Deccan Education Society's FERGUSSON COLLEGE (AUTONOMOUS), PUNE

Syllabus

for

M. Sc.(Geology) Part II

(Semester-III and Semester-IV)

[Pattern 2019]

from Academic Year

2020-21

Program Structure of M.Sc. (Geology) Part-II

Particulars	Paper code	Title of Paper	Type of Paper	No. of Credits
M.Sc. Semester- III	GLY5301	Indian Stratigraphy	T Special-3	4
	GLY5302	Exploration Methods	M- elect- 1	4
	GLY5303	Petroleum Geology	M- elect- **2 ***	4
	GLY5304	Hydrogeology and Groundwater Development and Management		4
	GLY5305	Indian Stratigraphy and Exploration Methods + Field work component	P Core-5	4
	GLY5306	Practicals related to **elect 2**(GLY 5303/GLY5304)+ **elect 3** (GLY5307/GLY5308/GLY5309)	P Special-1	4
	GLY5307	Engineering Geology	M elect- **3***	4
	GLY5308	Sequence Stratigraphy and Applied Micropalaeontology		4
	GLY5309	Mining Geology and Oil Field Practices		4
		Total number of Credits-24		
M.Sc. Semester- IV	GLY5401	Dissertation	P special 2	8
	OR			
	GLY5401	Internship	P special 2	4
		Training /Project		4
		Total number of Credits-8		

M- MOOC or SWAYAM courses approved by HoD

***select any one subject each from elect- 2 and elect- 3**

GLY 5301: Indian Stratigraphy (4 Credits) T Special-3

Course Outcomes	Suggested Pedagogies
After learning this course a student will be able to 1. Describe the different Stratigraphy units and their correlation to understand the stratigraphic framework of India.	1. Use appropriate ICT tool, wherever necessary, for effective teaching. 2. Discuss recent research papers related to development of stratigraphy.

Unit I	**Precambrian Stratigraphy of Peninsular India – I** Precambrian Stratigraphic framework of India. Dharwar Craton. Bastar Craton. Singbhum Craton. Aravalli Craton, Bundelkhand and Chota Nagpur Craton South Granulitic Terrain Proterozoic Mobile Belts : Pandyan Mobile Belt, Eastern Ghat Mobile Belt, CITZ Precambrian Igneous rocks
Unit II	**Precambrian Stratigraphy of Peninsular India – II** Stratigraphy, tectonics , Depositional Environment and Correlation of the following Proterozoic Basins/ Purana formations in India: Vindhyan Basin Cuddapah Basin Pranhita-Godavari Basin Bhima Basin Kaladgi Basin Chhattisgarh Basin
Unit III	**Stratigraphic framework of the Himalayas** Precambrians of the Extra Peninsular Region Paleozoic sequences of Himalaya from Spiti region. Mesozoic of Spiti. Geology of the Indus –Suture Zone, Geology of the Shyok –Suture Zone, Stratigraphy of North-Eastern region of India The Trans-Himalayan and Karakoram Granite Batholith. Stratigraphy and tectonics of the Siwaliks.
Unit IV	**Phanerozoic Stratigraphy of The Peninsular Region** Stratigraphic Boundaries in India –Archean- Proterozoic, Precambrian-Cambrian, Permo- Triassic, K-T Gondwana Sequence Jurassic of Kachchh and Jurassic of Rajasthan Cretaceous of Narmada valley/ Bagh Beds, Cretaceous of Tamil Nadu and Meghalaya Deccan Volcanic Province. Cenozoic of off shore –Krishna-Godavari Basin and Assam, Andaman-Nicobar Arc Quaternaries of Peninsular India.

