



SOUTH EASTERN KENYA UNIVERSITY

UNIVERSITY EXAMINATIONS 2017/2018

FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN METEOROLOGY

SMR 407: MICROMETEOROLOGY AND ATMOSPHERIC POLLUTION

DATE: 04TH DECEMBER, 2017

TIME: 4.00 -6.00 PM

INSTRUCTIONS TO CANDIDATES

Answer Question 1 and other two Questions

Question 1

- (a) Briefly discuss three properties of the Atmospheric Boundary Layer (PBL). **(6 Marks)**
- (b) (i) Define Richardson number. **(2 Marks)**
(ii) Explain how 1b(i) is used to classify turbulent motions in the atmosphere. **(5 Marks)**
- (c) The wind velocity of an air parcel is 15 km/hr at 10 m. Determine the speed of same air parcel at 25 m, given that the exponent based on terrain and surface cover and stability characteristics is 0.07. **(5 Marks)**
- (d) Discuss the importance of using a frequency wind rose in estimating the concentrations of air pollution in a given locality. **(6 Marks)**
- (e) Briefly discuss the impacts of urban and industrial pollution on the precipitation characteristics of a given area. **(6 Marks)**

Question 2

Using relevant equations and illustrations where applicable, differentiate between;

- (a) Superadiabatic and neutral atmosphere. **(10 Marks)**
- (b) Looping and fumigation. **(10 Marks)**

Question 3

- (a) (i) Define a greenhouse gas. **(2 Marks)**
- (ii) Discuss any two characteristics of the gases in 3a(i). **(4 Marks)**
- (b) Differentiate between greenhouse gas effect and global warming. **(4 Marks)**
- (c) Discuss HYSPLIT MODEL as a tool for air pollution transport and dispersion modelling. **(10 Marks)**

Question 4

Describe the following:

- (a) Influence of wind on the distribution of pollutants in the atmosphere. **(4 Marks)**
- (b) The process that lead to rainout of air pollutants in the atmosphere. **(7 Marks)**
- (c) Three factors that influence the impacts of air pollution on human health. **(9 Marks)**

Question 5

- (a) Briefly discuss two ways in which particulate matter can affect plants. **(4 Marks)**
- (b) SEKU plans to build a factory within its compound and you are requested to provide an initial advice on the potential impacts of the pollutants from the factory on the university staff and students. Discuss three factors you would consider. **(16 Marks)**