



# MANGALORE UNIVERSITY

## DEPARTMENT OF MARINE GEOLOGY

### MGS 503: EXPLORATION AND ENGINEERING GEOLOGY

**Course Outcomes:**

CO1: Understand the role of geology in the design and construction of underground openings in rock.

CO2: Attain knowledge about the principles and applications of airborne, onshore and offshore exploration methods.

CO3: Able to apply geologic concepts and approaches on rock engineering projects and Understand various geophysical exploration techniques and well logging techniques

CO4: Able to understand construction of large-scale features/establishments, like dams, tunnels, rail, sub-marine pipelines, road and runways, ports, harbours and airports.

### EXPLORATION GEOLOGY

<b>Unit 1</b>	Introduction: scope and objectives of exploration geology. General principles and applications of airborne, onshore and offshore exploration methods for understanding the structure of earth and in the exploration of water, fossil fuels and mineral deposits.	6 hrs
<b>Unit 2</b>	Geophysical Exploration: Principles, instrumentation, methodology and applications of onshore and offshore geophysical explorations - Gravity, magnetic, seismic, electrical and radioactive techniques. Well Logging Techniques: Electrical, Radioactive, Sonic and Miscellaneous. Echosounder and its uses.	6 hrs
<b>Unit 3</b>	Geological Exploration/Prospecting: Importance of geological and different types of maps. Various geological criteria for the identification of mineral deposits. Indications of ore body. Different methods of geological prospecting/exploration.	6 hrs
<b>Unit 4</b>	Geochemical and bio-geobotanical methods exploration: Geochemical and biogeochemical indicators of economically important ore deposits. Techniques of mineral exploration. Geobotanical prospecting: Importance of plants in identifying the ore deposits.	8 hrs

## ENGINEERING GEOLOGY

<b>Unit 5</b>	Geological studies and evaluation in planning, design and construction of major civil structures. Engineering properties of rocks. Concepts of rock mechanics and soil mechanics. Physical characteristics of building materials.	6 hrs
<b>Unit 6</b>	Resource evaluation of construction materials. Geological investigations for dams, reservoirs and spillways, tunnels, underground caverns, bridges, highways and tunnels. Problems of groundwater in engg. projects. Remedial measures.	8 hrs

### List of References:

1. Courses in Mining Geology – R.N.P. Arogyaswamy, Oxford & IBH Publ. Co. (1973)
2. Principles of Engineering Geology - McGraw Hill – Krynine, D.P. Judd, W.P. (1957)
3. Fundamentals of Engineering Geology - Butterworths – Bell F.G. (1983) Principles.
4. Engineering Hydrology – K. Subramaniam – Tata McGraw Hill Publishing Co. Ltd.
5. Anthony M. Evans (2006). Introduction to Mineral Exploration Blackwell II edition. (available in net)
6. Brain F. Windley (1977). The Evolving Continents John Wiley & Sons. 385p.
7. Burk, C.A. & Drake, C.L. The Geology of Continental Margins-Springler Verlag, NY (1974).
8. Condie, K.C. Plate tectonics and Crustal Evolution, Pergamon Press, 288p. (1989)
9. Christopherson, R. W. (1995). Elemental Geosystems A foundation in Physical Geography. Printice Hall Inc., 580p.
10. Vine, F. J., and Matthews, P. M. (1963). Magnetic anomalies over ocean ridges. Nature, 199, 947-949.
11. Bott, M.H.P., (1971). The Interior of the Earth. Arnold, London, 316p.
12. Khan, M. A., (1975). The Afro-Arabian Rift System.Sci. Prog.62, 207-236.
13. McElhinny, (1973). Palaeomagnetism and Plate Tectonics. Cambridge Univ. Press, 358p.
14. Ramachandra Rao, M. B (1975). Outlines of Geophysical Prospecting: A manual for Geologist E.B.D. Educational Pvt. Ltd., Dehra Dun.403p.
15. [Parasnis](#), D. S. (1979). Principles of applied Geophysics. Chapman and Hall, - 275 p.
16. Dobrin, M.B. (1976). Introduction to Geophysical Prospecting. **New York McGraw-Hill, 630p.**
17. Introduction to Geophysical Prospecting - Milton B Dobrin (1981).
18. Exploration geophysics – Jakaosku J. J.
19. Outlines of geophysical prospecting - A manual for geologists – M B Ramachandra Rao.
20. Exploration Geophysics for Geologist and Engineers – Bhimasanakaranand Gaur
21. Geochemistry in mineral exploration Rose, A.W Hawkes, H.E & Webb J.S. 1979. Academic press.
22. Engineering and General Geology: P T Sawant- New India Publishers.