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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**

**2018\_1 SEMESTER EXAMINATION**

**COURSE CODE: PHY 455**

**COURSE TITLE: LOWER ATMOSPHERIC PHYSICS**

**CREDIT UNITS: 3**

**TIME ALLOWED: (3 HRS)**

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

**QUESTION 1**

1a Describe the different layers of the earth’s atmosphere in terms of (i) temperature (ii) composition (iii) escape properties **5 marks**

1b. Briefly describe the different layers of the ionosphere. **5 marks**

1c. Explain briefly why our weather occurs within the troposphere **2 marks**

1d. Prove that for radiative transfer, . **5 marks**

1e. Mention two (2) the impacts of space weather **5 marks**

**QUESTION 2**

2a. Discuss the first law of thermodynamics. **5 marks**

2b. For a system undergoing isothermal expansion, derive an expression for the work done by an ideal gas. **5 marks**

2c. State the second law of thermodynamics. **2 marks**

**QUESTION 3**

3a. For a body undergoing a reversible adiabatic process, prove that: PVg= constant. **5 marks**

3b. Distinguish between moisture and quality of the liquid-vapour saturation region 2 **marks**

3c. Using the P-T diagram, discuss the saturation regions for phases of pure water 5 **marks**

**QUESTION 4**

4a. Derive an equation that shows that pressure decreases with height. **5 marks**

4b. Briefly explain the following, stating formulas where necessary (i) mixing ratio (ii) relative humidity (iii) partial pressure of vapour. **5 marks**

4c. What is the effect of troposphere on radio wave propagation? Briefly Discuss **2 marks**

**QUESTION 5**

5a. Describe the importance of the ionosphere in relation to radio wave propagation **5 marks**

5b. Differentiate between intensity and flux. **2marks**

5c. Discuss the concept of local thermodynamic equilibrium (LTE). **5 marks**

**QUESTION 6**

6a. What is line broadening? **2 marks**

6b Mention the classes of line broadening and give brief explanations. **5 marks**

6c. When is the width of the spectral line of Doppler broadening called Doppler width?

State the Doppler width formula in terms of (i) frequency (ii) wavelength.**5 marks**