

TIDES – Comprehensive Notes

1. Introduction

Tides are the periodic rise and fall of sea level caused primarily by the gravitational interaction between the Earth, the Moon, and the Sun. The Moon exerts the strongest influence due to its proximity to the Earth.

2. Causes of Tides

- Gravitational pull of the Moon (primary factor).
- Gravitational pull of the Sun (secondary factor).
- Centrifugal force due to Earth-Moon rotation.

3. Types of Tides

- Spring Tide – Occurs during full moon and new moon. Highest tidal range.
- Neap Tide – Occurs during first and third quarter phases. Lowest tidal range.
- Diurnal Tide – One high tide and one low tide in a day.
- Semi-diurnal Tide – Two high tides and two low tides of nearly equal height in a day.
- Mixed Tide – Two high and two low tides of unequal height.

4. Important Terminology

- High Tide – Maximum water level reached during a tidal cycle.
- Low Tide – Minimum water level during a tidal cycle.
- Tidal Range – Difference between high tide and low tide.
- Tidal Current – Horizontal movement of water during tidal change.

5. Importance of Tides

- Aid in navigation and port operations.
- Support fishing activities.
- Maintain ecological balance in estuaries.
- Used for tidal energy generation.

6. Spring vs Neap Tides (Comparison)

Type	Alignment	Tidal Range
Spring Tide	Sun-Moon-Earth aligned	Maximum
Neap Tide	Sun & Moon at right angles	Minimum