

अंतरी पेटवू ज्ञानज्योत

**NORTH MAHARASHTRA UNIVERSITY,
JALGAON**



Syllabus for

S.Y. B.Sc

Semester III and IV

GEOLOGY

w. e. f. June 2016

NORTH MAHARASHTRA UNIVERSITY,

JALGAON

S.Y. B.Sc

GEOLOGY

(w.e.f. June 2016)

Semester-III

GL 231- Mineralogy

GL 232 - Principles of Stratigraphy

Practical Course

GL 203 - Based on Semester III course

Semester-IV

GL 241- Petrology

GL 242 – Structural Geology

Practical Course

GL 204 - Based on Semester IV course

NORTH MAHARASHTRA UNIVERSITY, JALGAON**Syllabus for S.Y. B.Sc Semester III****GL 231 - Mineralogy****w.e.f. from – June 2016**

Unit No	Topic	Sub topics	Periods	Marks
I	Mineralogy	<p>1. Introduction.</p> <p>a) Definition of a mineral.</p> <p>b) Major elements constituting minerals</p> <p>2. Classification of Minerals based on</p> <p>A) Cations and Anions B) Industrial uses</p> <p>3. Phenomenon of Isomorphism, Polymorphism and Pseudomorphism.</p> <p>4. Systematic Mineralogy</p> <p>A) Silicate structures, chemical composition, occurrence and uses of :</p> <p>1. Olivine Group.</p> <p>2. Pyroxene Group</p> <p>3. Amphibole Group</p> <p>4. Mica Group</p> <p>5. Feldspar Group</p> <p>6. Silica Group</p> <p>B) Physical and optical properties of : Olivine, Augite, Hornblende, Muscovite, Biotite, Orthoclase, Plagioclase, Quartz.</p>	20	20
II	Gemology	<p>a) Introduction, definition, (beauty and rarity & durability)</p> <p>b) Physical properties (Crystal System, Hardness, Sp.Gr.) and Optical Properties (Colour, Luster, RI and Refraction) of Gemstone</p> <p>c) Physical and Optical properties of : Diamond, Ruby and Emerald.</p>	11	12
III	Crystallography	<p>a) Definition of Holohedral, Hemimorphic, Hemihedral forms.</p> <p>b) Crystallographic axis, symmetry and forms with indices of:</p> <p>i. Cubic system - Pyrite and Tetrahedrite type.</p> <p>ii. Hexagonal system - Beryl, Calcite, Quartz type.</p> <p>iii. Monoclinic system - Gypsum type.</p> <p>iv. Triclinic system - Axinite type.</p>	20	20

IV	Mineral Optics	a) Phenomenon of colour and pleochroism b) Phenomenon of relief and twinkling c) Principle of compensation and interference colors and Newton's Scale. d) Definition of Uniaxial and Biaxial minerals and their sign.	9	8
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LIST OF BOOKS (GL 231 – Mineralogy)

1. Rutley's Elements of Mineralogy (27th Edition) – H. H. Read and Revised by D. D Gribble (CBS Publication)
2. Introduction to rock forming minerals: Deer, Howie, Zisman
3. Text book of Geology - Kulkarni and others
4. Optical Mineralogy - Kerr
5. Gemology - P.G. Read
6. Dana's Textbook of Mineralogy – Willian E. Ford
7. Minerals and Rocks – Klein
8. Optical Mineralogy – Phillips & Griffin
9. Manuel of Mineralogy (21st Edition) – Cornelius, S. Hurlbut Jr., Cornelius Klein (J. Wiley & Sons)
10. Elements of Mineralogy – Berry, Mason and Dietrich
(W. H. Freeman and Company)
11. Minerals – Hans R., Wenk and A. Bulakh (Cambridge University Press)
12. Textbook of Geology – Kulkarni and others (Scintifica Publication, Pune)

NORTH MAHARASHTRA UNIVERSITY, JALGAON**Syllabus for S. Y. B.Sc Semester III****GL 232 - Principles of Stratigraphy****w.e.f. from – June 2016**

