

# Government Degree College, Baramulla (Autonomous)

Semester 7<sup>th</sup>

Course Type: Minor

Subject: Geology

Paper Title: Paleobiology & Stratigraphy

Code: GEOC1725N

Credits: 4 Th + 2 Lab

## Course learning outcomes (CLOs):

Upon completion of this course, students will be able to:

- Describe the origin and evolution of life, key fossil groups, and their applications in biostratigraphy and paleoenvironmental reconstruction.
- Interpret vertebrate, microfossil, and plant fossil records for paleoecological, paleoclimatic, and hydrocarbon studies.
- Explain the principles of stratigraphy and outline the geological evolution of Indian cratons and Proterozoic basins.
- Summarize the stratigraphy of major Indian type sections and address boundary problems using regional case studies.

## Unit-I (16 Hours)

Overview of paleobiology: Origin of life. Precambrian fossil record, origin of Metazoa, Taphonomy and key parameters in taphonomic studies. Fossil Assemblages and Communities and their applications in biostratigraphy and paleo-environment. Paleocology: Life habitats and various ecosystems. Paleobiogeography, Mass extinctions and their causes.

Invertebrate Paleontology: Overview of invertebrate paleontology and their application. Evolutionary trends and geological history of Ammonoidea, Brachiopoda, Bivalvia, and Trilobita.

## Unit-II (16 Hours)

Vertebrate Paleontology: Vertebrate life through ages and landmarks in the evolution of vertebrate life. Siwalik Mammals and possible causes of their extinction.

Micropaleontology: Overview, classification and application of foraminifera, diatoms, conodonts, Radiolaria, and Ostracoda. Oxygen and Carbon isotope studies of microfossils and their use in paleo-oceanographic, paleoclimatic interpretation and hydrocarbon exploration.

Paleobotany: An overview of plant life through geological time. Gondwana plant assemblages and their paleoclimatic significance.

## Unit-III (16 Hours)

Introduction to Stratigraphy: Overview of lithostratigraphy, biostratigraphy & chronostratigraphy. Overview and amalgamation of Cratons, Mobile belts, and supracrustal belts of Peninsular India. Pre-Cambrian stratigraphy & geological evolution of Dharwar, Singhbhum, Bastar and Aravalli-Bundelkhand cratons. Proterozoic (Purana) sedimentary basins: Cuddapah and Vindhyan Supergroups.

## Unit-IV (16 Hours)

Stratigraphy of Type Sections of India: Cambrian of Salt Range, Paleozoic of Kashmir, Spiti, Kumaon, and Gondwana. Mesozoic: Jurassic of Kutch and Narmada, Triassic of Spiti and Kashmir. Cretaceous of Trichinopoly and Deccan Traps. Cenozoic of Assam and Siwalik. Quaternary of Kashmir. Boundary problems in stratigraphy and fixing of boundary from Indian stratigraphy of India: Precambrian-Cambrian (e.g., Lolab Valley, Kashmir), Permian-Triassic (e.g., Guryul, Kashmir), Cretaceous-Tertiary (e.g., Assam, Meghalaya), and Neogene-Quaternary (e.g., Meghalaya Plateau).

# Government Degree College, Baramulla (Autonomous)

## Paleontology & Stratigraphy Lab

(Practical/Tutorial: 2 Credits, 60 Hours)

- Field-based exercises on lithostratigraphic and biostratigraphic sections from Kashmir.
- Identification, classification and morphological study of selected invertebrate fossils with labelled diagrams.
- Identification, classification and morphological study of selected microfossils with labelled diagrams.
- Identification, classification and taxonomic study of selected Gondwana plant fossils with labelled diagrams.
- Study of selected important rocks & fossils from stratigraphic horizons and preparation of stratigraphic columns.

### **Books Recommended:**

1. Bignot G., 1985, Elements of Micro palaeontology, Graham Trotman,
2. Boggs, S., 2001: Principles of Sedimentology and Stratigraphy, Prentice Hall.
3. Clarkson, E.N.K., 1998: Invertebrate Palaeontology and Evolution. IV Ed.-Blackwell.
4. Colbert E.M., 1960, Evolution of the vertebrates, Wiley Eastern.
5. Danbar, C.O. and Rodgers, J., 1957: Principles of Stratigraphy, John Wiley and Sons.
6. Doyle, Peter, 1996, Understanding fossils: an introduction to invertebrate palaeontology, John Wiley & Sons Ltd
7. Evolution of Vertebrates by E.H. Colbert. Wiley Eastern Ltd.
8. GSI 1990 Stratigraphic Boundary Problems in India, Memoir 16, ISSN No: 0016-7622, Geological Society of India, Bangalore, 116p.
9. Jain P.C., and Anatharaman M.S., 2018, An introduction to Paleontology, Vishal Publications.
10. Krishnan, M. S. 1982 Geology of India and Burma, C.B.S. Publ. and Distributors, Delhi.
11. Krumbein and Sloss 1956 Stratigraphy and Sedimentation, McGraw Hill.
12. Naqvi, S.M. and Rogers, J.J.W., 1987: Precambrian Geology of India, Oxford University Press.
13. Pascoe, E.H., 1968: A Manual of the Geology of India and Burma (Vols.I-IV), Govt. of India Press, Delhi.
14. Ramkrishnan, M. and Vaidhyanadhan, R. 2008. Geology of India, Volume I and II, Geological Society of India, Bangalore.
15. Raup & Stanley, 1985, Principles of Paleontology, CBS Publications
16. Ravindrakumar 1988 Fundamentals of Historical Geology and Stratigraphy of India, Wiley Eastern
17. Saraswati P. K., Srinivasan, M.S., 2016, Micropaleontology - Principles and Applications, Springer International Publishing.
18. Schoch, Robert, M., 1989: Stratigraphy: Principles and Methods, Van Nostrand Reinhold, New York.
19. Shrock R.R., and Twenhofel W.H., 1953, Principles of invertebrate Palaeontology, Arnold publication.
20. Sreepat Jain, 2017, Fundamentals of Invertebrate Palaeontology, Springer
21. Stearn, C.W. & Carroll, R.L., 1989: Palaeontology-the Record of Life-John Wiley
22. Wadia, D. N. 1998 Geology of India, Tata McGraw Hill, India.