INSTITUTE OF HYDROCARBON, ENERGY AND GEO-RESOURCES
ONGC CENTRE OF ADVANCED STUDIES
UNIVERSITY OF LUCKNOW, LUCKNOW-226007

ACTIVITIES OF IHEG

The Institute has initiated two new courses in the session 2017-18, which are presently being continued. These are the following:

- M.Sc. in Applied Geology with specialization in Petroleum Geosciences.
- PG Diploma in Exploration Resources & Mining Technology.

PROGRAM OUTCOME M.Sc. APPLIED GEOLOGY

The M.Sc. in Applied Geology (with specialization in Petroleum Geosciences) program at the Institute of Hydrocarbon, Energy and Geo-Resources, ONGC Centre of Advanced Studies, University of Lucknow, is designed with the objective of enhancing the practical and theoretical knowledge base of the students, leading to their over-all skill development. The students are tuned to face the present day challenges and opportunities of employability. The problem-solving attitude, better oral and written communication skills infused in the students over the two years, helps in educating students for success as a geo-scientist in government sector, public sector, private sector, research institutes etc. This enhances their potential for finding better placements in the present challenging scenario. It is also endeavoured to improve the Infrastructure with the state of art technological developments so that the students are also tuned to emerging developments in the proper and optimum resource management. The overall knowledge of students helps them in qualifying the NET or Gate Examinations so as to pursue the career in academics or other competitive examinations. With these holistic developments, the students are likely to get regular placements in multinational Oil & Gas Industries, ONGC, GSI, Mining Industries etc. apart from other Indian Industries related to oil and gas exploration, mineral exploration and mining etc.

PROGRAMME SPECIFIC OUTCOME

During the proposed first and second semester, students identify, examine and understand different geological materials and geological settings. The students learn to

interpret various geological maps, prepare cross sections, geologic field mapping, basic understanding of geological materials, rock identification on the basis of minerals composition and basic physical megascopic and microscopic characters and association, origin and evolution of landforms, fossils identification, in-depth understanding of the sedimentary structures and facies analysis, paleoclimatic and palaeogeographic changes, origin and distribution of economic resources of the country etc.

The students in their third semester onwards, are tuned to the specialized domain of petroleum geo-sciences. The syllabus incorporates detailed knowledge about the different sedimentary basins in India, the Indian Petroliferous basins, as also the geophysical and seismic techniques. Specialized courses on Sequence Stratigraphy, Exploration, Drilling, Production and Reservoir Engineering and Well Logging techniques. Further students are taught to work out the Techno-Economics and learn more about the different types of Energy Resources and Geochemistry. Exploration for economically useful Earth materials is another important outcome of the present program.

In order to enhance the knowledge base and confidence level amongst the students, during each of the semesters, the students are encouraged to prepare detailed Assignment Reports on separate topics given to each of them. They are also made to make a power-point presentation before all other students and the faculty members. This enhances their written and oral communication skills which are so important in their future professional carriers. The students are further provided with a Dissertation topic in their second and fourth semesters, so as to enhance their written and oral communication expertise.

Geological excursion and research based activities are important component of Masters Program in Applied Geology. As such, the syllabus is so formulated, so as to expose the students to the geological field work during the second and the fourth semester. The students are exposed to different types of geological and rock formations, from Himalayas to Rajasthan, to the mining areas in different parts of the country. Identification of geological formations, their structural, sedimentological studies as also the Geological mapping is essential part of geological excursions. Additionally, the students are made to visit different laboratories of national and international fame, so as to get acquainted with newer techniques of geological studies.

DETAILED PROGRAM OUTCOME

First Semester

Paper I deals with the basic principles of Earth Sciences. The students are imparted the knowledge about the origin, age and interior structure of the earth. The different techniques employed to study the earth are also elaborated.

The various processes acting on the surface of the earth and their specific products are also discussed. The surface landforms formed by the fluvial, Aeolian, glacial, coastal, and oceanic processes are all discussed.

Further the different processes active within the body of the earth are discussed in detail. These include the tectonic activities giving rise to earthquakes or the volcanic activities giving rise to different types of igneous bodies

The manner in which the earth evolved with time is equally important and the scientific studies on the evolution of the earth are also discussed in detail. The climatic variations and the resultant landforms specifically in the Indian context are discussed in detail.

Paper II discusses the formation of sediments and the origin of all types of sedimentary rocks. The processes that lead to the deposition of sediments and their subsequent solidification to form the sedimentary rocks are all discussed in this paper. Moreover the different types of sedimentary environments and their products are studied in detail.

Paper III deals with the sequence in which the sediments deposited over the last millions of years have given rise to specific stratigraphic columns. Moreover the different environmental settings and their physiographic locations have resulted in varying stratigraphic assemblages and specified with different sets of fossil combinations. These are all studied in the third paper.

Paper IV deals with the formation of Igneous rocks, the different mineral deposits and their crystal structures. The different types of mineral deposits, their characteristics and their properties.

