DEPARTMENT OF GEOLOGY

B.SC. GEOLOGY

Program Objective (PO)

PO1 Deliver comprehensive knowledge and understanding of basic concepts, theories and principles in the field of science

PO2 Self-equipped to engage in independent and life-long learning in the broadest context of socio-cultural and technological changes

PO3 Enrich learners with subject-related and transferable skills related with job trades and employment support MODULEs

PO4 Equip learners to demonstrate their own work and to investigate their awareness in relation to the wider research field

PO5 Understand the issues of environmental contexts and sustainable development

PO6 Adequate training in the application of digital knowledge at workplace and for higher education/research

PO7 Commit to professional ethics and responsibilities of the science practices

Program Specific Objective (PSO)

PSO1- Acquire a solid base of knowledge in the science of geology as a whole as well as earth materials, earth history, sedimentation and stratigraphy, deformational processes and structural features, and geomorphic processes and landforms.

PSO2- Know the geologic time scale and place important geologic events in a temporal framework.

PSO3- Use compasses, survey instruments, and images in geological investigations.

PSO4- Understand the pathways, fluxes, and influence of water and other fluids at Earth's surface and in the subsurface.

PSO5- Interpret topographic maps and terrain models and create profiles.

PSO6- Interpret geologic maps and construct cross sections from them.

PSO7-Develop the aptitudes and dispositions necessary to help democratize society by obtaining and maintaining employment as a professional geologist.

Course Outcomes

F.Y.B. Sc Geology (2019 Pattern)

1.GL-111-Fundamentals of geology & understanding the Planet Earth.

CO1- This course enables the students to appreciate the dynamic structure of the earth's processes.

CO2- This course enables the students to understand the concepts the plate tectonics on a global scale and analyses the physical processes responsible for the formation and destruction of the plates.

CO3- This course enables the students to understand about the geodynamics of the lithosphere and concept of isostasy, ocean floor spreading, continental drift, plate tectonics.

CO4- This course enables the students to understand about the interior of the Earth.

CO5- This course enables the students to understand about the morphology of the ocean floor.

CO6-The study of paleontology encompasses aspects such as age of the Earth, chronological arrangement of rocks and appearance and evolution of life through the geologic time.

CO7- The students will understand the role of plate tectonics in causing earthquakes and how this understanding can aid the assessment of seismic hazard.

2.GL-112-Mineralogy & Crystallography

CO1-The study of mineralogy encompasses aspects such as formation, uses & physical properties of minerals.

CO2- This course enables the students to understand about the branches & scope of mineralogy, importance & conservation of minerals.

CO3- The students will gain detail knowledge about uses of minerals in industries.

CO4- The students will gain detail knowledge about optical properties of minerals.

CO5- The students will gain detail knowledge about formation of crystals, crystal morphology, symmetry of crystals & bravaice crystal lattice.

3.GL-113-Practicals related to GL-112 & GL-113

CO1- The students will able to identify minerals & their physical properties.

CO2- The students will able to identify minerals & their optical properties.

CO3- The students will gain detail knowledge about elements of symmetry, crystallographic axes & forms with indices of the different crystal systems.

CO4- The students will get the knowledge about different landforms models.

CO5- The students will be able to read top sheets.

SEM II

4.GL-121-Principles of stratigraphy & sedimentation

CO1- The students will gain detail knowledge about principles of stratigraphy, development of stratigraphic concepts & importance of stratigraphy.

CO2- The students will gain detail knowledge about stratigraphic classification & nomenclature & stratigraphic elements.

CO3- The students will gain detail knowledge about sedimentary processes, classification of sedimentary rocks & different types of sedimentary environments.

CO4-The students will gain detail knowledge about sedimentary textures & primary sedimentary structures.

5.GL-122-Petrology & Geochemistry

CO1- The students will gain detail knowledge about evolution of magma, its composition & physical & chemical characteristics.

CO2- The students will gain detail knowledge about textures & structures of igneous rocks.

CO3- The students will learn about the igneous classification based on depth of formation, silica percentage, TAS & QAPF.

CO4- The students will gain detail knowledge about the geochemistry of Earth.

CO5- The students will gain detail knowledge about basics of radioactive decay, decay systems & their applications.

CO6- The students will gain detail knowledge about stable isotope geochemistry.

CO7- The students will gain detail knowledge about metamorphism & its types, facies & factors controlling textures and structures.

GL-123-Practicals related to GL-121 & GL-122

CO1- The students will able to identify different types of igneous rocks with respect to color index, mineral composition & texture.

CO2- The students will able to identify different types of sedimentary rocks with respect to texture, mineral composition & genesis.

