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**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**

1. 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**

1. Define the first law of thermodynamics for a closed system that undergoes no change in

 kinetic or potential energy. **2 marks**

1. 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**

1. 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**

1. Define the following terms:

i) Wet mixture **2 marks**

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

1. Itemize the four quantum numbers that characterised each energy level in an atom

(or ion) **2 marks**

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