Unit No	Topic	Sub topics	Periods	Marks
I	Introduction	Definition, branches and importance of Stratigraphy	2	2
II	Stratigraphy Principles	The different Principles of Stratigraphy	6	6
III	Geologic Systems	Geologic Time Scale with Geological and Biological Events.	4	8
IV	Stratification	Physical, Chemical & Biological controlled stratification	8	8
V	Vertical Succession	Lithologic Uniformity, Heterogeneous Succession, Patterned Succession (alternation, varves and cycles)	10	6
VI	Unconformity	Hiatus, Classification of unconformity (Structural and Environmental classification), Evidences of unconformity	6	6
VII	Stratigraphy Classification	a) Introduction b) Development of Classification – Two fold & Three fold Time rock division c) Concept of Time Unit (Chronostratigraphic Unit) Eon, Era, Period, Epoch, Age. d) Lithostratigraphic Unit : Groups, Formation, Members and Beds. e) Chrono-Lithostratigraphic Unit : Eon, Era, System, Series and Stages f) Biostratigraphic Unit : Different Biozones.	8	12
VIII	Lateral Succession	Lateral Succession	6	4
IX	Principles of Correlation	Introduction, Physical and Paleontological evidences of Correlation	10	8

LIST OF BOOKS (GL 232 - Principles of Stratigraphy)

1. Stratigraphic Principles and Practices – Weller, J. M (Universal Book – 1960)
2. Stratigraphy and Sedimentation – Krumbein and Sloss
3. Principles of Stratigraphy – Dunbar and Rogers
4. Principles of Stratigraphy – Grabau
5. Basic Concept of Historical Geology – E. W. Spencer
6. Principles of Sedimentology and Stratigraphy – Boggs S. (Prentice Hall – 2001)
7. Textbook of Geology (For S.Y.B.Sc.)– Chakranarayan and others.
(Scintifica Publication, Pune)
8. Principles of Stratigraphy By Leamon.

NORTH MAHARASHTRA UNIVERSITY, JALGAON

Syllabus for S. Y. B.Sc

Semester IV

GL 241: Petrology

w. e. f. from – June-2016

Unit No	Topic	Sub topics	Periods	Marks
I	Introduction	Introduction, Definition, Branches and Scope.	2	2
II	Igneous Petrology	1) Physico - chemical constituents of magma. a. Chemical composition b. Element composition c. Niggli Molecules. 2) Types of magmas – Primary (Granitic and Basaltic), Secondary magma. 3) Crystallization of Binary Magma. a) Eutectic (Orthoclase-Quartz) b) Solid Solution Albite – Anorthite 4) Textures i) Poiklitic : Ophitic, Subophitic ii) Porphyritic : Intergranular , Intersertal 5) Classification: Tabular classification based on color index, depth of formation, chemical composition, saturation concept and feldspar present showing , Granite, Diorite, Syenite, Gabbro, Dunite, Graphic granite, Pitchstone, Orthoclase porphyry, Pegmatite, Dolerite, Rhyolite, Trachyte, Andesite, Obsidian, Basalt.	20	22
III	Sedimentary Petrology	1. Introduction – Derivation and sources of sediments, Mineral composition of clastic sediments, Concept of Matrix/Cement. 2. Classification of Sediment admixture by Shepard. 3. Descriptive Sedimentary Petrology based on products of weathering: i) Residual deposits - Laterite and soils. ii) Rudaceous deposits - Conglomerate and Breccia. iii) Arenaceous deposits - Varieties of sandstones, Arenites, Greywacke, Arkose, Grit. iv) Argillaceous deposits - Mudstone, Shale. v) Chemical deposits – Limestone vi) Organic deposits - Fossil Limestone	20	20

Unit No	Topic	Sub topics	Periods	Marks
		4. Chemical and Biogenic structures: Stylolites, Nodules, Concretions, Burrows, Tracks and Trails.		
IV	Metamorphic Petrology	1. Definition and salient features of metamorphism as a process. 2. Metamorphic minerals (Stress and antistress minerals) Influence of original composition, heat, directed pressure and uniform pressure on minerals. 3. Cataclastic metamorphism of Pelitic rocks. 4. Thermal Metamorphism of Pure carbonate and Arenaceous rocks. 5. Regional metamorphism of argillaceous rocks and Basic Igneous Rocks	18	16

