Deccan Education Society's
Fergusson College (Autonomous), Pune

Program Specific Outcomes (PSOs) and Course Outcomes (COs) 2019-20

Department of Geology
Programme: M.Sc. Geology

PSO No.	Program Specific Outcomes(PSOs) Upon completion of this programme the student will be able to
PSO1	**Academic competence** **(i)** Understand fundamental concepts, principles and processes underlying the field of Geology, its different subfields and its linkage with related disciplinary areas/subjects **(ii)** Demonstrate an understanding of a wide range of geological processes (e.g. genesis of rocks and formation of geological structures, formation of minerals and their alteration, effects of human activities at meso to microscale.) **(iii)** Undertake fi1eld tour in any part of India with respect to lithology, structure and stratigraphy and produce geological maps
PSO2	**Personal and Professional Competence** **(i)** Carry out field mapping in any part of India with respect to lithology, structure and stratigraphy and produce geological maps. **(ii)** Analyse geological data and samples procured during field work. **(iii)** Formulate ideas, execute scientific writing and authentic reporting, geological maps, effective presentation and communication skills.
PSO3	**Research Competence** **(i)** Apply skills developed towards comprehension of geological conditions to address issues and find solutions in case of ground water, mineral and fossil fuel exploration and geo hazards. **(ii)** Integrate informatics and statistical skills to explore and authenticate field and laboratory data for experimental and research purpose
PSO4	**Entrepreneurial and Social Competence:** **(i)** Employ Plan and conduct various geological services with demonstration of true values of leadership, co-operation and teamwork. **(ii)** Demonstrate awareness of ethical issues: Emphasizing on academic and research ethics, scientific misconduct, intellectual property rights and issues of plagiarism.

F.Y. M. Sc. Semester I		
Title of the Course and Course Code	**Mineralogy GLY4101**	**Number of Credits 4**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Identify and describe various physical properties of megascopic specimens and optical properties of minerals under microscope.	1
CO2	Compare various crystals based on symmetry, symmetry functions and explain crystal system, mineral groups based on physical and optical properties.	2
CO3	Outline application of different micro analytical tools used in mineral analysis.	3
CO4	Categorize industrial applications and economic importance of various minerals.	4
CO5	Justify selection of microanalytical technique selected for the mineral analysis.	5
CO6	Prepare a report on a mineral sample by performing the necessary tests and suggest its applications in various fields.	6
Title of the Course and Course Code	**Principles of Stratigraphy and Palaeontology GLY4102**	**Number of Credits 4**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe methods of collection of various types of fossils.	1
CO2	Discuss the principles of Stratigraphy and its applications in geological investigations.	2
CO3	Apply surface and subsurface procedures based on the stratigraphic principles in geological investigations. Use standard stratigraphic codes while preparing geological reports.	3
CO4	Compare morphology, classification, evolutionary trends of Invertebrate fossils with geological, geographic distribution and paleo-ecological and paleo-enviromental relevance.	4
CO5	Review evolutionary trends in various Vertebrates.	5
CO6	Compile data on microfossils by studying their morphological and characteristic features.	6

Title of the Course and Course Code	**Sedimentology GLY4103**	**Number of Credits 4**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe the various principles of sediment transport by fluid motion.	1
CO2	Classify Biogenic, Chemical and Volcanoclastic sediments and sedimentary rocks.	2
CO3	Apply knowledge of tectonic settings to classify sedimentary basins.	3
CO4	Analyze data regarding provenance, paleocurrents and facies.	4
CO5	Compare characteristics of different depositional systems.	5
CO6	Formulate sedimentary sequence based on various depositional systems and facies of a given region.	6
Title of the Course and Course Code	**Practical 1 GLY4104**	**Number of Credits 4**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Identify and describe various body fossils and microfossils.	1
CO2	Explain and illustrate the assembly of petrological microscope.	2
CO3	Classify various rock forming minerals based on their optical and physical properties.	3
CO4	Analyze range charts	4
CO5	Determine order of superposition on the basis of lithostratigraphic well data.	5
CO6	Construct Stereograms and Gnomonograms for various crystal systems and find the interfacial angle.	6
Title of the Course and Course Code	**Practical 1 GLY4105**	**Number of Credits 4**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Identify and describe sedimentary rocks and primary sedimentary structures.	1

