

UNIVERSITY OF RUHUNA
 BACHELOR OF SCIENCE IN FISHERIES AND MARINE SCIENCES DEGREE
 Level II Semester II - Dec/Jan 2015/2016

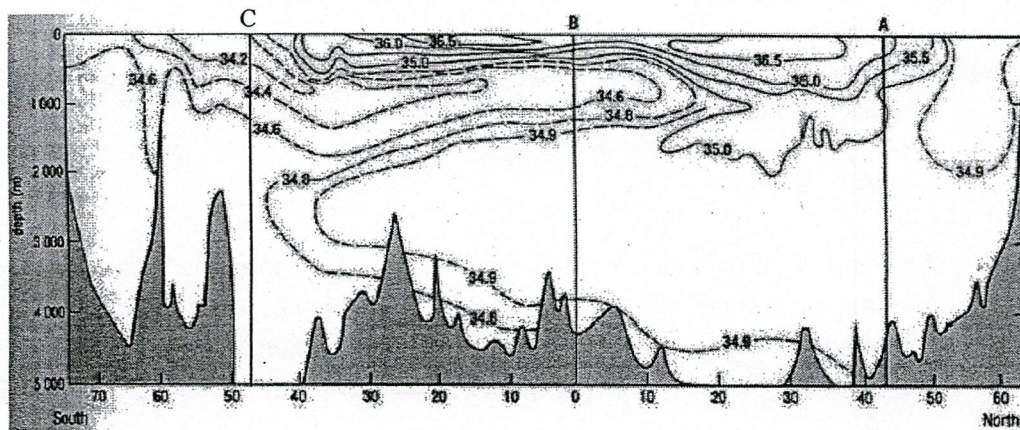
OCG 2212 – Physical Oceanography

Answer Four (04) questions

Time: 02 hours

(Potential temperature $(\theta) = T - Ap - Bp$, $A = 0.04(1 + 0.185T + 0.035[S - 35])$, $B = 0.0075(1 - T/30)$, $\sigma_t = \rho - 1000$, Gravitational constant $(G) = 6.674 \times 10^{-11} \text{ N}$)

01. (i) Briefly explain salinity in sea water and how different factors contribute ocean salinity?
- (ii) Below diagram shows the vertical structure of salinity along-160 W longitude in the Pacific Ocean.. Draw salinity profiles at A, B and C locations considering the salinity contours and describe their variability



02. (i) Define potential temperature?
- (ii) Calculate the potential temperature at Salinity 35 psu, Temperature -23 °C and Dynamic height – 6 km.
- (iii) Calculate the in-situ temperature at salinity 33.5 psu, Dynamic height 3 km, Potential temperature 26.2 °C of this ocean.
- (iv) Describe the relationship between potential temperature and in-situ temperature at a particular depth.

03. Mass of the earth (M_E) and moon (M_M) are 5.9×10^{24} kg, 7.35×10^{22} kg respectively. Distance between the earth and the moon is $D_{EM} = 3.84 \times 10^5$ km. Calculate the gravitational force between the two bodies.
- Explain how does the earth moon attraction affect the tide generation?
 - Describe different types of tides and their generation? Use diagrams if necessary.
 - Using appropriate diagrams discuss followings
 - High and low tides
 - Spring tides and Neap tides
 - Ebb and flood tides
 - Slack water.
04. (i) What are the dominant dynamic forces in the ocean? Give a brief description on each force.
- (ii) Compare and contrast eddies and gyres. If necessary use the diagrams.
- (iii) Briefly describe boundary currents? Giving examples list the major types of boundary currents.
- (iv) "Boundary current directions in northern and southern hemispheres are different". Is the statement true or false? Explain your answer.
05. (i). If salinity of inflow to a ocean basin is S_i and out flow from the basin is S_o and approximate volume of inflow is V_i and out flow is V_o , . Build a relationship of inflow and outflow using the concept of conservation of mass. Consider the density of inflow and outflow as ρ_i and ρ_o respectively.
- (ii). If the density of inflow (ρ_i) is 1.027×10^3 kg/m³ and volume of inflow (V_i) is 1.75×10^6 m³ and volume of out flow (V_o) is $= 1.53$, calculate the density of outflow (ρ_o) water.
- (iii) Define the flushing time. Calculate the minimum flushing time of a basin having a volume of 4.6×10^9 km³ when the rate of a river discharge in to the basin is 4×10^6 km³/yr.

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