

Unit I

Physiography: Oceans and seas, Origin of continents and oceans, salinity, temperature and density of sea water. Turbidity currents and submarine sedimentation. Physiography and divisions of the sea floor, continental shelves, slopes and aprons, submarine canyons and deep sea channels, sea mounts and abyssal plains. The mid ocean ridge systems and its structure, aseismic ridges. Various types of ridges in the Indian ocean region. The continental fracture system and island arcs. Growth and decline of ocean basins. Occurrence of offshore mineral deposits and hydrocarbons.

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Unit II

Geophysical Instrumentation and Surveys: Adaptation of geophysical instruments for marine surveys - for measurements at the sea surface and under water. Geophysical equipment currently in use on board research vessels. (principles of operation of geophysical instruments are already covered in related subjects). Complement of equipment on board the survey ship and layout of equipment. Towing logistics survey procedures and planning of survey lines. Reduction of data compared to land data. Various objectives of marine geophysical surveys. Bathymetry; Echosounding, bathymetric charts, bathymetry as an adjunct to geophysical surveys. Submergibles seabed mapping by side scan sonar and other surveys, seabed sampling, dredging and coring. Marine Geophysical surveys for sealed resources. Site selection for production platforms, pipelines, tunnelling, waste disposal, etc. (22 Hours)

Unit III

Thermal conductivity, steady state and transient methods. Applications, Heat flow in the oceanic crust in contrast to the continental crust.

Coordinate system for projections. Indian system and international system. Different map projections. Projections suitable for base maps for marine geophysical surveys. Position fixing at sea: Short range and long range systems, Integrated satellite navigation. global positioning system. (16 Hours)

Unit IV

Orogenesis, nature of orogenic belts. Continental drift: Super continents, Gondwana land and its break up, drift of India, Himalayan orogeny. The hypothesis of sea floor spreading. Spreading episodes in the Indian ocean region. Evolution of the Indian ocean floor and active lithospheric processes. Geophysical signatures of trenches active and passive margins, ridges, etc, Marine geophysical anomalies in the vicinity of India in relation to structure, sedimentary environment and resources. (18 Hours)

Unit V

Plate Tectonics: The lithosphere, major plates, accreting margins, subduction, active and passive continental margins, transform faults, Global sea level changes, sea level changes during the Quaternary period; transform faults, linear magnetic anomalies, magnetostratigraphy, paleomagnetism and the movement of the plates, triple junctions, the Wilson cycle, Continental

collisions, seismicity and the state of stress in the lithosphere, Benioff zones, the driving mechanism.

Concepts of mantle convection: Rheological effects, flexure of plates and compensation models in lithospheric studies. (20 Hours)