Prateek Kaushal
16NA30029
PDO
Physical and Dynamical Oceanography, NA60021

Q.1)

Ocean boundaries are defined based on the physiological as well as geographical features of the ocean. It is an imaginary boundary dividing the oceans quite often due to their geographical, physical and political features.

The Indian Ocean is bounded by Iran, Pakistan, India, and Bangladesh to the north; the Malay Peninsula, the Sunda Islands of Indonesia, and Australia to the east; Antarctica to the south; and Africa and the Arabian Peninsula to the west.Meridionally, the Indian Ocean is delimited from the Atlantic Ocean by the 20° east meridian, running south from Cape Agulhas, and from the Pacific Ocean by the meridian of 146°49'E, running south from the southernmost point of Tasmania. no opening in the northern subtropical regions. It has no opening in the northern subtropical regions and low latitude opening in its eastern boundary.

The Southern Ocean plays an important role in modulating the climate over the North Indian Ocean Basin. Changes in the Southern Ocean meridional overturning circulation and intermediate as well as bottom water masses affect the temperature in the Indian Ocean Basin. Apart from this, the ocean and sea ice shelf interaction in the coastal region of Antarctica influences the freshening and warming of bottom waters which further helps in the altercation of the temperature.

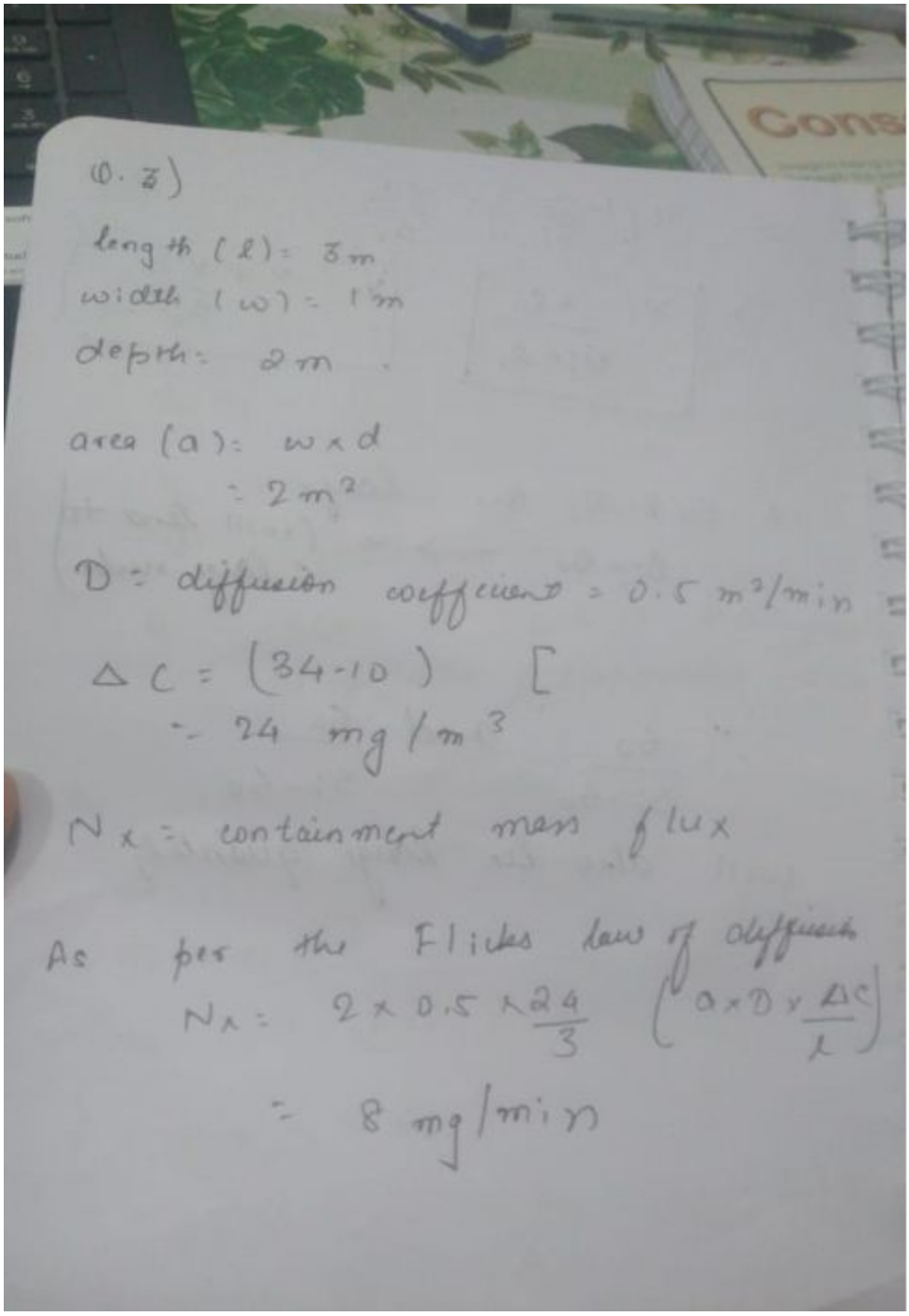
Q.2)
Shore line/Coast line is the name of the line separating the shore from the ocean

