



Fergusson College (Autonomous)

Pune

Learning Outcomes-Based Curriculum

For F. Y. B. Sc. Geology

With effect from June 2019

Program Structure

Particulars	Name of Paper	Code	Title of Paper	Type of Paper	No. of Credits
F.Y. Semester I	Theory Paper - 1	GLY1101	Earth System Science	CORE-1	2
	Theory Paper - 2	GLY1102	Mineral Science	CORE-2	2
	Practical Paper - 1	GLY1103	Geology Practical - I	PCORE-1	2
F.Y. Semester II	Theory Paper - 3	GLY1201	Palaeontology	CORE-3	2
	Theory Paper - 4	GLY1202	Petrology	CORE-4	2
	Practical Paper - 2	GLY1203	Geology Practical - II	PCORE-2	2
S.Y. Semester III	Theory Paper - 5	GLY2301	Mineralogy and Igneous petrology	CORE-5	3
	Theory Paper - 6	GLY2302	Structural Geology	CORE-6	3
	Practical Paper - 3	GLY2303	Practicals related to GLY2301 and GLY2302	PCORE-3	2
S.Y. Semester IV	Theory Paper - 7	GLY2401	Sedimentary and Metamorphic Petrology	CORE-7	3
	Theory Paper - 8	GLY2402	Principles of Stratigraphy and Indian Stratigraphy	CORE-8	3
	Practical Paper - 4	GLY2403	Practicals related to GLY2401 and GLY2402 + 4-5 Days Field Component	PCORE-4	2
T.Y. Semester V	Theory Paper - 9	GLY3501	Mineralogy, Optics and Crystallography	CORE-9	3
	Theory Paper - 10	GLY3502	Structural Geology and Tectonics	CORE-10	3
	Theory Paper - 11	GLY3503	Pre-Cambrian Stratigraphy of India	CORE-11	3
	Theory Paper - 12	GLY3504	Geomorphology, Remote Sensing & Field Geology	CORE-12	3
	Theory Paper - 13(A)	GLY3505	Engineering Geology	ELEC-1	3
	Theory Paper - 13(B)	GLY3506	Principles of Geochemistry	ELEC-1	3

Particulars	Name of Paper	Code	Title of Paper	Type of Paper	No. of Credits
T.Y. Semester V	Theory Paper - 14(A)	GLY3507	Quaternary Geology and Palaeoclimate	ELEC-2	3
	Theory Paper - 14(B)	GLY3508	Basics of Geophysics and Geophysical Prospecting	ELEC-2	3
	Practical Paper - 5	GLY3509	Geology Practical I Practicals related to: GLY3501: Mineralogy, Optics & Crystallography and GLY3507: Quaternary Geology and Palaeoclimate OR GLY3508: Basics of Geophysics and Geophysical Prospecting	PCORE-5	3
	Practical Paper - 6	GLY3510	Geology Practical II Practicals related to: GLY3502: Structural Geology and Tectonics and GLY3503: Pre-Cambrian Stratigraphy of India	PCORE-6	3
	Practical Paper - 7	GLY3511	Geology Practical III Practicals related to: GLY3504: Geomorphology & Remote Sensing and GLY3505: Engineering Geology OR GLY3506: Principles of Geochemistry	PCORE-7	3
	Theory Paper - 15	GLY3601	Economic Geology	CORE-13	3
	Theory Paper - 16	GLY3602	Igneous, Sedimentary and Metamorphic Petrology	CORE-14	3
Theory Paper - 17	GLY3603	Phanerozoic Stratigraphy of India	CORE-15	3	
Theory Paper - 18	GLY3604	Hydrogeology	CORE-16	3	

