2016

Paper : 60420

(SPACE AND ATMOSPHERIC PHYSICS)

1. *(a)* State True or False : 1

An adiathermal process is one in which heat is neither gained nor lost.

(b) Choose the correct answer : 1

Numerical value of solar constant is

(i) $F_s = 1730\ \text{Wm}^{-2}$

(ii) $F_s = 1370\ \text{Wm}^{-2}$

(iii) $F_s = 1{\cdot}370\ \text{Wm}^{-2}$

(iv) None of the above

(c) Choose the correct answer : 1

Which of the following is the least important layer in regard to high-frequency propagation?

(i) *D*-layer

(ii) *E*-layer

(iii) F_1-layer

(iv) F_2-layer

(d) Choose the correct answer : 1

The ionosphere plays a significant role in radio wave propagation at

(i) high frequency (HF)

(ii) ultra high frequency (UHF)

(iii) microwave frequency (MF)

(iv) optical frequency (OF)

(e) State True or False : 1

High-frequency waves are not affected by solar cycle.

(f) Fill in the blank : 1

The gaseous envelope surrounding the earth is called _____.

2. Answer any *six* questions : 2×6=12

(a) What is internal energy? State the first law of thermodynamics. 1+1=2

(b) How does pressure change with altitude? 2

(c) What is atmospheric boundary layer? 2

(d) What do you mean by inversion layer? 2

(e) Which layers disappear at night in Earth's atmosphere? Why? 2

(f) What is anemometer? Mention different types of anemometer. 2

(g) What is saturated adiabatic lapse rate? 2

3. (a) Show that if there is a uniform lapse rate Γ, the pressure in the atmosphere is given by

$$p(z) = p_0 \left(1 - \frac{\Gamma_z}{T_0}\right)^{g/(\Gamma R_g)}$$

where p_0 is the pressure and T_0 is the temperature at the ground $z = 0$, and R_g is the gas constant per unit mass of air. 6

(b) What do you mean by potential temperature? How is it related to entropy? 1+6=7

(c) What is the temperature as a function of pressure in an atmosphere for which the lapse rate equals the dry adiabatic lapse rate? 4

(d) Discuss the Chapman theory of atmospheric layer formation. 7

Or

How is ionization lost in the atmosphere? Explain briefly. 7

(e) What are solar flares? How do they appear? 1+3=4

(f) How do density and pressure vary in the corona of sun? Explain. 6

4. Write short notes on the following : 4×2=8

(a) Photoionization

(b) Solar wind