	Reference Books: Radhakrishna B.P. &Vaidyanadhan R, Geology of Karnataka, 2011, Geological Society of India Mathur U.B., Quaternary Geology: Indian Perspective, 2005, Geological Society of India Ramakrishnan M andVaidyanadhan R, Geology of India (Vol. 1 & 2), 2010, Geological Society of India Saha A.K.: Crustal Evolution of Singhbhum-North Orissa, Eastern India, 1994, Geological Society of India

GLY 5302: Exploration Methods (4 Credits) Elect -1

Course Outcomes After learning the course a student will be able to	Suggested Pedagogies
1. Describe the principles and proceduresofdifferent exploration techniques used to measure and map geologic, geophysical and geochemical characteristics of the subsurface. 2. To study the applications of various exploration techniques for mineral and energy exploration. 3. To understand the importance of data-quality, collection, analysis, data processing techniques, strength and limitation of each techniques.	1. Use appropriate ICT tool, wherever necessary, for effective teaching 2. Discuss recent developments in exploration techniques. 3. Discussion on case studies for comparative studies of different techniques.

Unit I	Gravity method- Introduction, Principles, Types of Gravimeters, Concept of Bouguer Anomaly- Generalised interpretation of Gravity data- Salient Case Studies. Magnetic Method- Introduction, Principles, Types of magnetometers- Magnetic anomalies and their interpretation- Salient Case Studies. Air borne surveys in Gravity and Magnetic Methods
Unit II	Seismic Method- Introduction and Principles Seismic Reflection Method Seismic Refraction Method Seismic instruments and Field procedures Processing of Seismic data and Salient Case Studies.
Unit III	Electrical Method- Introduction, Principles and Anomalies Resistivity Method- Introduction, Principles and Interpretation of resistivity data and Salient Case Studies. Self-potential Method- Origin of self-potential instrumentation and field procedure and Salient Case Studies Induced polarization method- Electrolytic and Electrode polarization- Instruments and field procedure and Salient Case Studies. Electromagnetic method- Principles, Instruments and Salient Case Studies. Magnetotelluric Methods- Principle, Instruments, Field Procedure and Salient Case Studies. Ground Penetrating Radar- Principles and Applications.
Unit IV	Geochemical methods- Introduction,Geochemical Anomaly, Geochemical cycle and Dispersion patterns. Geobotonical indicators of minerals. Surface and subsurface sampling methods Case studies
	Reference Books: Dobrin MB, Introduction to Geophysical Prospecting, 2014, Mcgrawhill Exclusive

	Hawkes HE, Principles of Geochemical Prospecting, 1957, US Government Printing Office Kearey and Brooks,An Introduction to Geophysical Exploration, 2016, Wiley India Paransis D.S., Principle of applied geophysics, 1997, Chapman & Hall Ramakrishna T.S., Geophysical Practice in Mineral Exploration & Mapping, 2006, Geological Society of India

GLY 5303: Petroleum Geology (4 Credits) Elect -2

Course Outcomes After learning the course a student will be able to 1. Describe the origin, occurrence and distribution of petroleum and natural gas. 2. To understand global scenario of petroleum industries and opportunities.	Suggested Pedagogies 1. Use appropriate ICT tool, wherever necessary, for effective teaching. 2. Case studies on various petroleum reservoirs in India and at global level. 3. Discuss the emerging techniques for hydrocarbon explorations.

Unit I	**Origin And Occurrence of Petroleum** Origin of Petroleum (Kerogen and Biomass) , Organic and inorganic occurrence. Nature of source rock. Chemical Classification and composition of Petroleum and oilfield water Physical properties of petroleum.
Unit II	**Migration and Accumulation of Petroleum** Reservoir rock, types and classification Types of traps and seals Migration and accumulation of petroleum. Concept of IsopachandIsolith maps Concept of In place volume, Compressibility, Formation volume factor, Reserve formula.
Unit III	**Petroliferous Basins of India** Petroliferous basins of India Life cycle of an oil field Geophysical Prospecting Methods in Brief Unconventional reservoirs- Indian examples Low resistivity oil reservoirs
Unit IV	**Global Scenario of Petroleum Industry** Important Petroliferous provinces of the world -Arabian Penninsula, North Sea, West Africa Concept of Demand-Supply in Indian context OPEC and non OPEC countries. Energy Scenario and unconventional resources India's position as regards to petroleum and natural gas and its future prospects.
	Reference Books: Bjorlykke, Knut, Petroleum Geoscience, 2015, Springer-Verlag Berlin Heidelberg Leverson, Geology of Petroleum, 2006, CBS Publishers & Distributors P. L. Zutshi, M. S. Panwar, Geology of petroliferous basins of India, 1997, KDM Institute of Petroleum Exploration

