RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

Bachelor of Science in Applied Sciences
Second Year - Semester II Examination – Jan/Feb 2023

PHY 2210 – ATMOSPHERIC PHYSICS

Time: Two (02) hours

Answer All Questions.
Calculators will be provided.

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1. a) Earth's atmosphere can be divided (atmospheric stratification) into five main layers. What is the most important layer among those? Give four reasons.

(05 marks)

b) What is meant by greenhouse effect and human enhanced greenhouse effect? Discuss the effect of water vapour in relation to the global warming.

(05 marks)

c) Drones use their rotors to produce downward thrust and it can hover when downward thrust of the drone is equal to the gravitational pull working against it. Why do drones have physical height limit of roughly 10 kilometres?

(04 marks)

d) Explain how ions are formed in the ionosphere and how it keeps balance with earth?

(06 marks)

2. a) Rain is a major component of the water cycle and it can be fallen to the Earth in different forms. What are the similarities and differences between Sleet and Frozen rain?

(05 marks)

b) What are the two ways of fog formation? Write down two examples for each type and briefly discuss them.

(05 marks)

c) In cold clouds, precipitation-sized particles form by the Bergeron-Findeisen process. Explain the Bergeron process. What are the differences between Riming and Aggregation?

(05 marks)

Contd.

d) What are the three basic texture (visual) categories of cloud?
Explain why the height classification has different heights in the sky according to the latitude.

(05 marks)

3. a) What is meant by adiabatic processes? What is the difference between dry adiabatic lapse rate and moist adiabatic lapse rate?

(05 marks)

b) At approximately what height above the sea level do two thirds (2/3) of the atmospheric mass lie above and one third (1/3) lie below? Assume an exponential pressure dependence with 7.5 km scale height.

(05 marks)

c) The vapor pressure of water is 1.0 atm at 373 K, and the enthalpy of vaporization is 40.7 kJ mol^{-1}. Calculate the potential temperature at 400 K, where R_d/C_p is equal to 0.28571 (R_d is the gas constant of air, and C_p is the specific heat capacity at a constant pressure).

(05 marks)

d) Specific humidity of an air mass is 0.0182 at 33^0C. Total pressure of the moist air mass is 1015 hPa. Determine the following:

i. Mixing ratio

ii. Specific humidity (05 marks)

4. a) State three factors that are important in cloud formation?
Explain each of them. (03 marks)

b) What is it meant by supersaturation? (02 marks)

c) Briefly explain three different types of lightning according to their appearance.

(06 marks)

d) What is the difference between active and passive sensing of remote sensing instruments? (04 marks)

e) Briefly describe the followings of the weather satellites.

i. Polar orbiting and geostationary satellites.
ii. Satellite instruments classification by observation geometry; nadir viewing, limb viewing and solar occultation.

(05 marks)

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