Particulars	Name of Paper	Code	Title of Paper	Type of Paper	No. of Credits
T.Y. Semester VI	Theory Paper - 19(A)	GLY3605	Environmental Geology	ELEC-3	3
	Theory Paper - 19(B)	GLY3606	Soil Geology	ELEC-3	3
	Theory Paper - 20(A)	GLY3607	Introduction to Oceanic & Atmospheric Sciences	ELEC-4	3
	Theory Paper - 20(B)	GLY3608	Fossil fuels, Mining methods & National Mineral Policy	ELEC-4	3
	Practical Paper - 8	GLY3609	Geology Practical IV Practicals related to: GLY 3601: Economic Geology and GLY 3607: Introduction to Oceanic & Atmospheric Sciences OR GLY 3608: Fossil fuels, Mining methods and National Mineral Policy	PCORE-8	3
T.Y. Semester VI	Practical Paper - 9	GLY3610	Geology Practical V Practicals related to: GLY 3602: Petrology and GLY 3603: Phanerozoic Stratigraphy of India	PCORE-9	3
	Practical Paper - 10	GLY3611	Geology Practical VI(including compulsory 10 days fieldwork) and Practicals related to: GLY 3604: Hydrogeology GLY 3605: Environmental Geology OR GLY 3606: Soil Geology	PCORE-10	3

Programme Outcomes

PO1	Identify various processes involved in shaping the Earth.
PO2	Identify and describe different minerals using their various properties.
PO3	Identify and describe various igneous, sedimentary and metamorphic rocks and their structures in the field.
PO4	Identify the sequence of rocks exposed in different parts of India and fit them against the geological time scale.
PO5	Identify different geological features in the field.
PO6	Apply the Principles of Stratigraphy in the field.
PO7	Identify and describe various fossils with their time range.
PO8	Identify economic mineral deposits with their processes of formation and their occurrences in India.
PO9	Carry out hydrogeological investigations.
PO10	Carry out preliminary engineering investigations.
PO11	Analyse and interpret remotely sensed data.
PO12	Qualify for further higher education in the field of earth sciences.
PO13	Assist in various geological services.
PO14	Demonstrate true values of leadership, co-operation, hard work, teamwork, etc. during the field works, surveys and field visits.
PO15	Show development in the overall personality traits like stage daring, communication skills, presentation which is essential for future career.
PO16	Pursue further learning in Geology with reasonable knowledge, skills and interest.

PAPER CODE: GLY1101
PAPER – I: EARTH SYSTEM SCIENCE

<p>Learning outcomes- A student will learn about:</p> <ol style="list-style-type: none"> 1. Formation and evolution of the earth. 2. Various processes involved in shaping the earth. 	<p>Suggested Pedagogies</p> <ol style="list-style-type: none"> 1. Use appropriate ICT tool, wherever necessary, for effective teaching. 2. Use diagrams and models to discuss landforms 3. Field studies.
Title and Contents	No. of Lectures
<p>Unit -I</p> <p style="text-align: center;">EARTH: ITS ORIGIN, AGE, INTERIOR AND PROCESSES</p> <p>A)</p> <p>1) Introduction: Definition of geology, its divisions, sub-divisions and scope</p> <p>2) Planet Earth Origin of the Universe (Big Bang Theory), Origin of the Solar System (Nebular, Encounter and Tidal theory)</p> <p>a) Earth: Its size, shape and density. Temperature, pressure and magnetism within the earth, Present day hypsographic curve</p> <p>b) Age of the Earth: A brief account of the historical methods.</p> <p>c) Determination of age by the K/Ar, U/Th and Carbon dating methods</p> <p>d) Geological Time Scale: Concept and Criteria.</p> <p>B)</p> <p>a) The Earth's Atmosphere (Introduction to Atmospheric circulation, weather and climate changes, land-air-sea interactions, global climatic changes), Hydrosphere (Introduction to ocean currents, types and causes, significance), Lithosphere (Structure and composition) and Biosphere (Ecology and food chain)</p> <p>b) Earth's crust, mantle and core</p> <p>c) Continental Drift: Concept and evidences- continental fit, geological and palaeontological evidences</p> <p>d) Plate Tectonics: A brief introduction.</p> <p>e) Concept of Isostasy: Pratt's and Airy's model.</p>	<p>18</p>

