

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
DSE-5 Marine microfossils and biostratigraphy (L3, P1)	4	3	0	1	12th pass with science	Studied Earth System Science, Paleontology and stratigraphy or Equivalent

Learning Objectives

Microfossil evolution has provided a rich archive for establishing relative time in marine sedimentary sequences. This course basically aims to make the student learn about marine microfossil distributions in oceanic sediments. Students will be trained in applying biostratigraphic zonation, quantitative stratigraphic correlation, and magnetic stratigraphy and interpret relative age. The students will be taught the various methods of integrated stratigraphic correlation at regional and global scales. The integrated stratigraphy will include biostratigraphy integrated with magneto, chemo, event stratigraphy and tuning of biostratigraphy with astronomical time scale.

Learning outcomes

After completing the course, students gain experience using microfossil distributions in deep-sea cores to apply a biostratigraphic zonation and interpret relative age, correlate from one region of the world ocean to another, and calculate rates of sediment accumulation. In addition, the student will be able to independently take out biostratigraphic studies of the marine sections, evolve integrated stratigraphy and perform stratigraphic correlation of the marine sections at the regional and global scale to understand the cause-and-effect relationship in the ocean- climate system and teleconnections.

SYLLABUS OF DSE-5 (Marine microfossils and biostratigraphy)

Theory (45 Hours)

UNIT – I (12 Hours)

Detailed content

Definition and scope of Micropaleontology. Relationship of Micropaleontology with Ocean Science. Deep Sea Drilling Project (DSDP); Ocean Drilling Program (ODP) and Joint Global Ocean Flux Studies (JGOFS) and their major accomplishments. Integrated Ocean Drilling Program (IODP) and its aims and objectives; Sampling Modern Ocean Biogenic Flux including Joint Global Ocean Flux Studies (JGOFS). Introduction to important Deep Sea Drilling Vessels like Sagar Kanya, GLOMAR Challenger, JOIDES Resolution and Chikyu.

UNIT – II (12Hours)

Sample processing techniques and brief idea about Equipment like mass spectrometer, scanning electron microscope and stereo zoom binocular microscope which are used for micropaleontological studies.

UNIT – III (11 Hours)

Detailed content

A brief study of various types of microfossils including calcareous (Foraminifera, Calcareous nannofossils, Ostracoda, Pteropods, Calpionellids and Calcareous algae), Siliceous microfossils (Diatoms, Radiolaria and Silicoflagellates), Phosphatic microfossils (Conodonts) and Organic walled microfossils (Acritarchs and Dinoflagellates, Pollens and spores) and their application in biostratigraphy.

Unit – IV (10 Hours)

Detailed content

Application of microfossil biostratigraphy in hydrocarbon exploration. Basic concepts of Biostratigraphy, Chemostratigraphy, magnetostratigraphy, and astronomical tuning. Regional and global stratigraphic correlation. Diachronism and methods to identify the extent of diachronism. Diachronism and paleoceanographic interpretation.

Practical Component- (30 Hours)

Techniques of separation of microfossils from the matrix

Microscopic identification of (a) Types of microfossils: Calcareous, Siliceous, Phosphatic and organic-walled microfossils

Microscopic study of important planktic foraminifera useful in surface water paleoceanography and biostratigraphy

Study of larger benthic foraminifera useful in Indian stratigraphy with special reference to Cenozoic petroliferous basins of India

Study of modern surface water mass assemblages of planktic foraminifera from Indian, Atlantic and the Pacific Ocean

Exercises on Integrated Oceanic Biostratigraphy for regional and global correlation.

Essential/Recommended readings

Bignot, G, 1985. Elements of micropalaeontology; Microfossils, their geological and palaeobiological applications, Graham & Trotman, London, United Kingdom.

Braiser, M.D., 1980. Microfossils, George Allen and Unwin Publisher.

Fischer, G and Wefer, G, 1999. Use of Proxies in Paleoceanography: Examples from the South Atlantic, Springer,

Recommended readings

Gross, M.G, 1977. Oceanography: A view of the Earth, Prentice Hall.

Haq and Boersma, 1978. Introduction to Marine Micropaleontology, Elsevier.

Haslett, S.K., 2002. Quaternary Environmental Micropalaeontology, Oxford University Press, New York.

Jones, R.W., 1996. Micropaleontology in Petroleum exploration, Clarendon Press Oxford.

Kennett and Srinivasan, 1983. Neogene Planktonic Foraminifera: A phylogenetic Atlas, Hutchinson Ross, USA. 9.

Sinha, D.K., 2007. Micropaleontology: Application in Stratigraphy and Paleoceanography, Alpha Science International, Oxford & Narosa Publishing House Pvt. Ltd. Delhi.