CO2	Classify sedimentary rocks using calculations on grain size and shape.	2
CO3	Carry out flow mapping in DVP.	3
CO4	Analyze and interpret morphometric data of a basin.	4
CO5	Evaluate vector database using geoprocessing techniques.	5
CO6	Generate maps using various GIS techniques.	6
Title of the Course and Course Code	**Geomorphology, Remote sensing and GIS in Geology GLY4106**	**Number of Credits 4**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe various geomorphic processes and resultant landforms.	1
CO2	Discuss historical perspective and development of geomorphological concepts.	2
CO3	Apply geomorphological knowledge in disaster management, town planning and hydrogeology.	3
CO4	Analyze GIS and Remote Sensing data.	4
CO5	Discriminate between various types of GIS and Remote sensing data.	5
CO6	Prepare geological report from Remote sensing data.	6
F.Y. M. Sc. Semester II		
Title of the Course and Course Code	**Igneous Petrology GLY4201**	**Number of Credits 4**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe the distribution of various rock types in the earth's crust and mantle.	1
CO2	Discuss the physical and chemical processes that produce the full range of igneous rock types.	2
CO3	Classify Igneous rocks with respect to different standard classification schemes.	3
CO4	Analyze various rocks on the basis of chemical characteristics and comment on their origin.	4
CO5	Compare various types of igneous rocks occurring in different tectonic settings on the basis of physical and chemical characters.	5

CO6	Compile information of various types of Igneous rocks occurring in India.	6
Title of the Course and Course Code	**Metamorphic Petrology GLY4202**	**Number of Credits 4**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe various types of metamorphism based on controlling factors.	1
CO2	Discuss the types of textures and metamorphic mineral growth relative to deformation.	2
CO3	Examine metamorphic grade and Facies based on mineral assemblages, PT conditions, and bulk rock chemical composition.	3
CO4	Compare regional and thermal metamorphism of different rocks.	4
CO5	Determine the grade of metamorphism based on the textures and mineral assemblages.	5
CO6	Construct phase diagrams to understand the relationships between mineral assemblages and plots of ACF, AKF, AFM diagrams.	6
Title of the Course and Course Code	**Structural Geology GLY4203**	**Number of Credits 4**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe behavior of rocks under different stress and strain regimes.	1
CO2	Explain geodynamism of Earth system.	2
CO3	Examine and formulate appropriate methods for deformation analysis.	3
CO4	Classify the structures on the basis of different parameters.	4
CO5	Compare between micro, meso and macro structures.	5
CO6	Construct Mohr circle using stress-strain data.	6

Title of the Course and Course Code	**Practical III GLY4204**	**Number of Credits 4**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Identify different rocks in thin sections and write petrography.	1
CO2	Illustrate and identify various metallic ore minerals, non-metallic minerals and describe their industrial specifications	2
CO3	Outline geographical distribution of various economic minerals in India.	3
CO4	Identify and explain various structures in Igneous rocks.	4
CO5	Assess class of the rock by solving CIPW Norms.	5
CO6	Prepare geological map and produce a report by carrying out geological mapping on field.	6
Title of the Course and Course Code	**Practical IV GLY4205**	**Number of Credits 4**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Identify metamorphic rocks in hand specimens and thin sections.	1
CO2	Interpret metamorphic grade and type of metamorphism based on metamorphic textures.	2
CO3	Solve mesonorms ACF and A'KF	3
CO4	Analyze given structural data by various techniques.	4
CO5	Determine geology of the area from given geological map.	5
CO6	Reconstruct fold from given data using Busk method.	6

Title of the Course and Course Code	**Economic Geology GLY4206**	**Number of Credits 4**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe different ore minerals.	1
CO2	Discuss the mineralizing processes and occurrence of various economically important minerals with respect to time and space.	2
CO3	Examine economic mineral policies in India.	3
CO4	Classify geological raw materials used in various industries on the basis of industrial specifications	4
CO5	Review the occurrence of economic minerals in India.	5
CO6	Synthesise the mineralisation processes in relationship with plate tectonic settings.	6
S.Y. M. Sc. Semester III		
Title of the Course and Course Code	**Indian Stratigraphy GLY5301**	**Number of Credits 4**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe the different Stratigraphic units in India.	1
CO2	Categorize different lithostratigraphic units in India with respect to their temporal and spatial relationship.	2
CO3	Apply the principles of Stratigraphy in context with Stratigraphy of India.	3
CO4	Explain stratigraphic framework of Himalaya.	4
CO5	Review different stratigraphic boundaries in India.	5
CO6	Compile information of different stratigraphic units to understand the stratigraphic framework of India.	6

