(This Question Paper contains 2 printed pages)

Roll No.:

a)	**Sl. No.**	: 7448 A
b)	**Name of the Course**	: **B.Sc. Hons.-(Physics**
c)	**Semester**	: **VIII**
d)	**Name of the Paper:**	:**Atmospheric Physics and Climate Change (DSE)**
e)	**Unique Paper Code:**	: **2223510039**
f)	**Duration**	: **3 hours**
g)	**Maximum Marks**	: **90**

Max Marks: 90

Instructions for candidates

1. Write your Roll Number on the top immediately on receipt of this question paper
2. Attempt any five questions. Question 1 is compulsory. All questions carry equal marks.

Question 1. Attempt any six of the following (3×6=18)

a) Explain features of SAO in the stratospheric region.
b) Why does the temperature increase in the stratospheric region?
c) Explain how climate change affects the global hydrological cycle.
d) What are the basic equations that govern large motion of Earth's atmosphere?
e) What is the restoring force for atmospheric gravity waves? In which atmospheric layers are gravity waves commonly observed?
f) Briefly explain the formation of sea breeze and land breeze.
g) What is atmospheric radar? State the frequency range of VHF atmospheric radar. What is meant by radar backscattering in the atmosphere?

Question 2.

a) Quasi-biennial oscillations plays a vital role in controlling large basic wind, show with a clear sketch in at least one parameter i.e. in wind or in temperature (6)

b) Describe the routine radiosonde observational programme carried out by the India Meteorological Department (IMD). What atmospheric variables are recorded during these observations? -6

c) Discuss the processes responsible for the development of convection in the tropical atmosphere during the summer season. Also explain how radar observations help in studying fine-scale atmospheric gravity wave systems. -6

Question:3

a) Derive the general form of the radar range equation of a high-power radar (in VHF band) and explain the physical meaning of each term. What is the difference between mono-static and bistatic radar? **6**

b) Calculate range resolution for a 8 micro second pulse? What is the corresponding wave-length for a 47 MHz frequency radar? 6

c) What is Doppler shift in radar systems, and how is it used to measure target velocity? 6

Question 4.

a) Show a graphical representation of diurnal (24 hour) variation of pressure, relative humidity, temperature, and wind during winter with explanation. 6

b) Give an account on different atmospheric wave system. 6

c) Strong convection growth in the tropics is a common phenomenon, explain it- 6

Question 5.

a) List the different sources of gaseous components for temperature rise? -6

b) Give a description on the Net Zero Emissions to be achieved by India? -6

c) What do you understand by aerosols, what is their role in the lower atmosphere? -6

Question 6. Write a short note on any of the three (6×3=18)

i) Toxic air quality during winter in Delhi-NCR
ii) Pollutants variability from summer to winter
iii) Advantage of Radar observations in the atmosphere
iv) Global rise in temperature and Climate change