<p>Unit -II</p>	<p>DYNAMICS OF THE EARTH</p> <p>A) Geomorphic processes and landforms</p> <ul style="list-style-type: none"> ❖ Weathering, erosion and denudation <p>Types of weathering:</p> <ul style="list-style-type: none"> • Mechanical – frost wedging, frost action, insolation, activities of organic life and exfoliation • Chemical-hydrolysis, hydration, solution, carbonation and oxidation <ul style="list-style-type: none"> ❖ The dynamics of erosional and depositional landforms resulting from the action of: <p>a) River</p> <ul style="list-style-type: none"> • Erosional landforms – waterfall, potholes, mesa and butte, meandering and ox-bow lake. • Depositional landforms- delta and types, alluvial fans, flood plains and river terraces. <p>b) Wind</p> <ul style="list-style-type: none"> • Erosional landforms - deflation and deflation armour, yardangs, mushroom rock. • Depositional landforms - sand dunes and its types, loess. <p>c) Sea</p> <ul style="list-style-type: none"> • Erosional landforms - sea cliff, sea cave, natural arch, sea stack • Depositional landforms- Beach and long shore drift deposits <p>d) Glaciers</p> <ul style="list-style-type: none"> • Erosional landforms - Valleys (U shaped and hanging valleys), crevasse, cirque, crag and tail • Depositional landforms - moraines and its types, drumlins, eskers. <p>B)</p> <p>a) Types of Mountains: Fold, fault block, volcanic and residual.</p> <p>b) Volcanoes: Genesis of volcanoes, Central and fissure type of eruptions. Products of volcanoes, effects of volcanoes, earth’s volcanic belts.</p> <p>c) Earthquakes: Definition, terminology, causes, intensity and magnitude. Recording of earthquakes (Modern recording method). Use of seismic waves and their importance in interpreting the earth’s internal structure. Seismic zones. History and susceptibility of the Indian subcontinent to earthquakes.</p> <p>d) Disasters and Disaster Management: Disaster: Definition, types, effects, phases, prevention, mitigation and preparedness. A case study of any one Indian disaster. Disaster Management: Definition, types, warning, precautions, mitigation and management.</p>	<p>18</p>
<p>Learning Resources:</p> <ol style="list-style-type: none"> 1. General Geology: Radhakrishnan 2. Holmes’Principles of Physical Geology: Edited by P. McL. D. Duff 		

3. Plate tectonics and Crustal evolution : Condie
4. Our evolving planet : Bergen, Alma Mater Fortag
5. Geomorphology and Global Tectonics: Summerfield M. A.
6. Geomorphology: Thornburry
7. Concepts of Geomorphology: Gupta and Kale

PAPER CODE: GLY1102		
PAPER –II: Mineral Science		
Learning outcomes- A student will learn about: <ol style="list-style-type: none"> 1. Formation, identification and classification of minerals. 2. Physical and optical properties of minerals. 3. Crystallographic systems of various minerals. 	Suggested Pedagogies <ol style="list-style-type: none"> 1. Use appropriate ICT tool, wherever necessary, for effective teaching. 2. Use diagrams specimens and models to discuss mineral groups, crystal systems and properties of minerals. 3. Field studies. 	
	Title and Contents	No. of Lectures
Unit -I	FORMATION AND PROPERTIES OF MINERALS A) 1) Introduction: Definition, branches and scope of mineralogy and uses of minerals. 2) Formation of minerals: Introduction and description of geological processes of mineral formation; a) Crystallization from melt. b) Crystallization from Solution. (evaporation and precipitation) c) Crystallization from Vapour (sublimation) d) Metamorphic processes e) Alteration and related weathering (oxidation and supergene sulphide enrichment) 3) Physical properties of minerals a) Colour, streak, lustre, cleavage, fracture, hardness, form and specific gravity b) Methods of determining specific gravity c) Properties based on magnetism, electrical properties, and radioactivity d) Luminescence (Phosphorescence and Fluorescence) B) 1) Optical mineralogy a. Nature of light – ordinary and plane polarized light. b. Double refraction of light (with the help of calcite crystal) c. Nicol’s prism and polaroids. d. Petrological microscope. e. Introduction to optical properties:–	18