Title of the Course and Course Code	**Exploration Methods GLY5302**	**Number of Credits 4**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe the principles and proceduresofdifferent exploration techniques.	1
CO2	Explain concept of anamoly.	2
CO3	Apply various exploration techniques for mineral and energy exploration.	3
CO4	Analyze the data generated from various exploration methods.	4
CO5	Determine appropriate method for geophysical and geochemical exploration.	5
CO6	Prepare and interpret geophysical map of a given area	6
Title of the Course and Course Code	**Petroleum Geology GLY5303**	**Number of Credits 4**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe the origin, occurrence and distribution of petroleum and natural gas.	1
CO2	Discuss global scenario of petroleum industries and opportunities.	2
CO3	Illustrate steps involved in life cycle of Oil Field. Calculate various reservoir parameters	3
CO4	Compare and study geological setup of different petroliferous basins of India.	4
CO5	Evaluate various reservoir parameters.	5
CO6	Prepare note on energy scenario and unconventional resources.	6
Title of the Course and Course Code	**Hydrogeology, Watershed Development and Management GLY5304**	**Number of Credits 4**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe the rock hydrological properties to understand the aquifer and its characteristics.	1

CO2	Discuss the concept of aquifer and their types.	2
CO3	Outline typology of a given area by studying its various aspects.	3
CO4	Explain different hydrogeological investigative methods.	4
CO5	Critique on groundwater governance, policies and legislations.	5
CO6	Plan hydro geological investigation for any region and propose watershed development measures.	6
Title of the Course and Course Code	**Indian Stratigraphy and Exploration Methods + Field work component GLY5305**	**Number of Credits 4**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Identify rocks related to different geological formations/cratons.	1
CO2	Interpret seismic data.	2
CO3	Calculate different gravity corrections from the given data.	3
CO4	Compare paleogeographic maps of India.	4
CO5	Evaluate resistivity data.	5
CO6	Compile a report on geology of an area orknowledge of techniques and methodsacquired during field studies.	6
Title of the Course and Course Code	**Practicals related to GLY 5303+GLY 5304 GLY5306**	**Number of Credits 4**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Identify different microfossils and facies/ recall engineering properties of rocks/ describe various logs	1
CO2	Discuss various system tracts/ Explain different geo-engineering techniques/ Compare various mining methods	2
CO3	Analyze vertical profile sections to infer sedimentary environments/ Examine microfossil assemblage to estimate paleo-depth/ Carry out plane table survey/ Calculate area influence using different methods.	3
CO4	Compare geological setup of different petroliferous basins in India./ Analyze hydrogeological data.	4
CO5	Evaluate various maps and litho-section /Evaluate aquifer characteristics.	5
CO6	Write a report on petroleum accumulation and occurrence./ Design hydrogeological survey.	6

Title of the Course and Course Code	**Engineering Geology GLY5307**	**Number of Credits 4**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Define the engineering properties of rocks.	1
CO2	Infer different geo-hazard zones in a given area.	2
CO3	Apply the knowledge of geological parameters in construction of engineering structures.	3
CO4	Analyze slope stability in an area.	4
CO5	Determine appropriate sites to build various engineering structures.	5
CO6	Plan and carry out geotechnical investigation in the field.	6

Title of the Course and Course Code	**Sequence Stratigraphy and Applied Micropalaeontology GLY5308**	**Number of Credits 4**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe the fundamental principles associated with sequence Stratigraphy.	1
CO2	Classify various microfossils.	2
CO3	Apply knowledge of micropalaeontology in various branches of geology.	3
CO4	Compare different sedimentological environments.	4
CO5	Evaluate the paleoclimatic conditions on the basis of micro-palaeo assemblage.	5
CO6	Reconstruct a sequence in light of principles of sequence stratigraphy.	6

Title of the Course and Course Code	**Mining Geology and Oil Field Practices GLY5309**	**Number of Credits 4**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe various drilling methods and techniques.	1
CO2	Summarize various aspects of oil exploration.	2
CO3	Apply knowledge of geological parameters in mineral and oil exploration.	3
CO4	Analyze various types of logs.	4
CO5	Determine appropriate mining methods.	5
CO6	Prepare a mining plan.	6
S.Y. M. Sc. Semester IV		
Title of the Course and Course Code	**Dissertation (8credits) / Internship (4 credits) and Project/ training (4 credits) GLY5401**	**Number of Credits 8**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Identify the scientific problem.	1
CO2	Outline the research methodology.	2
CO3	Carry out field and lab work.	3
CO4	Integrate data using various techniques.	4
CO5	Evaluate the scientific data.	5
CO6	Write scientific report.	6