

1. b) Write the definitions of wind, tide and currents.

Tides are driven by the gravitational force of the moon and sun. Tides are characterized by water moving up and down over a long period of time.

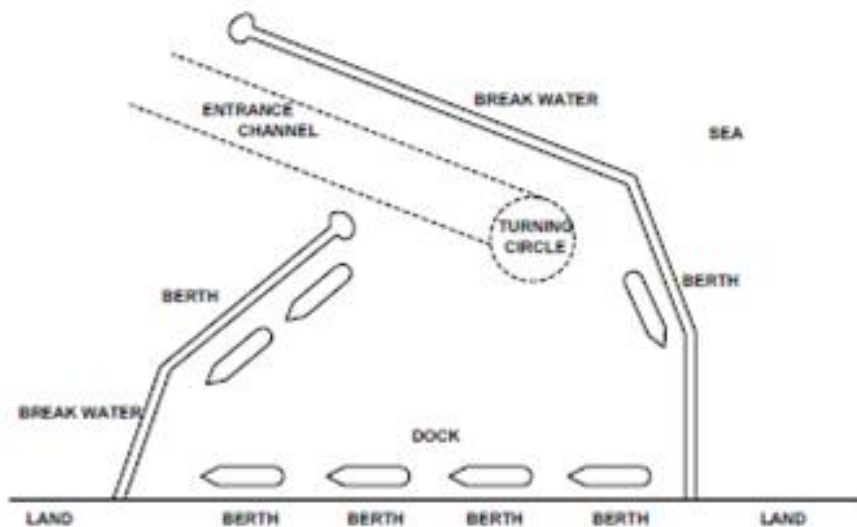
A factor that drives **currents** is thermohaline circulation - a process driven by density differences in water due to temperature (thermo) and salinity (haline) in different parts of the ocean. Currents driven by thermohaline circulation occur at both deep and shallow ocean levels and move much slower than tidal or surface currents.

Wind the perceptible natural movement of the air, especially in the form of a current of air blowing from a particular direction.

2. a) What do you mean by slipways?

A **slipway**, also known as boat ramp or launch, is a ramp on the shore by which ships or boats can be moved to and from the water. They are used for building and repairing ships and boats, and for launching and retrieving small boats on trailers towed by automobiles and flying boats on their undercarriage.

3. b) Draw the layout of a harbor and explain.



1. Approach channel
2. Entrance channel
3. Berthing basin
4. Turning basin
5. Quays and wharves
6. Breakwaters
7. Dry docks and slipways
8. Jetties & piers

9. Lock and locked basin
10. Other components like sheds, buoys, godown, fire protection towers, lights, anchors, warehouses, moorings etc. are also included in the layout of harbor

Approach channel:-

- Depth of water in the entire harbor area should be adequate or sufficient for the purpose of navigation of design vessel or ship. When the depth of water is not sufficient, then a channel with sufficient depth & width should be made by dredging which further provides a passage of ship between the harbor entrance & the docks
- There are two types of approach channel namely (i) Outer channel and (ii) Inner channel

Entrance channel:-

- The portion entrance to a harbor is called as entrance channel & entrance to a harbor is generally more exposed to sea waves, hence depth & width of entrance channel are more.
- The entrance channel should be sufficiently wide for navigational purposes & to prevent dangerous tidal currents.

Berthing basin:-

- A basin in which the vessels or ships rest or park is called as berthing basin. Area of berthing basin is protected by shore & breakwaters.
- In such basin, other elements of harbor including area for anchorage of vessels

Turning basin:-

- The area required for manoeuvring the ship while going or leaving the berth so that a ship can leave head on is called as turning basin
- The size & area of turning basin should be preferably designed large enough so as to allow a free turning

Quays and wharves:-

- Quays & wharves are the structures generally constructed parallel to shore or breakwater within harbor itself so as to permit berthing of vessel alongside for cargo working. It has wide platform at top.

Breakwaters:-

- Breakwater is a structure constructed so as to protect the enclosed area of water from strong storm waves of sea. Breakwater helps to keep the water steady or calm in the harbor and provide safety to the vessel and easy working
- The monolithic structure generally built at the tip of the breakwater which is termed as pier head.

Dry docks slipways:-

- Dry docks and slipways are used for repairs, maintenance and construction of ships. Building dock is essentially provided for construction of ship.
- These are kept dry for easy working.

Jetties and piers:-

- Jetties and piers are open or solid type of structure having a wide platform on the top so as to permit cargo working of vessels or ships berthed alongside.

Lock and locked basin:-

- Locked basin is an enclosed basin in which a number of ships or vessels are berthed. Locked basin has an entrance gate which is controlled by lock gates.

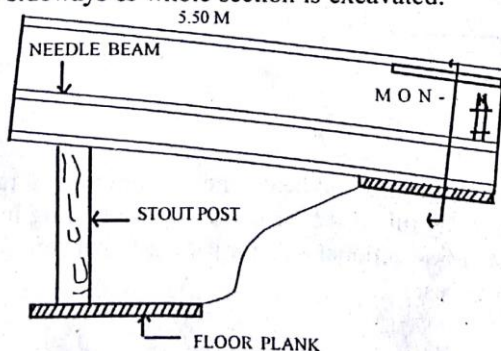
Other components:-

- Components like moorings, sheds, buoys, godowns, fire protection towers, anchors, warehouses, lights and other essential service unit are essential at different location in the harbor.

4. Write in detail about needle beam method.

this method is used for tunnelling in soft ground whose roof soil can stand without support for few minutes. In this method 5 to 6 metres long R.S joist or timber beams are required in addition to other timber boards and struts. This method requires large number of jacks which cause obstruction in efficient working of the labours. The working sequence of needle beam method of tunnel is as follows.

- 1) First of all a small drift of size of about 1 x 1 m is prepared on the working face of the tunnel.
- 2) The needle beam consisting of two 'I' girders are bolted together with a wooden block at the centre & is inserted in the drift & its roof is supported on laggings carried out on the wooden segment. These segments are supported by jacks.
- 3) The needle beam is placed horizontally whose front end rests on the drift itself & the rear end is supported on vertical stout post resting on the lining of the tunnel.
- 4) The jack is placed on the top of the needle beam to support the roof through lagging & the drift is widened sideways & whole section is excavated.



5. What are the different ways in which ventilation can be provided. Explain.

Ventilation means supply of fresh air, light & keeping the level of noise to bearable to human beings. The importance of tunnel ventilation is as follows:

- i. To supply the fresh air to the workers during construction.
- ii. To remove injurious & obnoxious fumes & gases of explosion.
- iii. To remove the dust caused by drilling, blasting & mucking safely.
- iv. To reduce the temperature in tunnel situated at great depth.

The various methods adopted for ventilation are:

i. Natural ventilation:

When a drift is driven from portal to portal, it provides fair ventilation during enlarging operations, especially when the tunnel is a short one of large diameter. Natural ventilation is achieved due to the difference of inside & outside temperature of tunnel. It will be effective if the orientation is along the direction of wind. The length up to which the natural ventilation would be effective depends upon the following factors:

- a. Alignment & Grade
- b. Flow of Traffic.

ii. Mechanical Ventilation:

Mechanical Ventilation is provided by one or more electric fans or blowers, which may blow fresh air into a tunnel or exhaust the dust & foul air from the tunnel. There are Three Systems of ventilation.

- a. Blowing or plenum process.
- b. Exhausting or Vacuum process.
- c. Combination of blowing & exhausting.

6. What are wharf, jetties, Quay, piers and breakwater.

