

Swami Ramanand Teerth Marathwada University, Nanded

B.Sc.II year GEOLOGY Revised Syllabus-2014.

Course Structure

This revised syllabus of B.Sc. II year being implemented from June 2014, according to semester system.

Semester	Paper Numbers		Title of the Paper	MCQ Pattern	
				University Examination	Internal Examination
III	Theory	VI	Optical and Descriptive Mineralogy	40 Marks	10 Marks
		VII	Dynamics of the Earth and Igneous Petrology	40 Marks	10 Marks
IV	Theory	VIII	Structural Geology	40 Marks	10 Marks
		IX	Sedimentary and Metamorphic Petrology	40 Marks	10 Marks
	Practical	X	Based on theory Paper VI and VII	100 Marks	--
		XI	Based on theory Paper VIII and IX	100 Marks	--

B.Sc.II Year (Semester III)

Subject: - Geology

Paper - VI

OPTICAL AND DESCRIPTIVE MINERALOGY

Optical Mineralogy :

(45 Periods)

Introduction to petrological microscope. Nature of Light reflection, refraction, double refraction, total internal reflection and critical angle. Nicol's prism, position of extension, and extinction angle isotropism and anisotropism, isotropic and anisotropic minerals. Birefringence, refractive index, use of accessory plates, compensation and determination of interference colour. Newton's scale, determination of sign of elongation where 'C' axis is known. Vibration direction and optic orientation, anomalous colours, pleochroism and absorption.

Uniaxial and biaxial interference figures and determination of optic sign of uniaxial and biaxial minerals.

Methods of determination of refractive index; Becke line and Oblique illumination method.

Study of optical properties of minerals.

Descriptive Mineralogy : (45 Periods)

Introduction to mineral, silicate structure, isomorphism, polymorphism and pseudomorphism. Classification of minerals. Study of silicate structure, Chemistry, physical and optical properties, paragenesis and uses of the following mineral groups: Olivine, garnet, aluminosilicate, pyroxene, amphibole, mica, silica, feldspar and feldspathoid.

B.Sc.II Year (Semester III)

Subject: - Geology

Paper - VII

DYNAMICS OF THE EARTH AND IGNEOUS PETROLOGY

Dynamics of the Earth -

(45 Periods)

Isostasy: Concept and theories of Isostasy, evidence of continental drift and sea-floor spreading. Origin and significance of Mid-oceanic ridges. Island arc and trench. Evolution of plate tectonic theories, nature and types of plate margins. Evolution of ocean and continents, Wilson cycle. Palaeomagnetism. Geosynclines.

Igneous Petrology :

(45 Periods)

Formation of glass and crystal. Crystallisation of unicomponent magma. Crystallisation of binary magma, eutectics, mixed crystals. Crystallization of Ternary magma. Reaction relation and Bowen's reaction series. Textural characters such as granularity, shape of the crystal, mutual relation of crystals, textures and their types. Microstructures of igneous rocks. Classification of igneous Rocks. Theories of differentiation and assimilation. Crystallisation of Granitic and Basaltic magma. Study of common igneous rocks.

B.Sc.II Year (Semester IV)
Subject: - Geology
Paper - VIII
STRUCTURAL GEOLOGY

UNIT-I: Fold and Fault

(45 Periods)

Introduction, Attitude of beds, strike and dip, study of clinometer compass, Brunton compass and its application in the field survey.

Fold: Parts of fold, nomenclature of folds, plunge of folds, types of fold field study of folds, determination of top of beds by primary features.

Fault: General characteristic of fault, types of movement, classification of fault based on genetic, net slip, attitude of faults relative to attitude of beds, fault pattern and value of dip of fault. Criteria for reorganization of fault such as discontinuity of strata, repetition and omission of beds, feature characteristic of fault plane and physiographic criteria.

UNIT-II: Joints, Unconformity, Lineation and Foliation.

(45 Periods)

Joint: Introduction, Genetic and geometric classification of joints.

Unconformity: Introduction, general significance of unconformity. Types of unconformities such as disconformities, angular unconformity, non-conformity, local unconformity, over lap, off lap, overstep, outlier and inlier.

Lineation and Foliation : Introduction, descriptive terminology, kinds origin and relation to major structures.

B.Sc.II Year (Semester IV)
Subject: - Geology
Paper - IX
SEDIMENTARY AND METAMORPHIC PETROLOGY

Sedimentary Petrology:

(45 Periods)

Formation of sediments and different types of depositional environment Such as eolian, fluvial and sea environment. Mineral composition of sedimentary rocks. Textural characters such as grain size, sphericity, roundness, shape. Mechanical, chemical and organic structures. Maturity of sediments Heavy Minerals. Mineralogy, Texture, Structure and Classification of conglomerate, sandstones and lime stones. Study of common sedimentary rocks.

Metamorphic Petrology :

(45 Periods)

Kinds if metamorphism. Concept of depth zones, Facies and grades of Metamorphism. Eskola's concept of metamorphic facies pressure-Temperature Diagram. Metamorphic minerals (stress and antistress minerals) Texture and structure of metamorphic rocks. Process of formation of metamorphic rocks such as cataclastic Metamorphism, thermal metamorphism, dynamothermal metamorphism, plutonic Metamorphism and their products. Metasomatism, pneumatolytic metamorphism, injection metamorphism and Auto-metamorphism. Lit-per-lit gneiss, composite gneiss. Anatexis and palingenesis. Study of common metamorphic rocks.

