocks based on weathering products. [Rocks mentioned in practical course to be considered in tabular classification]

(4)

METAMORPHIC PETROLOGY:

15. **DEFINITION, AGENTS AND KINDS OF METAMORPHISM:**
Definition of Metamorphism. Agents of metamorphism. Kinds of metamorphism. Characteristics of different types of metamorphism.
16. **STRUCTURES OF METAMORPHIC ROCKS:** - Granulose, Schistose, Maculose, Gneissose structures.
17. **TABULAR CLASSIFICATION OF METAMORPHIC ROCKS:**
AS MENTIONED BELOW : (Based on original rock and types of metamorphism).
SLATE, MARBLE, QUARTZITE, MICA SCHIST, HORNBLende SCHIST AND HORNBLende GNEISS.

(3)

TOTAL LECTURES 19

PAPER III: GENERAL GEOLOGY AND PALAEOBIOLOGY

Number of Lectures.

Units

GENERAL GEOLOGY

- | | | |
|-----|---|------|
| 1. | Introduction : Definition of Geology, it's divisions, subdivisions and scope. | (1) |
| 2. | EARTH IN SPACE
Origin of the universe (Big Bang theory)
Origin of solar the system (Nebular, Encounter and Tidal theory).
Earth: Its size, shape and density. Temperature and pressure within the earth.
Age of the earth: A Brief account of historical methods. Determination of age by the K/Ar and U/Th methods. | (7) |
| 3. | The Earth's Atmosphere, Hydrosphere and Lithosphere. | (2) |
| 4. | Continental Drift: Concept and Evidences | (1) |
| 5. | Distribution of Land and Sea through the Geologic Ages (Palaeozoic, Mesozoic and Cenozoic).
The present day distribution of Land and sea (Hypsographic curve.) | (2) |
| 6. | Weathering, Erosion, Denudation and Deposition.
Types of weathering and the cycle of erosion. | (3) |
| 7. | Erosional and depositional landforms formed by the action of Rivers, Lakes, Winds, Sea and Glaciers. | (12) |
| 8. | Isostasy: Definition, Gravity and Isostasy, Gravitational Balance, Airy's and Pratt's models of isostatic compensation. | (2) |
| 9. | Mountain Building Processes (Epirogeny, Orogeny, Epeirogeny, Taphrogeny, Pyrogeny and Cymatogeny).
Types of mountains (Fold, Fault block, Volcanic and Residual). | (3) |
| 10. | Volcanic: Generation of magma, its migration and eruption. Cone and crater structure, Central and fissure types of eruptions. Distribution of volcanic belts. | (3) |

11. Earthquakes: Definition, Seismic waves, Elastic rebound theory, Focus, Epicenter, Intensity, Magnitude, Richter's scale, Determination of the epicentre, Seismograph and Seismogram, Earthquake belts of the world, Earthquakes of the Indian sub continent. (3)
12. Internal structure of the earth based on seismic study. (1)
13. Major Rivers and Mountain systems of India. (1)

TOTAL LECTURES 43

PALEONTOLOGY

14. a. Paleontology: Definition, and branches.
 b. Fossils: Definitions, Conditions and modes of preservation, uses, fossil bearing rock types, techniques used in collections, preservation and illustration of fossils. (3)
15. Study of Fossils: Study of the following fossils with reference to their systematic position, morphology of hard parts, classification and distribution in time and space (1)

LAPELLERANCHES, GASTROPODS, CEPHALOPODS, BRACHIOPODS, ECHINODERMS, TRILOBITES, COELENTERATES = MARIPORARIAN CORALS. (1)

16. An outline of organic evolution. Life (Fauna and Flora) through the ages (Paleozoic, Mesozoic, Cenozoic) (4)
17. The Geological Time Scale: Concept, Criteria used in it's construction, Tabular representation. (1)

Total = 74

4. **CRYSTALLOGRAPHY** Study of the elements of symmetry, crystallographic axis, Forms and indices of the following systems

- a. Triclinic system (Albite Type) 7.
- b. Tetragonal system (Zircon Type) 5.
- c. Orthorhombic system (Epsom salt Type) 6.
- d. Monoclinic system (Gypsum Type) 6.
- e. Hexagonal system (Apatite Type) 5.
- f. Triclinic system (Axinite Type) 7.

Figures to the right indicate the number of models to be used.

4. Measurement of the Interfacial Angle with a Contact Goniometer

5. **OPTICAL MINERALOGY:**

Study of optical properties of minerals :
In plane polarised light and under Crossed Polaroids.
Identification of the following minerals :
Olivine, Augite, Hornblende, Microcline, Plagioclase,
Muscovite, Biotite, Calcite, Garnet.

6. **TOPOGRAPHY :**

Shading of topographs. Study of Contour maps and drawing of their sections.

7. **PALAEONTOLOGY :**

Study of at least two specimens from each phylum/class
(Total number of specimens should not be less than 15)

- a. Phylum Mollusca (Lateral branchia, Gastropoda, Cephalopoda)
- b. Phylum Brachiopoda.
- c. Phylum Funicularata.
- d. Phylum Arthropoda (Trilobites).
- e. Phylum Coelenterata (Polysiphonian corals).

8. **PETROLOGY.**

A Mega optic study of the following rocks:

- a. **Igneous:** Granite, Gabbro, Syenite, Basalt, Pegmatite. (Classification based on color index, mineral composition, and texture).
- b. **Sedimentary:** Conglomerate, Breccia, Sandstone, Shale, Mudstone, Limestone, Organic Limestone, Lignite and Sauxite.
- c. **Metamorphic:** Slate, Marble, Quartzite, Schist and Gneiss.

TOTAL NO. OF PRACTICALS 18

BOOKS

1. Ratley's Mineralogy by H.H. Read
2. Text Book of Mineralogy : Dana and Ford
3. Rock Forming Minerals : Deer, Howie, Zussman.
4. Manual of Mineralogy : Cornelius, S. Murlbut and Cornelis Klein.
5. Principles of Mineralogy: W.H. Blackburn, W.H. Deane.
6. Mineralogy: Berry, Mason, Dietrich.
7. Principles of Petrology - Tyrre!
8. Invertebrate Palaeontology - Henry Woods.
9. General Geology . - Radhakrishnan
10. Physical Geology - Arthur Holmes.

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