



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

DEPARTMENT OF PURE AND APPLIED SCIENCE

2021\_2 EXAMINATIONS

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

**INSTRUCTION:** *Answer question 1 and any other four questions*

**QUESTION 1**

1. Write short note on the following terms;

- (i) Astronomy (3 marks)                      (ii) Galaxy (3 marks)                      (iii) Aurora (3 marks)  
(iv) Redshift (3 marks)                      (v) Steady State Universe (2.5 marks)                      (vi) Transition (2.5 marks)  
(vii) Thermodynamics (2.5 marks)                      (viii) Stellar Magnitude (2.5 marks)

**QUESTION 2**

- a. Discuss briefly the term Atmosphere of the Earth (4 Marks)  
b. Enumerate and discuss any three (3) properties of atmosphere (6 Marks)  
c. Mention the region of the Atmosphere is capable of reflecting radio waves, (2 Marks)

**QUESTION 3**

- a. Mention three (3) major constituents of Earth's atmosphere in terms of Volume and percentage (3 Marks)  
b. Briefly discuss atmospheric stratification from highest to lowest (9 Marks)

#### QUESTION 4

a. State the following law:

(i) Kirchhoff law (ii) Stefan-Boltzmann law (iii) Wien's Displacement Law (6 Marks)

b. The Sun converts  $6 \times 10^{11}$  kg of hydrogen into helium every second. Only 99.3% (= 0.993) of that goes into helium; the rest, 0.7%, goes into the energy that causes the Sun to shine. So, over the next 5 billion years (=  $1.6 \times 10^{17}$  seconds). Calculate the amount of hydrogen that will be converted into helium. (4 Marks)

c. State the Keplers' second Law (2 Marks)

#### QUESTION 5

a. State the First law of Thermodynamics (2 Marks)

b. Discuss the any three (3) applications of First law of Thermodynamics (6 Marks)

c. Suppose there is heat transfer of 40.00 J to a system, while the system does 10.00 J of work. Later, there is heat transfer of 25.00 J out of the system while 4.00 J of work is done on the system. What is the net change in internal energy of the system? (4 Marks)

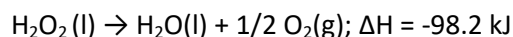
#### QUESTION 6

a. Explain the following with relevant derivation;

(i) The internal energy of a system held at constant volume; (4 Marks)

(ii) The reversible isobaric processes the enthalpy of a system (4 Marks)

b. Hydrogen peroxide decomposes according to the following thermo chemical reaction:



Calculate the change in enthalpy,  $\Delta\text{H}$ , when 1.00 g of hydrogen peroxide decomposes. (4 Marks)