B.Sc. IInd Year
Practical Paper – X
(Based on Theory Paper No-VI & VII)

Total Marks: 100

- A) Study of Optical Properties of Following Minerals : Quartz, orthoclase, microcline, plagioclase, augite, hypersthene, Hornblende, actinolite, olivine, muscovite, biotite, garnet, calcite, chlorite, Kyanite, Sillimanite and andalusite.
- B) Newton's scale of interference colours, Determination of sign of elongation. Determination of optic sign of uniaxial/biaxial minerals.
- C) Calculation of Hess Metasilicate of Pyroxene Minerals.
- D) Study of Following Rocks in Hand Specimen:
Granite and its varieties, Nepheline syenite, Obsidian, Pumice, Andesite, pegmatite, Granodiorite, felsite, norite, dunite, peridotite, dacite, basalt and its varieties,
- E) Study of the Optical Properties of Following Rocks :
Granite, Syenite, Diorite, Gabbro, Dunite, Rhyolite, Trachyte, Andesite, Basalt.

B.Sc.II Year
Practical Paper – XI
(Based on Theory Paper No-VIII & IX)

Total Marks: 100

- A) Study of Structural Geological Maps Covering Faults, Unconformity, Folds and Dykes.
- B) Orthographic and Stereographic Methods of Solving Structural Problems.
- C) Study of Following Rocks in Hand Specimen:
Sandstone and its types, Grit, Carbonaceous shale, Fossiliferous limestone, Shelly limestone, Breccia, Marl, mudstone, greywacke, Conglomerate, Arkose, Quartzite, Marble, Mica-Garnet schist, Actinolite schist, Sillimanite Schist, Gneisses, Granulite eclogite, schorl, Amphibolite.
- D) Study of the Optical Properties of Following Rocks :
Sandstone, Limestone, Breccia, Conglomerate, Oolitic limestone, Fossiliferous limestone, Quartzite, Shale. Quartzite, Marble, Mica-Garnet schist, Actinolite schist, Sillimanite Schist, Gneiss, Granulite.
- E) Study of structures of Sedimentary and Metamorphic Rocks in hand specimen.
- F) Preparation of Geological report based on field tour of four days duration.

Scheme Of Marking of Theory Papers

Semester III

Paper - VI

OPTICAL AND DESCRIPTIVE MINERALOGY

Optical Mineralogy	25 marks
descriptive Mineralogy	25 marks
MCQ 40 marks + Internal Examination	10 marks

Semester III

Paper - VII

DYNAMICS OF THE EARTH AND IGNEOUS PETROLOGY

Dynamics of the Earth	50 marks
Igneous Petrology	50 marks
MCQ 40 marks + Internal Examination	10 marks

Semester IV

Paper - IX

SEDIMENTARY AND METAMORPHIC PETROLOGY

Sedimentary Petrology	25 marks
Metamorphic Petrology	25 marks
MCQ 40 marks + Internal Examination	10 marks

(Semester IV)

Paper - VIII

STRUCTURAL GEOLOGY

Structural Geology:	50 marks
MCQ 40 marks + Internal Examination	10 marks

Scheme of Marking for Practical Papers

Paper – X

Based on theory Paper VI and VII

Marks: 100

A) Optical Mineralogy

- | | |
|----------------------------------|----------|
| 1) Mineral thin section | 15 Marks |
| 2) Sign of Elongation/Optic sign | 10 Marks |

B) Mineralogy

- | | |
|------------------------------|----------|
| 1) Minerals in Hand specimen | 15 Marks |
| 2) Hess Metasilicate | 10 Marks |

C) Structural Geology

- | | |
|---------------------------|----------|
| 1) Maps | 20 Marks |
| 2) Structural Problems | 10 Marks |
| 3) Stereographic Problems | 10 Marks |
| Record Book | 10 Marks |

100 Marks

Paper – XI

(Based on Theory paper no. VII and IX.)

Marks : 100

A) Igneous Petrology

- | | |
|------------------|----------|
| 1) Hand Specimen | 10 Marks |
| 2) Thin section | 10 Marks |

B) Sedimentary Petrology

- | | |
|------------------|----------|
| 1) Hand specimen | 10 Marks |
| 2) Thin section | 10 Marks |

C) Metamorphic Petrology

- | | |
|------------------|----------|
| 1) Hand specimen | 10 Marks |
| 2) Thin section | 10 Marks |

D) Structures and Textures of

- | | |
|-------------------------------|----------|
| 1) Rocks in Hand Specimen | 15 Marks |
| 2) Field Report and Viva-Voce | 15 Marks |
| Record Book | 10 Marks |

100 Marks

Books Recommended for B.Sc. IInd Year Geology

Title of Books and Author Name

- 1) Optical Mineralogy Paul. F..Kerr
- 2) An Introduction to Rock forming Minerals Deer,Howie And Zussman
- 3) Optical Mineralogy Phillips & Griffen
- 4) Rutlay's Elements of Mineralogy C.D. Gribble, 27 th Edn.
- 5) Principles of Sedimentology Friedman & Sanders
- 6) Petrology of the Metamorphic Rocks Roger Mason
- 7) Structural Geology M. P. Billing's
- 8) Petrology of Sedimentary rocks J. T. Greensimth
- 9) Sedimentary Rocks F.J. Pettijohn
- 10) An Introduction to Sedimentology S.R.Selley
- 11) Introduction to Sedimentology S.M. Sengupta
- 12) Igneous Rocks Alok Gupta
- 13) Igneous and Metamorphic Petrology Turner and Verhoogen
- 14) Sedimentary Structures J. D. Collinson & D.B. Thompson
- 15) Layered Igneous rocks L. R. wager and G.M. Brown
- 16) Study of rocks in Thin sections W.W. Moorhouse
- 17) Petrology G. W. Tyrrel
- 18) Geomprphology-Singh
- 19)Physical Geology – Auther Holms
- 20)Mannules of Structural Maps-N.W.Gokhale
- 21) Mineralogy- J.D. Dana