A.

Storm surge is produced by water being pushed toward the shore by the force of the winds moving cyclonically around the storm. The impact on surge of the low pressure associated with intense storms is minimal in comparison to the water being forced toward the shore by the wind.

B.
4 degrees will produce a greater storm surge. This occurs because storm surge is caused by the relationship between the winds and the ocean's surface. A gentle slope provides a greater surface area for water and ocean surface leading to greater disaster.

Q.3)



Q.4)

a.)

A- Continental Slope
B-Mid atlantic ridge Ridge
C-Abyssal Plain

D- East pacific ridge
E-trench

b.)
At 2, mid atlantic ridge we can expect the maximum sediment deposit because:

1. At the ridges, sediments thickens due to the accumulation due to interaction of ocean floors leading to a rise which is observed here

2. 2.Anomalous sediments that followed the continental rift and collision in the basins of the Atlantic and Indian Oceans are missing in the Pacific Ocean

c.)

The continental shelf extends to an average width of about 75 miles (120 km) in the Indian Ocean, with its widest points (190 miles [300 km]) off Mumbai (Bombay) on the western coast of India and off northwestern Australia. The island shelves are only about 1,000 feet (300 metres) wide.

d.)

The Ninety East Ridge (also rendered as Ninetyeast Ridge, 90E Ridge or 90°E Ridge) is a mid-ocean ridge on the Indian Ocean floor named for its near-parallel strike along the 90th meridian at the center of the Eastern Hemisphere.

e.)
Indian Ocean is Landlocked on the North, unlike other oceans which go all the way from the Arctic to the Antarctic ocean.

Q.5)

a.

Q 5.

a.) Conservation of volume :

By eqn of continuity,

$V_o - V_i = (R + AD) - AE$ — (1)

V_o — output volume

V_i : input volume

A — area at which precipitation & evaporation occur.