GLY 5304 Hydrogeology, Watershed Development and Management (4 Credits)Elect -2

Course Outcomes After learning the course a student will be able to 1. Describe the rock hydrological properties to understand the aquifer and its characteristics. 2. Carry out hydro geologicalinvestigationfor any region and propose watershed development measures.	Suggested Pedagogies 1. Use appropriate ICT tool, wherever necessary, for effective teaching. 2. Discusscase studies related to ground water issues in India. 3. One day field work for hydro geological investigation.

Unit I	**Hydrogeology** Rock hydrologic properties Factors controlling accumulation and movement in different rocks Lithological and structural and controls on groundwater occurrence The concept of aquifer and types of aquifers; Concept of watersheds,Groundwateraccumulation and movement Groundwater and Watersheds Aquifer properties;Concept of aquifer mapping Concept of Hydrosphere and the hydrologic cycle, Scope and Importance(Uses) of Groundwater, Age of Groundwater Climate, topography and geology: their influence on groundwater
Unit II	**Wells, Well Hydraulics, Groundwater Quality and Distribution in India** Well Inventory Well hydraulics: Principles, ProceduresandConcept Pumping tests:i) Well tests, ii) Aquifer Performance testsiii) Slug tests Quality of Groundwater Springsandbase flows Groundwater Exploration Techniques
Unit III	**Groundwater Development and watershed development** Wells (types) design and construction, well characteristics Groundwater Monitoring Concept of integrated aquifers and watershed development in relation to groundwater resources Rainwater and rooftop harvesting codes Sea water ingress and mitigative measures
Unit IV	**Groundwater Management and Governance** **Groundwater Management** Groundwater Balance equation for watershed (Groundwater assessment in a region) Groundwater Budget (Village water audit) Conjunctive use of surface and groundwater resources

	Participatory Ground Water Management (PGWM) and Community Based Ground Water Management (CBGWM) Concept of Water User Groups: Case studies Protocols of Ground Water Management **Groundwater Governance** Policy, Legislation and Institutions Role of NGOs, Panchayati Raj Science, policy and regulatory frameworks: integrating disciplines Typology concept in groundwater management, Groundwater Modeling Groundwater provinces in India,Groundwater in Maharashtra State
	Reference Books: Davis S.N. and Dewiest R.J.M.: Hydrogeology 1968, John Wiley & Sons Fetter CW,Applied Hydrogeology, 4th Edition,2001, Pearson Karanth, K.R.: Groundwater Assessment Development and Management 1e, 1987,Tata McGraw-Hill Education Publishers Raghunath, H.M.: Groundwater, Wiley Eastern Ltd Todd, D.K.: Groundwater Hydrology 3e, 2015, Wiley India Exclusive

GLY5305 :Indian Stratigraphy and Exploration Methods + Field work component P Core-5

Course Outcomes	Suggested Pedagogies
After learning the course a student will be able to 1. Identify rocks related to different geological formation/craton. 2. To solve problems related to various exploration techniques. 3. To interpreted resistivity and seismic data. 4. Carry out independent field work. 5. Know applications of geological knowledge in the professional arena.	1. Identification and description of rocks. 2. Plotting various tectono-stratigraphic zones in map of India **3.** Solving numerical related to geophysical methods. **4.** Explain various lithologies, mining techniques. **5.** Filed work and visits to various institutions.

