NATIONAL OPEN UNIVERSITY OF NIGERIA
PLOT 91, CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESSWAY, JABI - ABUJA
FACULTY OF SCIENCES

DEPARTMENT OF PURE AND APPLIED SCIENCE

APRIL/MAY, 2019 EXAMINATIONS

COURSE CODE: **PHY 455**
COURSE TITLE: **LOWER ATMOSPHERIC PHYSICS**
CREDIT UNIT **3**
TIME ALLOWED **(2½ HRS)**

INSTRUCTION: ***Answer question ONE (1) and any other four (4) questions***

QUESTION 1

a. Define the following terms (i) stratopause **3 marks** (ii) exobase **3 marks**
(iii) ionosphere **3 marks**
b. List the layers of the atmosphere in terms of the variation of temperature with height. **2 marks**
c. State the following laws:
i) Charles' law **3 marks**
ii) Boyles' law 3 **marks** iii) Snell's law. **3 marks**
d. When an electron jumps from level j to i, define the intensity of the resulting spectral line. **2 marks**

QUESTION 2

a. Define the terms**:** i) Aurora **2 marks**

ii) Solar wind **2 marks**

iii) Electromagnetic coupling **2 marks**

b Show that the difference of the principal specific heat capacities of ideal gases is numerically equal to the gas constant. **6 marks**

QUESTION 3

a) Define the first law of thermodynamics for a closed system that undergoes no change in kinetic or potential energy. **2 marks**

b) Define the work done by an ideal gas undergoing isothermal expansion and hence determine the work done in expanding from V_1 to V_2. **6 marks**

c. Distinguish between isothermal process and adiabatic process. **4 marks**

QUESTION 4

a. State the second law of thermodynamics as presented by:

i) Clausius statement **3 marks**

ii) Kelvin-Plank statement. **3 marks**

b. Distinguish between intensity and flux and also give the expression relating both the intensity and flux. **6 marks**

QUESTION 5

a. State the five phases in which ordinary water exists. **5 marks**

b. Describe the properties of air at room temperature. **3.5 marks**

c. Describe the properties of water vapour at room temperature. **3.5 marks**

QUESTION 6

a. Define the following terms:

i) Wet mixture **2 marks**

ii) Compressed liquid **2 marks** iii) Super-heated vapour **2 marks**

b. Itemize the four quantum numbers that characterised each energy level in an atom (or ion) **2 marks**

c. State the selection rules for magnetic dipole radiation. **4 marks**