CO3- The students will able to identify different types of metamorphic rocks with respect to texture/structure, mineral composition, degree, facies & type of metamorphism.

CO4- The students will able to identify different types of sedimentary structures with their environmental significance.

CO5- The students will gain detail knowledge about stratigraphic co-relation.

CO6- The students will gain detail knowledge about the rock types, their textures & structures & genesis during geological fieldwork

S.Y.B. Sc Geology (2019 Pattern)

1. GL-211-Structural Geology

CO1-The course deals with the geological structures resulting from the action of these forces on rocks.

CO2-Students will have gained knowledge of Planar and linear features in rocks and their application in the field.

CO3-The student will gain knowledge of geometry of rock structures, understand the evolution of mechanism of rock structures and its application in the field.

CO4-On completion of the course students will have gained knowledge of fundamental processes of rock deformation.

2. GL-221-Paleontology

CO1-The study of paleontology encompasses aspects such as age of the Earth, chronological arrangement of rocks and appearance and evolution of life through the geologic time.

CO2-The knowledge of paleontology would enable the students to understand the changes that occurred in the history of Earth and relate them to their field observations.

CO3-The knowledge of paleontology would enable the students to understand different types of fossils which are preserved under different environments.

CO4-The students will acquire skills of discovering & describing fossils & their taxonomic classification.

3. GL-213-Practicals related to GL-211 & 212

CO1- The students will able to solve structural problems related to hill slope & three-point problems.

CO2- The students will able to solve structural map & outcrop.

CO3- The students will acquire knowledge of invertebrate fossils & microfossils along with their systematic position & time range.

CO4- The students will acquire knowledge of Gondwana plant fossils along with their systematic position & time range.

4. GL-211-Global Tectonics and geodynamics of the lithosphere

CO1- This course enables the students to appreciate the dynamic structure of the earth's processes.

CO2- This course enables the students to understand the concepts the plate tectonics on a global scale and analyses the physical processes responsible for the formation and destruction of the plates.

CO3- This course enables the students to understand about the geodynamics of the lithosphere and concept of isostasy, ocean floor spreading, continental drift, plate tectonics.

CO4- This course enables the students to understand about the interior of the Earth.

CO5- This course enables the students to understand about the morphology of the ocean floor.

5. GL-222-Environmental management and geogenic disasters

CO1- The students will get to know the basic fundamentals of earth science as applied to the interaction between human activity and natural environment.

CO2- The students will understand the occurrence and availability of both surface and subsurface water resources and the role of the hydrologic cycle and pollution.

CO3-The students will understand the role of plate tectonics in causing earthquakes and how this understanding can aid the assessment of seismic hazard.

CO4-Students will able to test and evaluate water quality for drinking and agricultural use.

CO5- The students will also have knowledge about various natural disasters.

6. GL-223-Practicals related to GL-221 & 222

C01- The students will able to mark the tectonic elements such as craton, mobile belt, platforms and sedimentary basins.

CO2- The students will able to solve problems related P & S waves- Interior of Earth.

CO3-The students will able to solve mathematical problems related to geotherm/isostasy.

CO4- The students will able to test and evaluate water quality for drinking and agricultural use.

CO5- The students will able to prepare hazard zonation map of India & World (Eg. Earthquake & Landslide).

T.Y.B. Sc Geology (2019 Pattern)

SEMESTER I

GL-311-Geology of India -I

CO1- On completion of course students will have gained knowledge of the Geological time scale in depth & Indian and World Pre-Cambrian stratigraphy.

CO2- Students will identify difference between shield, shelf, cratons and mobile belts and will have gained knowledge of Precambrian cratons and mobile belts of Peninsular India and Extra-peninsular region.

CO3- On completion of the course students will have gained knowledge of stratigraphy, tectonics, depositional environment & co-relation of the Proterozoic basins of India.

GL-312-Mineral Resources

CO1: On completion of the course students will have gained knowledge of primary and secondary processes of formation of economic mineral deposits.

CO2: Students will have gained knowledge of metallic, radioactive mineral deposits and fossil fuels.

CO3: Students will able to show economic mineral deposits on map of India.

CO4: Students will have gained knowledge of geophysical & geochemical methods of mineral exploration.

GL-313-Marine Geology

CO1: On completion of the course students will have gained knowledge of physiographic divisions of oceans, ocean floor rocks.

CO2: On completion of the course students will have gained knowledge of origin, structure & evolution of Indian ocean shelf and margins (estuaries, deltas & tidal flats).

CO3: On completion of the course students will have gained knowledge of applications of geophysical techniques for the exploration of the seafloor.