	1) **Practicals for GLY5301: (2 Credit)** Study of typical hand specimens of rocks from different lithological units of Indian Stratigraphy. Study of Palaeogeographical maps of India for different geological periods. Study of geological maps of different unts of Indian Stratigraphy. Interpretation of regional geological maps. **2) Practicals for GLY5302: (2 Credit)** Study of patterns of geophysical responses from various geological mediums.

	Plotting a Drift curve for an observed gravity data to which an elevation correction is applied, Plotting and interpretation of gravity profiles, Simulations of causative bodies. Study of maps related to Gravity and Magnetic anomalies Analysis of seismic refraction data for velocities and thickness of sub-surface layers. Interpretation of Seismic Data Plotting, collection and interpretation of resistivity data. **Fieldwork Component :** Visit to two to three Institutes or Mines or geotechnical sites or field traverses.

GLY5306 :Practicals related to **elect 2**(GLY 5303/GLY 5304) **+elect 3**(GLY5307/GLY5308/GLY5309)**P Special-1**

Course Outcomes After learning the course a student will be able to	Suggested Pedagogies
1. Prepare various maps and litho-section to study the characteristic of petroleum accumulation and occurrence. 2. Procedure for data collection, hydrographs preparation and interpretation. 3. Plotting and analysis of pumping test and hadrochemical data. 4. To carry out surveying using various instruments and calculation related togeotechnical investigation of field. 5. To prepare facies map, vertical profile for sedimentary environments. 6. Plotting the data and prepare mine plan using different techniques. 7. Solve problems related to oil field investigations.	1. Solving numerical and creating various maps related to topic. 2. Carryout various analyses based on the data given. 3. Prepare charts, lithologs and their interpretation.

	Practicals related to elect 2(GLY 5303/GLY 5304) **1) Practicals for GLY5303: (2 Credit)** 1. Ratio maps: sand-shale, Limestone facies maps 2. Preparation of Structural contour maps. 3. Preparation of Isopach maps, Isolith, Isopay, Isoporosity maps 4. Interpretation of different geological cross-sections from well data. 5. Study of Porosity and Permeability. 6. Darcy's law numerical examples, Archie's equation

2) Practicals for GLY5304: (2 Credit)

1. Analysis of rainfall data.
2. Preparation of water level contour maps and their interpretation.
3. Analysis of pumping test data by simple graphical methods for determination of aquifer and well characteristics.
4. Plotting and analysis of hydro-geochemical data.
5. Use of computer in groundwater data analysis.
6. Use of morphometric analysis in planning watershed development.
7. Calculation of water balance for a given watershed

Practicals related to elect 3 (GLY5307/GLY5308/GLY5309)

Practicals for GLY5307: (2Credit)

1. Various methods of Surveying used in engineering geology.
2. Plane table surveys, use of dumpy level and theodolite.
3. Magnetic Compass Survey.
4. Demonstration of engineering properties of geological materials.
5. Interpretation of bore-hole data.
6. Preparation of bore logs/ lithologs/RQD/RMR.

Practicals for GLY5308: (2Credit)

1. Description of basic concepts in seismic and sequence stratigraphy.
2. Preparation of facies maps and facies diagrams.
3. Study of vertical profile sections of some selected sedimentary environments.
4. Study of significant system tracts.
5. Techniques of separation of microfossils from matrix and preparation of slides.
6. Microscopic study of Calcareous, Siliceous, Phosphatic and organic walled microfossils.
7. Study of surface ultra-structures of microfossils.
8. Depth biotopes and estimation of paleo-depth using microfossil assemblages
9. Study of some important microfossils useful in Indian Stratigraphy with special referenceto Cenozoic petroliferous basins of India

Practicals for GLY5309: (2Credit)

1. Mine valuation and calculation by uniform spacing on rectangular co-ordinate method.
2. Included area problems related to valency.
3. Area influenced methods of combining irregular spaced assay.
4. Triangle grouping of irregular spaced assayed.
5. Veins problems (linear groups, minimum stoping widths).