LIST OF BOOKS (GL 241: Petrology)

1. Principles of Petrology - G.W. Tyrell
2. Igneous and Metamorphic petrology - Elthers and Blatt
3. Sedimentary rocks - F.J. Pettijohn
4. Metamorphic Petrology - R. Mason
5. Petrography - Williams, Turner, Gilbert
6. An Introduction to Metamorphic Petrology – Yardley (ELBS Publication – 1990)
7. Igneous and Metamorphic Petrology – Best M. G. (Wiley Publication – 2002)
8. Principles of Metamorphic Petrology – Vernon R. H. and Clarke G. L. (Cambridge Publication – 2008)
9. An Introduction to Igneous and Metamorphic Petrology – John D. Winter (Prentice Hall – 2001)
10. Igneous and Metamorphic Petrology – Best, Myron G. (Blackwell Science – 2002)
11. Petrology (Igneous, Sedimentary, Metamorphic) – Blatt H. and Tracy R. J. (W.H. Freeman and Co., New York – 1996)
12. Igneous, Sedimentary and Metamorphic Petrology – Ehlers E. G. & Blatt H. (CBS Publication – 1982)
13. Petrology – Huang (McGraw Hill Book Co. – 1962)
14. Petrology for Students – Nockold, Knox and Chinner (Cambridge University Press – 1978)
15. Petrogenesis of Metamorphic Rocks – Winkler H. G. F. (Verlag – 1967)
16. A practical Approach to Sedimentology – Roy Lindholm

NORTH MAHARASHTRA UNIVERSITY, JALGAON**Syllabus for S. Y. B.Sc Semester IV****GL 242: Structural Geology****w. e. f. from - June-2016**

Unit No.	Topic	Sub Topic	Periods	Marks
I	Introduction	a) Definition and its relations with other branches of geology b) Tectonic and Non-tectonic structures	2	2
II	Planar/Linear Structures, Outliers / Inliers	a) Attitude of planer feature – Strike and Dip b) True and Apparent Dip, True and Vertical thickness and width of outcrop of planer features. c) Outlier and Inlier – Definition d) Clinometers and Brunton Compass and its uses e) Reading of Toposheets used as base map for Geological mapping.	10	8
III	Folds	a) Definition causes and parts of fold – axis, axial plane, limb, hinge, crest and crestal plane, trough and trough plane. b) Definition, causes and characters of following types of fold – antiform, synform, anticline, syncline, anticlinorium, synclinorium, symmetrical, asymmetrical, overturned, recumbent, isoclinal, chevron, box, fan, monocline, structural terrace, open, close, drag, plunging fold, Dec'ollement, diapir, disharmonic, Suprataneous fold. c) Recognition of folds by direct observation, plotting attitude of beds on map, topographic studies, drilling and mining data	20	22
IV	Joints	a) Definition and general characteristics of Joints b) Rupturing Under tension, Compression, Couple and torsion c) Geometric and genetic classification of joints	14	10

Unit No.	Topic	Sub Topic	Periods	Marks
V	Faults	a) Definition of fault as a planar zone b) Movement along faults – absolute, relative, translational and rotational c) Slip, Shift and Separation along fault d) Geometric classification of faults e) Genetic classification of faults f) Recognition of faults in the field : Discontinuity of Strata, Repeat and Omission of strata, Silicification and Mineralization, Fault Scarp and Slickenside	14	18

LIST OF BOOKS (GL 242: Structural Geology)