CO4: On completion of the course students will have gained knowledge of exclusive economic zones.

GL-314-Engineering Geology

CO1: Students will able to solve problems related to Engineering geology. They will be familiarized with rock quality designation and various tests carried out for soil and rock analysis.

CO2: Students will have gained knowledge of engineering properties of rocks.

CO3: Students will have gained knowledge of tunnels, dams & bridges.

GL-315-Hydrogeology

CO1: Students will have gained knowledge of hydrogeological properties of rocks.

CO2: Students will have gained knowledge of well inventory.

CO3: Students will have gained knowledge of groundwater chemistry & groundwater resources of India.

GL-316-Applied Geophysics

CO1: Students will have gained knowledge of gravity, magnetic & seismic methods.

CO2: Students will have gained knowledge of electrical, resistivity & self-potential method.

CO3: Students will have gained knowledge of self-polarization, induced polarization & electromagnetic methods.

SEC-I-Geotechnology

C01: The students will gain detail knowledge about the concepts, methods & hands on determination of soil & rock properties which will strength their knowledge of engineering geology.

CO2: On completion of the course students will have a basic knowledge of surveying techniques.

CO3: The students will gain detail knowledge of geotechnical lab measurements used in engineering geology.

CO4: The course provides vital skills in geotechnical lab work and skills related to surveying and levelling techniques in the field.

SEC-II-Gemmology

CO1: The basic idea is to make students well versed with the different terminologies used in the gem industry and to provide skills to become a successful gemmologist.

CO2: The course covers the various aspects of gem testing using both theoretical as well as lab work by dealing with basics to the advanced techniques of gemstone identification.

CO3: The students will acquire skills which will be useful for them gem industry.

Practical I-GL-317-Practicals related to GL-311 & GL-312

CO1: The students will be able to identify different lithological units of Precambrian's of India.

CO2: The students will gain detail knowledge about paleo-geographical maps of different periods of Precambrian's of India.

CO3: The students will gain detail knowledge of interpretation of geological map of India.

CO4: The students will be able to identify different ore minerals & industrial minerals.

CO5: The students will be able to prepare mineral maps of India showing occurrences of ore minerals & industrial minerals.

CO6: The students will be able to prepare charts showing specifications of materials required for different industries.

Practical II-GL-318-Practicals related to GL-313 & GL-314

CO1: The students will gain detail knowledge of rocks of ocean floor.

CO2: The students will be able to plot distribution of major bathymetric and tectonic features in the global oceans.

CO3: The students will gain detail knowledge of oozes & authigenic sediments.

CO4: The students will gain detail knowledge of distribution & plotting of carbonate & siliceous oozes, glacio-marine, pelagic clays and volcanogenic sediments in global oceans.

CO5: The students will be able to prepare a section along mentioned direction & able to interpret for construction of dam, tunnel & bridge.

SEMESTER II

GL-321-Geology of India – II

CO1- On completion of course students will have gained knowledge of the Indian and World Phanerozoic stratigraphy.

CO2- The student will gain knowledge about the stratigraphy and geology of India with respect to Paleozoic, Mesozoic and Cenozoic Era which will help in understanding the different episodes on the earth during the geologic past.

CO3- Students will acquire skills that will enable to recognise different geological formation, their age and economic potential.

CO4- Learn to correlate International Geological Time Scale with Indian Stratigraphic Time Scale.

CO5- Students will learn the geology of India which is synonymous with the geology of the world and its ancient rock types from the Indian Peninsula, Cretaceous Deccan volcanism and Tethyan sediments exposed in the mighty Himalayas.

GL-322-Mining and Mineral Exploration

CO1- The student will learn essential and basic concepts of mineral exploration techniques and the science of mining mineral resources.

CO2- The students are exposed to the topics such as geology in mining industry, methods of exploration, Sampling Principle, Methods, estimation of reserves, Ore Dressing and Beneficiation.

CO3- This course tries to impart skills related to Geology in mining and enable student to perform duties of a geologist at the mining site.

CO4- Students will learn Mining Acts and Regulations in India and conservation of mineral resources.

GL-323-Oceanography

CO1- A student will understand and learn about the basic concepts of oceanography with respect to geology as to enable them to work as an oceanographer.

CO2- Students will learn essential concepts of oceanography and to study the physical oceanography, ocean currents, sea level changes, beach and coastal zones also resources with respect to the oceans.

CO3- The students will have the knowledge and skills related to dealing with the physical and chemical components related to oceanography

CO4- Students will learn El-Nino-La Nino effect relation between climate and ocean in the Indian context.