6. Description and identification of well cuttings based on physical properties, calcimetry and fluorescence.
7. Master log preparation.
8. Description of core samples.
9. Basic log interpretation.

	10. Correlation of electrical logs. 11. Calculations of Shale factor and shale density. 12. Introduction, Aspects of Balance Cross Section and examples, Types of Cross Section, Applicability.

GLY5307 Engineering Geology elect-3 *

Course Outcomes After learning the course a student will be able to	Suggested Pedagogies
1. Describe the engineering properties of rocks. 2. To carry out geotechnical investigation in the field. 3. To carry out slope stability Analysis.	1. Use appropriate ICT tool, wherever necessary, for effective teaching 2. Discuss recent developments in geotechnical studies 3. Research paper related to geological consideration for engineering structures.

Unit I	**Rock Mass Characterization** Scope of Engineering Geology. Engineering properties of rocks. Methods of determining engineering properties of rocks. Behavior of rocks under stress. Rock failure mechanisms. Engineering properties of soils. Methods of soil investigations.
Unit II	**Geotechnical Studies** Drilling in geotechnical field and Drilling Equipments, Rock Quality Designation (RQD) and Core Recovery (CR) Core logging and bore logging RMR(Rock Mass Rating) (Bienawiski, 1989) Types of foundations and Safe Bearing Capacity Laboratory and field Geotechnical test
Unit III	**Engineering Structures** Geological considerations for the selection of various sites. Dam sites and types of Dams and Spillways. Forces acting on Dam wall. Reservoir competency. Silting of reservoirs. Tunnels: Tunnel sites and Tunnel alignment. Bridges, Y ducts Roads and similar structures
Unit IV	Slope Stability Analysis Applications Remote Sensing in Engineering Geology Types of Synthetic materials used as remedial measures. Estimation of Over-burden thickness and Rock strata classification. Preparation of Report and Presentation of Engineering data. Building Stones and Road Material Aggregates: Classification, Aggregate resources development
	Reference Books: Blyth, F G H. A geology for engineers.-7th ed Krynine and Judd: Principles of Engineering Geology and Geotechniques. Parbin Singh, Engineering Geology, S.k.Kataria& Sons Rise and Wateson: Elements of Engineering Geology.

GLY5308 Sequence Stratigraphy and Applied Micropalaeontology elect-3 *

Course Outcomes After learning the course a student will be able to 1. Describe the principles of Stratigraphy and understand the applications different stratigrafies in geological investigations.	Suggested Pedagogies 1. Use appropriate ICT tool, wherever necessary, for effective teaching 2. Discuss recent developments in Sequence Stratigraphy. 3. Explain the morphology of fossil forms with specimens, diagrams and models.

Unit I	**Introduction to sequence stratigraphy** Historical Development, Interdisciplinary nature of sequence stratigraphy Fundamental concepts of sequence stratigraphy: definitions and terminologies Methods of Sequence Stratigraphic Analysis
Unit II	**Basic concepts of Base level changes, accommodation and shoreline Shifts** Base level cycles, allogenic controls on sedimentation: significance and signatures, sediment supply and energy flux, sediment accommodation, shoreline trajectories Stratigraphic surfaces: types of stratal terminations, sequence stratigraphic surfaces, system tracts Clastic and Carbonate Facies Models.
Unit III	**Applied Micropaleontology1** Definition and scope Surface and subsurface sampling methods, Laboratory techniques andequipments for micropaleontological studies Geological Timescale. Calcareous Microfossils Foraminifera: morphology, biostratigraphicsignificance, application and paleobathymetric reconstructions. Calcareous algae: Classification, morphology and biostratigraphic significance; applications and paleobathymetric interpretation. Ostracoda: classification, morphology and biostratigraphic significance, applications and paleoclimatic studies. Introduction to Bryozoa: classification, morphology and biostratigraphic significance (In brief). Introduction to Calcareous Nannofossils, Outline morphology; biostratigraphic and paleoclimatic significance (In brief).
Unit IV	**Applied Micropaleontology 2** Siliceous Microfossils: Diatoms: morphology and classification, and Application Introduction to Silicoflagellates and Radiolaria, their morphology and significance (In brief) Organic walled Microfossils: Pollens and Spores: Morphology, ClassificationandApplications; Palynomorphs Introduction to Acritarch , Dianoflagellates and Phytoliths;
	Reference Books: Emery, D, Sequence Stratigraphy, 1996, Blachwell Scientific Publ.