By conservation of salt,

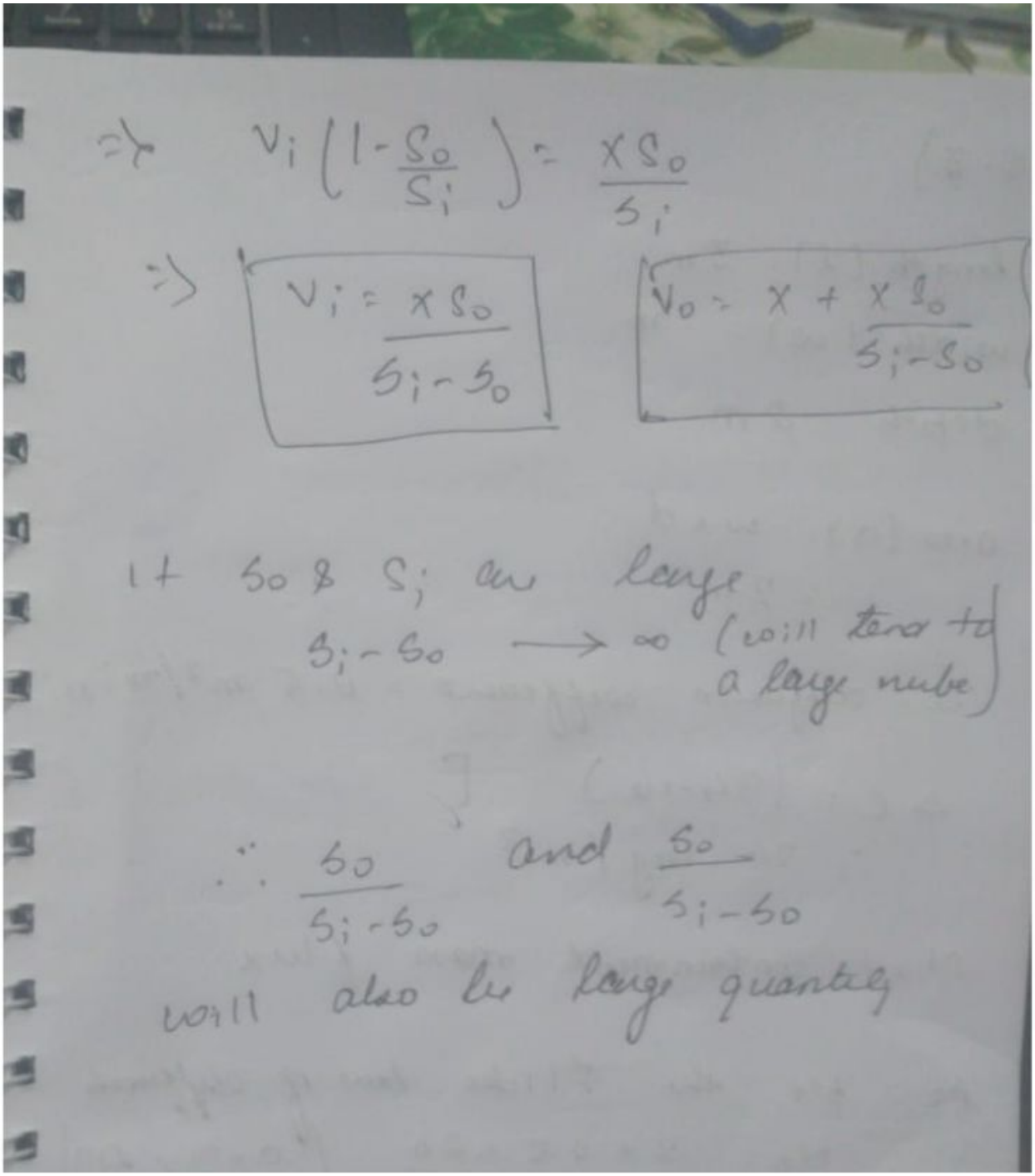
$V_i S_i = V_o S_o$ — (2)

eq (1) + eq (2),

$V_o - V_i = (R + P) - E = X$

$\therefore X + V_i = V_o$

Also $V_i = \frac{V_o S_o}{S_i} = \frac{(V_i + X) S_o}{S_i}$


$\Rightarrow V_i\left(1-\frac{S_o}{S_i}\right) = \frac{X S_o}{S_i}$
$\Rightarrow V_i = \frac{X S_o}{S_i - S_o}$
$V_o = X + \frac{X S_o}{S_i - S_o}$
If S_o & S_i are large
$S_i - S_o \longrightarrow \infty$ (will tend to a large numbe
$\therefore \frac{S_o}{S_i - S_o}$ and $\frac{S_o}{S_i - S_o}$
will also be large quantity

B.

b.) $R_D \frac{S_i}{S_i - S_D} \simeq 25$

$$V_i = 1.75 S_v$$

By conservation eqn :

$$V_i S_i = V_o S_D$$

$$V_o : 1.25 \times \frac{25}{26} = 1.68 S_v$$

Volume $= 3.8 \times 10^6 \text{ Km}^3$

$= 3.8 \times 10^{15} \text{ m}^3$

Residue time $= \frac{Vol}{V_i} = \frac{3.8 \times 10^{15}}{1.75 S_v}$

$= \frac{3.8 \times 10^{15}}{1.95 \times 10^6}$

$= 2.2 \times 10^9 \text{ s}$

$\approx 69.84 \text{ yrs} = 70 \text{ yrs}$