CO5- The students will have knowledge about Coastal Regulatory Zones, Classification & Prohibited activities within CRZ & Regulation of permissible activities in CRZ.

GL-324- Petroleum Geology

CO1- A student will understand and learn about the basic concepts of Petrology Geology with respect to geology as to enable them to work as a Petroleum Geologist.

CO2- Student will learn the process and the operations involved in Petroleum exploration.

CO3- The students will learn about the origin, migration and accumulation of petroleum.

CO4- Students will also learn basic skills in prospecting, drilling and logging operation in oil exploration.

GL-325-Climate Change: Past, Present & Future

CO1: The course introduces the students to the Earth's climatic system and explores the science of global climate using different proxies.

CO2: After completing this course students will be able to describe how the Earth's climatic system works & summarize general atmosphere circulation pattern, ocean circulation patterns & climatic oscillations such as El-Nino Southern oscillation.

CO3: Students will also be in a position to illustrate the Earth's carbon cycle and quantitatively describe how addition of CO2 to the atmosphere due to burning of fossil fuels influences the climate.

CO4: Students will get knowledge about evolution of Indian Monsoon System through the geological time.

GL-326-Geological Field Methods & Mapping

CO1: This course is devised to provide basic knowledge of geological mapping and surveying techniques.

CO2: This course also upgrades and relate the theoretical knowledge of geological aspects to field observations.

CO3: Students will be able to use Brunton compass & GPS in the field for geological mapping & preparation of cross sections.

CO4: Students will be able to interpret toposheets & geological maps.

SEC-III-Applications of Remote Sensing in Geosciences.

CO1: The course meant to address the fundamental techniques used for remote sensing.

CO2: At the end of this course, the students will be appraised with all the theoretical knowledge, information & skills to use remotely sensed data for geological applications.

CO3: After completion of this course, the student will be well versed with the world of remote sensing and the applications & interpretation of data related to geosciences.

CO4: Students will get knowledge of aerial photography & they can also able to interpret aerial photographs & FCC images.

CO5: Students can apply their knowledge of remote sensing in studying the natural resources like minerals, groundwater, soil, forests & geotechnical investigation.

SEC-IV-Oil Field Services

CO1: This course is taken to be in combination with Petroleum geology. The course focuses on the mud logging component as a supplementary service industry in oil & natural gas exploration.

CO2: The students who completes this course will have acquired all the skills needed for mud logging job and can be employed with private and public organizations engaged in oil exploration.

CO3: Students will get knowledge about different types of oil wells & methods of oil well drilling.

CO4: Students will get knowledge about different types of well logging techniques.

SEC-V-Watershed Development

CO1: This course introduces the fundamental concepts of watershed management planning & principles.

CO2: This course encompasses the water quality issues, storm water management, drought management, soil erosion, rainwater harvesting & watershed management modelling.

CO3: This course provides inputs for integrated watershed management.

CO4: Upon completion of this course the students will acquire all skills to undertake watershed: rainfall runoff & groundwater analysis.

Practical IV: GL-327-Practicals related to GL-321 & GL-322

CO1: Students will be able to study typical hand specimens of rocks from different lithological units of Phanerozoics of India.

CO2: Students will be able to study paleogeographical maps of different periods of Phanerozoics of India.

CO3: Students will be able to interpret geological map of India.

CO4: Students will be able to study flora of Gondwanian Period.

CO5: Students will be able to calculate assay values, specific gravity, porosity & bulk density.

CO6: Students will be able to determine the tenor, cut-off grade, ore reserves etc.

CO7: Students will be able to correlate subsurface data from different logs.

Practical V: GL-328-Practicals related to GL-323 & GL-324

CO1: Students will be able read coastal toposheets, hydrographic sheets and ocean floor topography.

CO2: Students will be able to prepare bathymetric cross sections using hydrographic sheets.

CO3: Students will get knowledge about global surface & deep-water currents & also distribution of global pressure belts.

CO4: Students will be able to solve numerical problems related to porosity & permeability.

CO5: Students will get detailed knowledge about the Petroliferous basins of India.

Practical VI: GL-329-Practicals related to GL-325 & GL-326

CO1: Students will be able to prepare & interpret isotherm & isobar on map.

CO2: Students will get knowledge about major wind pattern on World map.

CO3: Students will be able to prepare palaeogeographical maps (distribution of land & sea) of India during specific geological time intervals.

CO4: Students will be able to solve numerical exercises on interpretation of proxy records for paleoclimate.

CO5: Students will able to do Plane table chain survey.

CO6: Students will able to GPS survey or magnetic compass survey.

CO7: Students will be able to solve stereographic problems involving two intersecting planar features.