	Miall, A.D., The Geology of Stratigraphic Sequence, 1997, Springer-Verlag. W.G.Hatlelid, Seismic stratigraphy and global changes of sea level, 1977, American Association of petroleum Geologists, Vol.26. Haq and Boersma, Introduction to Marine Micropaleontology, 1978, Elsevier. Jones RW, Micropaleontology in Petroleum exploration, 1996, Clarendon Press Oxford Kathal, P.K., Applied Geological Micropaleontology, 2011, Scientific Publishers, Jodhpur. Kennett and Srinivasan, Neogene Planktonic Foraminifera: A phylogenetic Atlas, by, Hutchinson Ross, USA. 1983. Kundal, P. and Humane, S.K. (Eds.) Applied Micropaleontology, 2010, Gondwana Geological Society,V. 24 (1). Prothero, D.R., Bringing Fossil to Life – An Introduction to Paleontology (2nd Ed.), 2004, McGraw Hill. Seaward, A.C., Plant fossils, Today's and Tomorrow, 1991, New Delhi. Wray, J.L., Calcareous Algae, 1977, Elsevier.

GLY5309 Mining Geology and Oil Field Practices elect-3 *

Course Outcomes After learning the course a student will be able to	Suggested Pedagogies
1. Discuss and suggest appropriate mining methods 2. Discuss and prepare mining plan 3. Discuss various aspects of oil exploration	1. Use appropriate ICT tool, wherever necessary, for effective teaching 2. Share recent developments in mining and oil industry.

Unit I	**Guides To Ore And Drilling Methods** Concept of reserve and resource- Resources classification, EMG classification Deterministic methods and Probabilistic Methods Concept of ore blending- Numerical concept of volume and weightage, Estimation of bulk density, Assay classification Ringed Target and Intersecting loci Regional and Topographical Guides Mineralogical Guides Structural Guides Stratigraphic Guides Types of Dills - Percussion Drills,Rotary Drills, Miscellaneous Drills
Unit II	**Mining Methods – Open Cast And Underground Cast** Mining Methods- Selecting Mining Machinery, Alluvial Mining Introduction to the terminologies used in exploration and exploitation of the ore in the mine -Mining methods Concept of exploration and mining license (National Mineral Policy) Strategic minerals

	Concept of national Wealth-Basic Mining law, Market Analysis Preparation of Mining Plan and Mining Scheme and Mine Closer Plan
Unit III	**Drilling Operations In Oil Field** Types oil wells and geotechnical order Methods of Oil well drilling Types of Drilling Rigs\. Rotary drilling Drilling Mud Concept of Subsurface pressure. Directional Drilling Coring: Introduction and Techniques
Unit IV	**Formation Evaluation** Well logging- Techniques, Principles and Instrumentation Interpretation of logs Mud logging: Principle, Techniques,ToolsandInterpretation MWD (Measurement While Drilling)/LWD (Logging While Drilling): Principle, Tools of MWD/LWD, Data Analysis and Interpretation. Formation (Drillstem) Testing: Introduction, Tools and Techniques of DST, Retrievable Formation Tester (RFT)
	Reference Books: Gaudin A.M, Principles of Mineral Dressing,1939, McGraw Hill, NewYork Ghose AK, Prof.B.B.Dhar, Mining Challenges of 21st Century,2000,A.P.H.Publishing Coperation, Delhi PanigrahiD.C,Mine Environment and Ventilation,2001,CRC Press Singh OP, Mining Enviroment,Problems& Remedies,2005 Regency, New Delhi Singh RB, P. Pal Roy, Blasting in Ground Excavation and Mines,1993, A Balkema Publishers Hearst and Nelson and Paillet, Well Logging for Physical Properties 2000, John Wiley & Sons Kennedy JL, Fundamentals of drilling--technology and economics 1983, PennWell Rider M. H., The Geological Interpretation of Well Logs, 1996, Whittles Publishing

