Time: 3 hrs   **M.M. 70, Pass percentage 40**

Note: This paper consists of two sections, A and B. Attempt both the sections as per given instructions.

Section A

Instructions: Attempt FIVE questions (6 marks each) in about 150 w0rds each.

Q1. Explain the formation of weather fronts through horizontal wind shear.

Q2. Obtain the value of vertical wind shear.

Q3. What is Stefan-Boltzmann law? Calculate the equivalent black body temperature of solar photosphere if flux density of solar radiation reaching earth is 1368 Wm^{-2}, the sun earth distance is 1.5×10^{11} m and radius of photosphere, 7×10^{8} m.

Q4. Assuming the earth to be in radiative balance with planetary albedo of 0.3, calculate its equivalent
    black body temperature.

Q5. Explain the radiative balance of solar radiation and resulting temperature of the earth's surface.

Q6. What is role of carbon di oxide in global warming?

Q7. Explain the formation of Antarctic ozone hole and reason for absence of such Arctic hole.

Q8. What is biological impact of Ultraviolet Radiation?

Q9. What is air quality index and how is it measured? Describe different ranges of air quality index.

Q10. What is the unit of noise pollution? What is the limiting value for noise?

Section B

Instructions: Attempt FOUR questions (10 marks each) in detail.

Q11. Give the vertical thermal structure of Atmosphere. Also describe the reason for the variation of temperature with height in each region.

Q12. Starting from equation of hydrostatic equilibrium find the variation of atmospheric pressure with
    height and dry adiabatic lapse rate of an air parcel rising in the atmosphere.

Q13. What is Wein's displacement law? Compute temperature of the sun for which wavelength of maximum solar emission is observed to be about 0.475 μm. Explain with appropriate emission spectra at respective temperatures, as to why cloudy nights are warmer than clear nights.

Q14. Explain Physics of scattering, absorption and emission with particular reference to (i) Scattering By air molecules and particles. (ii) Absorption by particles. (iii) Absorption and emission by gas molecules.

Q15. A parallel beam of radiation is passing through a 100 m thick layer of absorbing gas with average
    density of 0.1 kg m^{-3} at an angle of $60°$ relative to the normal. Calculate the optical thickness, transmissivity, and absorptivity of the layer at wavelengths for which the mass absorption coefficients are 10^{-3}, 10^{-1} and 1 $m^{2}kg^{-1}$.

Q16. Describe solar spectrum, it's variation at outer boundary of atmosphere and at sea level and it's
    interaction with matter. Derive Beer's law for attenuation of radiation by the medium.

Q17. Explain the global warming and radiative forcing. What are the feedback effects on them?

Q18. What are different parameters of water pollution and how are they measured? What are the

limiting values of these parameters for safe drinking water?