

Student's Name and Code:

Instructions:

- 1. Please write your name and nationality in English on the cover page.
- 2. The time allocated for this examination is 30 minutes.
- 3. Please write your answer legibly, illegible answer will be counted as incorrect.
- 4. Please write your answer only on this test booklet.
- 5. You may respond to questions in English.
- 6. Read the entire question carefully before starting to answer. Marks for each question are indicated on the right.
- 7. Any inappropriate examination behavior will result in disqualification.



Two sets of data pertaining to profiles of temperature, salinity and (density-1000) from two locations on from the north Indian Ocean are given below. Draw the vertical distribution of temperature and salinity. Use **one graph sheet each** to draw the Data SET-1 and Data SET-2 and answer the following questions.

Data – **SET-1**

Depth (m)	Temperature (°C)	Salinity (PSU)	Density-1000 (kg m ⁻³)
		(also parts per mil)	
0	29.03	31.04	19.09
-10	28.99	31.05	19.10
-20	28.98	31.06	19.11
-30	28.96	32.56	20.35
-40	28.97	33.41	21.80
-50	28.96	34.38	22.98
-75	23.54	34.69	23.94
-90	23.21	34.73	24.56
-100	19.79	34.79	24.98
-125	17.85	34.86	25.57
-150	15.87	34.91	25.71
-200	13.43	34.99	26.30

Data – **SET-2**

Depth (m)	Temperature (°C)	Salinity (PSU)	Density-1000 (kg m ⁻³)
		(also parts per mil)	
0	26.00	36.54	24.20
-10	25.98	36.53	24.20
-20	25.95	36.53	24.21
-30	25.92	36.53	24.22
-40	25.90	36.51	24.21
-50	25.89	36.52	24.22
-75	25.87	36.5	24.21
-90	23.91	36.3	24.65
-100	21.78	36.14	25.15
-125	20.33	36.03	25.46
-150	18.97	35.94	25.75
-200	17.17	35.93	26.19

Questions:

a) Plot the vertical profiles of temperature and salinity for SET-1 & SET-2 in the two graph sheets provided.

5 marks

b) Determine the Mixed layer depth (in m) in SET-1& SET-2? 2 marks

SET-1	
SET-2	

- c) Using the plots you made and the (density-1000) values from the tables, if needed, determine the thickness of the barrier layer (in m) in SET-1& SET-2? (barrier layer refers to the depth zone within the isothermal layer where the salinity increases rapidly). Circle the correct option. 2 marks
 - A. 30 m for SET-1 and 0 m for SET-2
 - B. 20 m for SET-1 and 75 m for SET-2
 - C. 50 m for SET-1 and 75 m for SET-2
 - **D.** 10 m for SET-1 and 0 m for SET-2
- d) What are the temperature and salinity gradients in the barrier layer for SET-1 & SET-2 data?

 4 marks
 - A. 0 per m in salinity for SET-1 and 0 per m in temperature for SET-2
 - **B.** 0.09 per m in salinity for SET-1 and 0 per m in temperature for SET-2
 - **C.** 0.09 per m in salinity for SET-2 and 0 per m in temperature for SET-1
 - **D.** 0.09 per m in temperature for SET-1 and 0.09 per m in salinity for SET-2
- e) Identify which SET pertains to the Arabian Sea (less river discharge), and which SET the Bay of Bengal (more river discharge): Write AS for Arabian Sea and BB for Bay of Bengal, in the appropriate row.

 2 marks

SET-1	
SET-2	



