

SARDAR PATEL UNIVERSITY
Programme & Subject: M.Sc (Earth Science)
Semester: IV
Syllabus with Effect from: June - 2014

Paper Code: PT04CESC02	Total Credit: 4
Title Of Paper: Oceanography	

Unit	Description in Detail	Weightage (%)
I	Physical oceanography: T-S diagrams; mixing processes in the oceans; characteristics of important water masses. Wind generated waves in the oceans; their characteristics; shallow and deep water waves. Propagation, refraction, and reflection of waves. Wave spectrum, principles of wave forecasting.	25%
II	Tidal Waves and Eustaries: Tide-producing forces and their magnitudes; prediction of tides by the harmonic method; tides and tidal currents in shallow seas, estuaries and rivers. Factors influencing coastal processes; transformation of waves in shallow water; effects of stratification; effect of bottom friction, phenomena of wave reflection, refraction and diffraction; breakers and surf; littoral currents; wave action on sediments-movement to beach material; rip currents; beach stability, ocean beach nourishment; harbour resonance; seiches; tsunami; interaction of waves and structure; Estuaries: classification and nomenclature; tides in estuaries; estuarine circulation and mixing; depth - averaged and breadth-averaged models; sedimentation in estuaries; salinity intrusion in estuaries; effect of stratification; coastal pollution; mixing and dispersal of pollutants in estuaries and near-shore areas; coastal zone management.	25%
III	The Global Wind System: Action of wind on ocean surface; Ekman's theory; Sverdrup, Stommel and Munk's theories; upwelling and sinking with special reference to the Indian ocean. Inertial currents; divergences and convergences; geostrophic motion; barotropic and baroclinic conditions; oceanic eddies, relationship between density, pressure and dynamic topography; relative and slope currents. Wind driven coastal currents; typical scales of motion in the ocean.	25%
IV	Chemical Oceanography: Behavior of elements; chemical exchanges across interfaces and residence times in seawater; Chemical and biological interactions-Ionic interactions; cycling and air-sea exchange of important biogenic dissolved gases; carbon dioxide-carbonate system; alkalinity and control of pH; abiotic and biotic controls of trace elements in the ocean; biological pump and controls on atmospheric composition; biogeochemical processes in aerobic and anaerobic environments; water column-denitrification and emission of green house gases.	25%

Basic Text & Reference Books:-

- Geoffrey K. Vallis, Atmospheric and Oceanic Fluid Dynamics; Fundamental and large scale circulation, Cambridge University Press (2006)
- Gerold Siedler, John Gould, John A. Church, Ocean Circulation and Climate - observing and modeling the global ocean, International Geophysics, Academic Press (2001)
- Sujkvinder Singh, Oceanography, Wisdom Press (2014)
- Shyam Prakash, Oceanography-An Analytical Study, Cybertech Publications (2014)
- Robert H. Stewart, Introduction to Physical Oceanography, Texas A & M University (2008)
- John Noye, Marcus Grzechnik, Sea level changes and their effects, World Scientific (2001)

