

ASL360 - The Earth's Atmosphere: Physical Principles

Minor I Examination

Time: 1 Hour

Please write your Serial Number on the front page of the answer sheet
Do not write anything on the question paper - not even a dot mark

1. State whether the following statements are true or false

- i. Weather includes the information of atmosphere, ocean, land, and sea-ice.
- ii. Weather is a transient state of the atmosphere whilst climate is a mean state.
- iii. Spatial scale of motion in the vertical direction is smaller than that in the horizontal direction.
- iv. Upper tropospheric winds are stronger than the lower tropospheric winds.
- v. Gradient winds in the cyclonic flow is stronger than in the anticyclonic flow.
- vi. Planetary vorticity decreases with latitude.

{1x6=6 Marks}

2. Answer the following questions briefly (in 4-5 sentences) with reasoning.

- (i) Why geo-strophic winds are not common in the tropical atmosphere?
- (ii) Compute the magnitude of planetary vorticity at the North Pole?
- (iii) Why Rossby waves are not common in the tropics?
- (iv) What is the magnitude and direction of Coriolis force, an air mass will experience, if it moves vertically upward with a velocity of 1 m/s over the equator?
- (v) Between the low pressure and high pressure systems (hint: gradient winds), in which case the wind speed is stronger (give the reasoning)?
- (vi) What is the difference between climate change and climate variability?
- (vii) What is effective gravity (describe its components and direction)?

{3x7=21 Marks}

3. Write down the equation of horizontal motion for the free troposphere.

{3 Marks}