Paper V provides the students with the overall practical knowledge of the entire gamut of subjects studied in the first semester. Practical classes relating to solving the structural problems. Identifying the physical and chemical properties etc of igneous, sedimentary rocks

and the minerals in hand specimens and also under microscope form part of the exposure to students in the first semester.

Paper VI provides the students with the opportunity to prepare a detailed report on any of the topics relating to each of the four theoretical papers covered during the semester. These reports are evaluated and the student is also required to make a power point presentation of the work compiled.

Second Semester

Paper I deals with the structural geology and tectonics of the earth. Different processes act within the earth body and also on the earth surface. These processes are the result of different forces acting within and without the earth surface. Certain late stage deformations also occur which are also studied and analysed.

Paper II deals with all forms of primitive life that existed on the planet since the time it came into being. Right from the micro-organisms which indicated the beginning of life on earth, upto the great dinosaurs and then the different other living beings that existed on the earth have left behind numerous trails and tracts which help in reconstructing the chronology of their existence on the earth. All this is studied under this paper.

Paper III deals with the metamorphic processes and products that have re-shaped the earth from time to time. The economically viable mineral deposit, their extents and their expanses are all studied and assessed to establish the economic potential of any given area.

Paper IV is an important link between the pure geology and the applied component as far as Petroleum products are concerned. This paper gives a deep insight into the basics of hydrocarbons, their formation and their physical and chemical characteristics. The occurrence of hydrocarbons and the manner in which they migrate from one place to the other are all discussed and understood in detail. What are the different forms of hydrocarbons that exist in different parts of the earth are best understood in this part of the syllabus.

Paper V is again the practical understanding of all that is studied in the II semester. Problems relating to structural geology, the metamorphic petrology, economic geology and the fossil remains are all taken up during the practical classes. The basic problems of petroleum geology are also learnt during this semester.

Paper VI is an important component as it deals with the field exposures. The students are given first hand knowledge about the field work in different types of terrains. Subsequently, the students are required to compile the field report and make presentation on what they have learnt in the field

Semester III

Paper I deals with the details of different geophysical methods of exploration. The basics of geophysical surveys, the different methods including the electrical, gravity and magnetic surveys have all been dealt with in detail. The seismic methods of surveys are the best in petroleum explorations and these have been dealt with in detail. The manner in which the surveys are carried out, how the data is recorded and interpreted are integral part of the syllabus so that the student may employ those techniques in practical field surveys.

Paper II imparts detailed knowledge about the different sedimentary basins of India vis-à-vis their importance in oil explorations. How the sedimentary basins are formed and how are they classified, analyzed and modeled forms integral part of the syllabus.

Paper III imparts specific knowledge about the different exploration techniques. The drilling rigs used in oil exploration and the fluids employed along with the tools and techniques used in oil well drilling forms the part of the syllabus. The details about the assessment of reservoir, it's potential and the methods of oil exploration and exploitation are all dealt with in detail in this part of the syllabus.

Paper IV imparts important knowledge about the different types of renewable and non-renewable energy resources available in India. Their distribution composition and status is covered in detail. Additionally, this paper has an important component on Geochemistry, which covers all related components.

Paper V is an Open Elective Course, where the student has the choice of selecting any additional subject of his preference from any other department of the Science Faculty of the University.

Paper VI is the Laboratory work relating to the practical exercises of geophysical and seismic interpretations, sedimentary basins, sequence stratigraphy, remote sensing and groundwater.

Semester IV

Paper I deals with the basics of well logging, and the different methods used in well logging. The different apparatus employed in well logging as also their applicability in varying geological set-ups. This paper also aims at imparting specialized training in working out the economics of an oil well. Which technique would be best suited in a particular situation and how to enhance the output potential of the well. These and many other components form part of this paper.

Paper II covers an important topic of Sequence Stratigraphy. What are the basic concepts and the different processes and components of establishing the sequence stratigraphy. This is important in understanding the distribution of petroliferous sequences in different sedimentary formations.

Paper III provides a detailed knowledge about the different petroliferous basins in India. These basins are spread over different types of terrains and different geological settings. This paper provides in-depth knowledge about the distribution, extents, potential and the present and future status of different petroliferous basins in the country.

Paper IV is a Freezed Elective paper, where-in the student would be required to select any one of the here-in under mentioned papers i.e. Environmental Geology / Remote Sensing / Groundwater / Disaster Management. Remote Sensing deals with the new techniques of investigations. These include the new technology of Remote Sensing. The basics of R.S., the different types of satellites, their resolutions and their applicability in natural resource explorations and management programs. The Ground water paper deals with the basic knowledge about the Groundwater potential, their distribution and methods of groundwater studies. Likewise Environmental Geology and Disaster Management would cover topics related there-in.

Paper V is the laboratory work relating to the different aspects of the subject covered in this semester. Additionally, the student may be asked to prepare a detailed project report on an allotted subject and would also be required to make a detailed power point presentation.

Paper VI is an important integral part of all geological studies, which includes field work, Industrial visit, Industrial training etc. relating to the course work.

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