

21 November 2017 (3:30 – 5:30 PM)

Instructions: Questions 1-2 are compulsory. Answer any 4 from Questions 3-8 (4 out of 6). If additional question answered, then marks of low scored questions will be considered.

[6x1]

Q 1. Answer in very short.

- Over the Indian ocean in which season/months (i) maximum number of depressions form, (ii) maximum severe cyclonic storms form?
- What are Generating and Restoring forces for (i) Capillary waves, (ii) Tides
- What is the criteria to define a wave as a shallow water wave or a deep water wave?
- In which different applications you think the Significant wave height and Maximum wave height information are important?
- What is Spreading loss in Swell waves?
- How positive Indian ocean dipole affects rainfall over India?

Q 2. From your understanding of this subject, answer following:

(a) Hypothetically, if half of the Earth's surface covered by ocean and other half by land (longitudinally 0-180° Land and 180-360° Ocean, both for full 90°S to 90°N latitudes). Then which processes in ocean will get affected and how? [2.5]

(b) What are disturbing and restoring forces for Tsunami? For prediction of Tsunami to save life and property at any given coastal city, which data or information is needed and how these are used to give Tsunami warning? [2.5]

(c) How you see the oceans as a renewable energy source, which process/oceanic condition can be a potential source of renewable energy? [2]

(d) Large number of tropical cyclones form over the Bay of Bengal but very less over Arabian sea, explain the reason. [2]

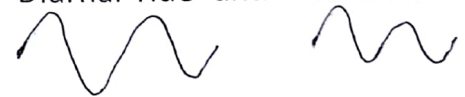
Q 3. Give a sketch of vertical structure of tropical cyclone with wind motions associated with it. How a passing cyclone affects oceanic structure/parameters? How extra-tropical cyclones form? A tropical cyclone with wind speeds of 150 ms⁻¹ in the Arabian Sea is moving towards Gujarat (west coast of India) with speed of 25 ms⁻¹. With respect to the landfall location of this cyclone, where maximum surge is expected and why? [5]

Q 4. With respect to ocean waves, explain terms Significant wave height, Wave drift, and Wave field. Explain water particle's motion associated with a wave and its variation with depth in Deep waves and Shallow water waves. How and when the waves get refracted? [5]

[P.T.O.]

Q 5. What is difference between static stability and dynamics stability? How and when the ocean surface waves break? What are 'Seiches' and associated water particle's motion. At what depths the Internal waves forms and how these waves can be detected on the surface? [5]

Q 6. How Tides are different from other wind waves on sea surface? What factors you think can change tidal range at any location? What are Spring Tide and Neap Tide? What assumptions made in Equilibrium theory of tides? Give typical plots of 'Diurnal Tide' and 'Mixed semidiurnal Tide'. [5]



Q 7. What is the role of ocean in climate and its response to changing climate? How oceanic variability related with climate on seasonal, interannual, decadal and longer time scales? What is El Nino, ENSO, and how these are monitored/measured? [5]

Q 8. Explain types, generation and propagation mechanism of Kelvin waves in oceans. How a Rossby wave is generated and in what ways it is different from Kelvin waves? What could be possible impacts of travelling Kelvin and Rossby waves? What is effect of continental shelf on Kelvin waves? [5]