SEMESTER –IV

GLY5401 Dissertation (8credits) P special 2

Course Outcomes After learning the course a student will be able to • Objectives To develop systematic approach and logical thinking To identify a research problem and to learn the research methodology To develop data handling and analytical skills To develop scientific report writing skills	Suggested Pedagogies • Impart necessary skills to work in the field and in the lab • Train to analyse and synthesise the scientific problem • Train to write a report on the work done.

Policy and Procedure for students

- Students can take up their work at home department or at any other College/ University/ Research Organization/ Industry/ Laboratory/ NGO that is related to Geosciences.
- The work should consist of Geological Field studies/ Laboratory studies/ Data processing, reference work and preparation of report.
- Student should approach PG coordinator and inform regarding the work which will be undertaken. Outline of the work is to be submitted to the Head of the Department latest by second week of Semester IV.
- The proposed work needs to get endorsed by a committee, chosen by the Head of the Department, which will consists of supervisor, co-supervisor, and one subject expert appointed by Head of Department in consultation with the supervisor.
- Financial support will not be given by the department/ college.
- The student should work towards the completion of this course at least for sixty days.
- The student should submit a progress report, in the given format, signed by supervisor/ co-supervisor, every fortnight.
- The student should submit a report; give a seminar which will be followed by viva-voce, as a fulfilment of the programme, towards end of semester IV.

- Assessment of the work will be done by an Examination Panel.
- Non compliance of any of the above rules will disqualify the student form grant of term.

OR

GLY5101:Internship (4 credits) and Project/ training (4 credits).P special 2

Course Outcomes After learning the course a student will be able to	Suggested Pedagogies
• Objectives To gain hands-on training in Industry/ Institute To develop systematic approach and logical thinking To identify a problem and to learn the methodology required To develop data handling and analytical skills To develop scientific report writing skills	• Impart necessary skills to work in the field and in the lab • Train to analyse and synthesise the scientific problem • Train to write **a report on the work done.**

Policy and Procedure for students

- The course consists of Internship (4 credits) and Project/ training (4 credits).
- Towards Internship (4 credits) , a student can take up the work as an intern or trainee, at any Industry or Government organization/ Laboratory/NGO,that is related to Geosciences, for one month period.
- Towards Project/ training (4 credits), a student can take up the work in home department or at any other college or University or research organization or Industry or Laboratory that is related to Geosciences.
- The work undertaken in Internship (4 credits) and Project/ training (4 credits), will consists of Geological Field studies/ Laboratory studies/ Data processing, Reference work related to Geosciences.

- Field studies minimum of eight days is an essential component of this course and needs to be fulfilled in either of the sessions mentioned above.

- Student should approach PG coordinator and inform regarding the work proposed. Outline of the proposed work is to be submitted to the Head of the Department latest by second week of Semester IV. The proposed plan needs to get endorsed by a committee, chosen by the Head of the Department.

- Financial support will not be provided by the Department/ College.

- The student shall work towards the course at least for sixty days in total.

- Every fortnight the student shall submit a progress report, in the given format, signed by concerned authority.

- The student should submit reports of both the training works undertaken, give a seminar which will be followed by viva-voce, as a fulfilment of the programme towards end of semester IV.

- Assessment of the work will be done by an Examination Panel.

- Non compliance of any of the above rules will disqualify the student for grant of term.