	<p>In plane polarized light: Colour, form, cleavage, cracks, relief, twinkling, pleochroism.</p> <p>In between Crossed Nicols: Isotropism, anisotropism, extinction positions (straight, oblique, symmetrical and determination of extinction angle), interference colours, twinning (simple, multiple and cross hatching).</p> <p>2) Crystal Chemistry</p> <p>a) Geochemical affinity & geochemical classification of elements.</p> <p>b) Isomorphism, polymorphism, pseudomorphism.</p> <p>c) Silicate structures</p>																			
Unit -II	<p>MINERAL GROUPS AND CRYSTALLOGRAPHY</p> <p>A) Mineral Groups- Study of following mineral groups with respect to their silicate structure, chemical composition, physical and optical properties</p> <table border="0"> <tr> <td>a) Olivine</td> <td>d) Mica</td> </tr> <tr> <td>b) Pyroxene</td> <td>e) Feldspar</td> </tr> <tr> <td>c) Amphibole</td> <td>f) Silica</td> </tr> </table> <p>B) Crystallography</p> <p>a) Definition and conditions conducive for the formation of crystals.</p> <p>b) Crystal morphology – faces, forms, edges, solid angles, interfacial angle and its measurement by contact goniometer, law of constancy of interfacial angle.</p> <p>c) Symmetry of crystals – Elements of Symmetry-Plane, axis and center of symmetry; crystallographic and geometrical symmetry.</p> <p>d) Crystallographic axes, lettering and order of crystallographic axes, parameters, axial ratio, indices, parameter system of Weiss, index system of Miller, Law of rational indices.</p> <p>e) Study of following crystallographic systems with respect to their elements of symmetry, crystallographic axes and their forms with indices.</p> <table border="0"> <tr> <td>i. Orthorhombic</td> <td>(Type: Barytes)</td> </tr> <tr> <td>ii. Tetragonal</td> <td>(Type: Zircon)</td> </tr> <tr> <td>iii. Cubic</td> <td>(Type: Galena)</td> </tr> <tr> <td>iv. Hexagonal</td> <td>(Type: Beryl)</td> </tr> <tr> <td>v. Monoclinic</td> <td>(Type: Gypsum)</td> </tr> <tr> <td>vi. Triclinic</td> <td>(Type: Axinite)</td> </tr> </table>	a) Olivine	d) Mica	b) Pyroxene	e) Feldspar	c) Amphibole	f) Silica	i. Orthorhombic	(Type: Barytes)	ii. Tetragonal	(Type: Zircon)	iii. Cubic	(Type: Galena)	iv. Hexagonal	(Type: Beryl)	v. Monoclinic	(Type: Gypsum)	vi. Triclinic	(Type: Axinite)	18
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<p>Learning Resources:</p> <ol style="list-style-type: none"> 1. Read, H. H. , 1916, Rutley's Elements of Mineralogy, 26th Edition, Thomas Murby & Co., London 2. Gribble, C. D., 1988, Rutley's Elements of Mineralogy, 27th Edition, Unwin Hyman, London 3. Dana, E. S., and Ford, W. E., 1922, Text Book of Mineralogy, John Wiley, New York, 748 p. 4. Deer, W. A., Howie, R. A. and Zussman, J., 2013, An Introduction to Rock Forming Minerals, Essex: Longman Scientific and Technical; New York: Wiley. , 696pp. 5. Manual of Mineralogy: Cornelius, S. Hurlbut and Cornel Klein 6. Principles of Mineralogy: W.H. Blackburn, W.H. Denman 7. Berry, L. G., Dietrich, R. V., and Mason, B., 1985, Mineralogy, CBS Publishers & Distributors, India, 561p. 																				

