

(This Question Paper contains 2 printed pages)

Roll No.:

Sl. No. 8126

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| a) Name of the Course | : B.Sc. Hons.-(Physics |
| b) Semester | : VIII |
| c) Name of the Paper: | : Atmospheric Physics and Climate Change (DSE) |
| d) Unique Paper Code: | : 2223510039 |
| e) Duration | : 3 hours |
| f) Maximum Marks | : 90 |

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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 the observed decrease in temperature with increasing altitude in the troposphere.
- b) Provide a brief explanation of the processes responsible for the lowering and uplifting of the atmospheric boundary layer (ABL)
- c) In which portion of the atmosphere, ozone plays a crucial role?
- d) Discuss the key characteristics of waves in the tropical atmosphere.
- e) Extreme weather events are increasing, comment on the link with the climate change.
- f) State the frequency range of UHF and VHF radars and explain their operating principles.
- g) Which parameter is most suited in diagnosing atmospheric stability and conditions.

Question 2.

(6×3=18)

- a) Explain the role of latent heat in the development of clouds and weather systems.
- b) Describe the seasonal movement of the Inter-Tropical Convergence Zone (ITCZ) and its influence on rainfall over India.
- c) Briefly explain the Hadley circulation and its importance in tropical climate.

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. 6
- b) Calculate range resolution for a 4 micro second pulse? What is the corresponding wavelength for a 50 MHz frequency radar? 6
- c) What is Doppler shift in radar systems, and how is it used to measure target velocity. Compute velocity for a 6 Hz Doppler shift. - 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) Explain the concept of global warming and discuss its observed impacts on India's climate system. - 6
- b) What is the greenhouse effect? Briefly describe the role of major greenhouse gases in Earth's atmosphere. - 6
- c) Discuss the sources and impacts of air pollution in urban regions of India. -6

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

- i) Linear increase in CO₂ emission
- ii) Hazardous air quality and health
- iii) Aerosols and Clouds
- iv) Remote sensing techniques