1. Structural Geology – M. P. Billings (Prentice- Hall -1987)
2. Theory of Structural Geology – N. W. Gokhale
3. Fundamentals of Structural Geology – Park and Blackie
4. An Outline of Structural Geology – Hobbs, Means, Williams
5. Structural Geology – B. S. Sathya Narayanswami
6. Structural Geology of Rocks and Region – Davis G. R. (John Wiley – 1984)
7. Fundamental of Structural Geology – Park R. G. (Chapman and Hall – 2004)
8. Fundamentals of Structural Geology – Pollard D. D (Cambridge University Press – 2005)

NORTH MAHARASHTRA UNIVERSITY, JALGAON

Syllabus for S. Y. B.Sc

GL 203: Practicals

w. e. f. from June-2016

Semester – III

Unit No.	Topic	Sub Topic
I	Physical Properties of the Minerals	Quartz crystal, Amethyst, Moss Agate, Bloodstone, Opal, Asbestos, Tourmaline, Beryl, Olivine, Augite, Hornblende, Chlorite, Plagioclase, Microcline, Fluorite, Calcite, Barytes, Gypsum, Apatite, Orthoclase. Muscovite, Biotite, Garnet, Talc, Corundum.
II	Physical properties of the Ore Minerals	Graphite, Galena, Pyrite, Hematite, Magnetite, Bauxite, Chromite, Sphalerite.
III	Optical Mineralogy	Microcline, Plagioclase, Garnet, Augite, Calcite, Muscovite, Hornblende, Olivine, Quartz
IV	Crystallography	Crystallographic axis, elements of symmetry and forms present with indices of- i) Cubic System – Pyrite and Tetrahedrite type ii) Hexagonal System – Beryl, Calcite and Quartz type iii) Monoclinic System – Gypsum type
V	Structural Problems	Problems based on the WOC, VT, TT and Dip of Strata with and without Hill slopes.
VI	Field work	Field visit / Excursion/ Study Tour.

NORTH MAHARASHTRA UNIVERSITY, JALGAON

Syllabus for S. Y. B.Sc

GL 203: Practicals

w. e. f. from - June-2016

Semester – IV

Unit No.	Topic	Sub Topic
I	Introduction to Petrology	Introduction to Petrology and Classification tables
II	Igneous rocks	Granite, Graphic Granite, Rhyolite, Syenite, Gabbro, Dolerite, Basalt, Pitchstone,
III	Sedimentary rocks	Laterite, Conglomerate, Breccia, Siliceous Sandstone, Ferruginous Sandstone, Shale, Carbonaceous Shale, Mudstone, Limestone, Fossiliferous Limestone, Crenoidal Limestone,
IV	Metamorphic rocks	Quartzite, Mica- Garnet Schist, Actinolite Schist, Biotite Schist, Hornblende Gneiss, Biotite Gneiss
V	Microscopic Petrology	Igneous Rocks – Granite, Gabbro, Basalt. Sedimentary rocks– Sandstone, Meliolic Limestone Metamorphic Rocks – Quartzite, Marble, Mica-Garnet Schist, Hornblende Gneiss.
VI	Paleontology – Classification, hard part morphology and range	Metatrix, Arca, Ostrea, Pecten, Unio, Conus, Turbo, Turritella, Murex, Cypraea, Physa, Ammonites, Terebratula, Productus, Echinolampas, Hemiaster, Montlivaltia, Isastria, Nummulites, Glossopteris, Gangamopteris, Vertibraria
VII	Structural (Geological) Maps	i) One series inclined beds (2 maps) ii) One series inclined beds with vertical dyke (2 maps) iii) Two series of beds with and without dyke (2 maps) iv) One series inclined beds with fault (2 maps) v) Two series inclined beds with fault (1map) vi) One series inclined beds with two fault (1 map)
VII	Field work	Field visit and excursion / Study tour.



To

The Dy Registrar (Academic)
North Maharashtra University,
Jalgaon

Sub. : Submission of Syllabus for Geology at S Y B Sc from June 2016.

Dear Sir,

Pl find enclosed a copy of the syllabus framed by the Expert members at its meeting held in the Department of Geology of this college on 23.2.2016 at 11.00 am.

Requested to the needful at your end.

Thanking you,

Yours sincerely,

(Principal Dr P H Pawar)