PAPER CODE: GLY1103
PAPER –III: GEOLOGY PRACTICAL - I

<p>Learning outcomes -</p> <ol style="list-style-type: none"> 1. Identify various minerals using physical properties. 2. Identify various crystal forms shown by minerals belonging to different crystal systems. 3. Analyze and interpret topographic maps and draw vertical sections along given line. 4. Read a Toposheet. 5. Undertake stream ordering in drainage basin. 6. Find epicenter of earthquake. 	<p>Suggested Pedagogies</p> <ol style="list-style-type: none"> 1. Use of specimens, charts and models for mineralogy and crystallography 2. Use of toposheets 3. Use of models for understanding landforms. 4. Use appropriate ICT tool, wherever necessary, for effective teaching. 5. Use of appropriate maps to understand topography and drainage.
Title of Experiment/ Practical	
1	Physical properties of minerals Colour, form, streak, luster, cleavage, fracture, hardness and Specific gravity.
2	Identification of following Megascopic minerals in hand specimens with the help of physical properties Silica Group: Quartz, Rock crystal, Amethyst, Chalcedony, Agate, Jasper, Flint, Feldspar Group: Orthoclase, Plagioclase Mica Group: Biotite, Muscovite
3	Identification of following Megascopic minerals in hand specimens with the help of physical properties Ca-Ba bearing minerals: Calcite and Baryte. Ore minerals: Magnetite, Haematite, Chromite, Chalcopyrite, Galena, Pyrolusite, Bauxite and Graphite Other Group minerals: <ul style="list-style-type: none"> • Garnet • Olivine • Amphibole- Hornblende • Alluminosilicate-Kyanite
4	<ul style="list-style-type: none"> • Study of elements of symmetry • Crystallographic axes and forms with indices of the Cubic System (Type- Galena) representing all the fundamental crystal forms.
5	Crystallographic axes and forms with indices of the Orthorhombic System (Type- Baryte), Monoclinic System (Type- Gypsum) and Triclinic System (Type- Axinite) representing all the fundamental crystal forms
6	<ul style="list-style-type: none"> • Crystallographic axes and forms with indices of the Tetragonal System (Type-Zircon) and Hexagonal System (Type- Beryl) representing all the fundamental crystal forms • Measurement of interfacial angle with Contact Goniometer
7	Study of topographic maps with section drawing
8	<ul style="list-style-type: none"> • Study of toposheets • Study of landforms
9	<ul style="list-style-type: none"> • Stream ordering in a drainage basin • To find the epicenter of an earthquake using seismic data
10	Revision Practical

PAPER CODE: GLY1201
PAPER –I: PALAEONTOLOGY

<p>Learning outcomes- A student will learn about</p> <ol style="list-style-type: none"> 1. Various processes of fossilization. 2. Morphology, identification and classification of various invertebrate fossils, microfossils and ichnofossils. 	<p>Suggested Pedagogies</p> <ol style="list-style-type: none"> 1. Use appropriate ICT tool, wherever necessary, for effective teaching. 2. Use diagrams, specimens and models to discuss morphology of various fossils 	
	Title and Contents	No. of Lectures
Unit -I	<p style="text-align: center;">Introduction to Palaeontology and Invertebrate Palaeontology</p> <p>A)</p> <ol style="list-style-type: none"> a) Palaeontology: Definition, branches, Importance and scope. b) Fossils: Definition, conditions and modes of preservation of fossils. c) Techniques used in collection (Spot and channel), preservation and illustration of mega fossils. d) Uses and Importance of fossils. e) Mass extinction, causes and evidence <p>Systematic position, morphology of hard parts, geological and geographical distribution of the following:</p> <p>Phylum Mollusca:</p> <ol style="list-style-type: none"> I. Class Lamellibranchia or Bivalvia: Morphology of hard parts of the shell, ornamentation and types of hinge lines. II. Class Gastropoda: Morphology of hard parts of the shell and forms of the gastropod shell. III. Class Cephalopoda: Morphology of hard parts of Nautilus, Ammonoids, Belemnites and type of suture lines. <p>Comparison between Nautilus and Ammonoids. Evolutionary trends in Ammonoids</p> <p>B)</p> <p>Systematic position, morphology of hard parts, geological and geographical distribution of the following:</p> <p>Phylum Brachiopoda</p> <p>Morphology of hard parts of Class Articulata and Inarticulata. Types of brachial skeleton. Comparison between Lamellibranchs and Brachiopods.</p> <p>Phylum Echinodermata</p> <p>Class Echinoidea: Morphology of hard parts of Regularia. Variation in the apical disc in echinoids.</p> <p>Phylum Arthropoda</p> <p>Class Trilobita – Morphology of hard parts of Trilobites and evolutionary trends.</p> <p>Phylum Coelenterata</p> <p>Class Anthozoa- Madreporaria, polyp, medusa, types of</p>	18

