ATSC 201 Fall 2023 Chapter 6: A4e, A12e Chapter 11: E1, E2 Total marks: 18

Chapter 6

A4e) (6.5 marks)	Given the following descriptions of ordinary clouds. (i) First classify as cumuliform or stratiform. (ii) Then name the cloud. (iii) Next, draw both the WMO and USA symbols for the cloud. (iv) Indicate if the cloud is made mostly of liquid water or ice (or both). (v) Indicate the likely altitude of its cloud base and top. (vi) Finally, sketch the cloud similar to those in Figs. 6.3 or 6.5.			
	Given:	e.) Thick laye relatively clo snow. No dir the ground. (er of grey cloud with well poorly-defined cloud base use to the ground, and widespread drizzle or light rain or ect sunlight shining through, and no shadows cast on Gloomy.	
	Find:	(i) classification (ii) cloud name (iii) cloud symbols (iv) contains mostly ice, water or both (v) altitude of cloud top and base (vi) sketch		
	(i) Classificatior	1:	Stratiform (streaks, not fluffy)	
	(ii) Cloud name	:	nimbostratus (gloomy, dark, no sun)	
	(iii) Cloud symb Using Table 6-2	ols:	WMO	

(iv) Low altitude, so mostly liquid

(v) From near-surface to 2km up. Low altitude cloud.

(vi) Sketch:	nimbostratus
Discussion:	You typically cannot see the sun when nimbostratus clouds cover the sky. Nimbostratus is characteristic of much of the rainy season in Vancouver.

. 2e) 5 marks)	Draw the cloud coverage symbol for weather maps, and write the METAR abbreviation, for sky cover of the following amount (oktas). e) 4				
	Given:	4 oktas cloud cover			
	Find:	Symbol METAR abbreviation			
	Use Table 6-7:				
	Symbol:	METAR abbreviation: SCT			
	Discussion:	SCT means Scattered Clouds and is used for 3-4 oktas (4-5 tenths).			

E1	L)
(5	marks)

During months when the major Hadley cell exists, trade winds cross the equator. If there are no forces at the equator, explain why this is possible.

Given: Months when major Hadley cell exists No forces at the equator

Find: Why trade winds cross the equator

There is an energy surplus where the incoming solar radiation is largest, triggering convection. Since the solar declination angle changes throughout the year, also the location of the ITCZ shifts accordingly. The tradwinds are the near-surface winds of the Hadley cell, which converge at the ITZC.

When the solar declination angle is close to zero and the ITCZ is near the equator, both Hadley cells are almost symmetric. However, when the ITCZ is shifted off the equator and onto the Northern/Southern hemisphere, a major Hadley cell exists across the equator, hence, the trade winds cross the equator. This process is driven by the incoming solar radiation independent of other forces. However, the effect of the coriolis force in the real world turns the trade winds towards the west.

E2) (4 marks)

In regions of surface high pressure, descending air in the troposphere is associated with dry (nonrainy) weather. These high-pressure belts are where deserts form. In addition to the belts at $\pm 30^{\circ}$ latitude, semi-permanent surface highs also exist at the

Given: Semi-permanent surface high at poles

Find: Explain whether polar regions are deserts

Deserts are defined as regions with arid climates, which means that the mean annual precipitation in these regions is relatively small. This is true for both the belts at ±30° latitude and the polar regions, due to the descending air associated with the surface high pressure. Therefore, polar regions are deserts. The subtropical highs cause hot deserts with small amounts of rainfall and high evaporation, whereas the polar highs cause cold deserts of snow and ice with small amounts of snowfall.