	<p>septa. Origin and evolution of life over geological time. Concepts of organic evolution. (Definition, Evidence of evolution, Macro & Micro evolution, Darwinism, Lamarckism & Mutation)</p>	
Unit - II	<p>Micropalaeontology, Palaeobotany and Ichnology</p> <p>A) Micropalaeontology</p> <p>a) Introduction to Micropalaeontology</p> <p>b) Definition, different types of microfossils, their size range and composition</p> <p>c) Different branches of Micropalaeontology, uses of microfossils</p> <p>d) Field and Laboratory Techniques</p> <p>i. Field techniques for collection of microfossils (sampling methods)</p> <p>ii. Laboratory techniques for separation- Mechanical and chemicals methods, Recovery of microfossils from shale and limestone. Separation of microfossils from coal (maceration), Preservation and Illustration.</p> <p>e) Study of the following microfossils: (with respect to their morphology, environmental and paleo-ecological significance)</p> <p>(i) Foraminifers</p> <p>(ii) Ostracods</p> <p>(iii) Diatoms and Radiolarian</p> <p>B) Palaeobotany</p> <p>a) Introduction to Palaeobotany, Classification of Plants, preservation of parts of plants ,</p> <p>b) Study of Pollens and Spores</p> <p>C) Ichnology</p> <p>Ichnofossils its classification, significance</p>	18
<p>Learning Resources:</p> <p>1. Woods, H., 1958, Text Book of Palaeontology (Invertebrate), Cambridge University Press, UK.</p> <p>2. Clarkston E.N.K., 1998, Invertebrate Palaeontology and Evolution, 4th Edition, Wiley - Blackwell, 468p.</p> <p>3. Brasier, M.D., 2011, Microfossils, Chapman & Hall, 193p.</p> <p>4. Remer: Vertebrate Palaeontology</p>		

PAPER CODE: GLY1202
PAPER –II: PETROLOGY

<p>Learning outcomes- A student will learn about</p> <ol style="list-style-type: none"> 1. Various rock forming processes. 2. Description, identification and classification of different igneous, sedimentary and metamorphic rocks. 	<p>Suggested Pedagogies</p> <ol style="list-style-type: none"> 1. Use appropriate ICT tool, wherever necessary, for effective teaching. 2. Use diagrams, specimens and charts to understand different types of rocks. 3. Field studies. 	
	Title and Contents	No. of Lectures
Unit -I	<p style="text-align: center;">INTRODUCTION TO PETROLOGY AND IGNEOUS PETROLOGY</p> <p>A) Introduction to Petrology</p> <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. <p>Igneous Petrology</p> <ol style="list-style-type: none"> a) Magma, its composition, physico-chemical constitution of magma, Bowen’s reaction series and formation of crystals and glass b) Forms of Igneous bodies: Intrusive-Concordant-sill, Discordant-dyke and batholith; Extrusive-Lava flows <p>B) Textures and Structures</p> <ol style="list-style-type: none"> a) Textures: Definition and factors controlling following textures: granitic, porphyritic, poikilitic, directive, glassy b) Structures: Vesicular, amygdaloidal, blocky, pillow, flow, columnar c) Classification of igneous rocks, basis of Classification: Depth of formation, silica percentage, type of feldspar content and colour index, Tabular classification. Study of following rocks-dunite, granite, gabbro, syenite, diorite, pegmatite, dolerite, rhyolite, basalt, trachyte, andesite 	18
Unit -II	<p style="text-align: center;">SEDIMENTARY AND METAMORPHIC PETROLOGY</p> <p>A) Sedimentary Petrology</p> <ol style="list-style-type: none"> a) Sediments and derivation of sediments: <ol style="list-style-type: none"> i. source of sediments ii. mineral composition of clastic/detrital sediments iii. concept of matrix and cement b) Transportation of sediments- modes of transportation and progressive changes in sediments during transport 	18

	<p>c) Sedimentary environments and formation of sedimentary rocks</p> <p>d) Textures and structures</p> <p>i. Textures- Clastic and non-clastic textures.</p> <p>ii. Primary sedimentary structures- lamination, bedding, cross bedding, graded bedding, ripple marks and mud cracks.</p> <p>e) Classification of sedimentary rocks and study of following rocks- laterite, bauxite, conglomerate, breccia, varieties of sandstone, shales, chemical and organic deposits</p> <p>B) Metamorphic Petrology</p> <p>a) Definition of metamorphism, agents of metamorphism, kinds of metamorphism</p> <p>b) Metamorphic minerals- Stress and antistress minerals</p> <p>c) Metamorphism and metamorphic products-</p> <ul style="list-style-type: none"> • Cataclastic- crush breccias, crush conglomerate, mylonite • Thermal metamorphism- quartzite, marble • Regional metamorphism- slate, phyllite, schist and gneiss <p>d) Structures in metamorphic rocks: maculose, slaty cleavage, granulose, schistose, gneissose</p> <p>e) Tabular classification of metamorphic rocks</p>	
<p>Learning Resources:</p> <p>1. Principles of Petrology: Tyrrell</p> <p>2. Igneous, metamorphic and sedimentary Rocks : Elher and Blatt</p>		

PAPER CODE: GLY1203
PAPER –III: GEOLOGY PRACTICAL – II

<p>Learning outcomes- A student will be able to-</p> <ol style="list-style-type: none"> 1. Identify some characteristic minerals in thin sections. 2. Identify various igneous, sedimentary and metamorphic rocks in hand specimens. 3. Identify different invertebrate fossils, microfossils and ichnofossils. 	<p>Suggested Pedagogies</p> <ol style="list-style-type: none"> 1. Use of specimens, microsections and charts for optical mineralogy, petrology and palaeontology. 2. Use appropriate ICT tool, wherever necessary, for effective teaching.
Title of Experiment/ Practical	
1	Optical properties of minerals: Study of optical properties of minerals in plane polarised light and between crossed nicols
2	Microscopic study of rock forming minerals (Properties in PPL) Augite, hornblende, microcline, plagioclase, biotite, calcite and garnet.
3	Properties in BCN
4	Identification of the following megascopic igneous rocks with respect to their texture/structure, mineral composition and classification Granite, gabbro, rhyolite, basalt (its varieties), pegmatite (Classification based on colour index, mineral composition and texture)
5	Identification of the following megascopic sedimentary rocks with respect to their texture/structure, mineral composition and classification Laterite, bauxite, breccia, conglomerate, sandstone, shale, mudstone and limestone.
6	Identification of the following megascopic metamorphic rocks with respect to their texture/structure, mineral composition and classification Slate, marble, quartzite, mica schist, hornblende schist, mica gneiss and hornblende gneiss.
8	Study of specimens from Phylum Mollusca – Class Lamellibranchia, Class Gastropoda, Class – Cephalopoda
9	Study of specimens from i. Phylum Brachiopoda. ii. Phylum Echinodermata. iii. Phylum Arthropoda. iv. Phylum Coelenterata.
10	Micropalaeontology- Study of microfossils- Two each from Foraminifera, Ostracoda, Pollens/ spores.
11	Study of ichnofossils
12	Revision