P. P. SAVANI UNIVERSITY

Third Semester of B.Sc. Examination

December-2021

SSES2090–Fundamentals of Air Pollution

10.12.2021, Friday **Time: 09:00 a.m. to 11:30 a.m.** **Maximum Marks: 60**

Instructions:

1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

Section-I (Total Marks - 30)

Q.1 **Short Questions** **[10]**

1.1 **Objectives** **[05]**

1.1a Troposphere layer extends from sea level to and altitude of

- **A** 0-12 km
- **B** 0-5 km
- **C** 13-20 km
- **D** 0-10 km

1.1b Ozone layer is present in

- **A** Troposphere
- **B** Stratosphere
- **C** Ionosphere
- **D** Exosphere

1.1c Hydrogen and helium are the prime component of

- **A** Stratosphere
- **B** Mesosphere
- **C** Exosphere
- **D** Thermosphere

1.1d In 1952 which episode proved to be dramatic and costly to human life and health

- **A** Photochemical Smog
- **B** Classical Smog
- **C** Los Angeles Smog
- **D** London Smog

1.1e The gas that was leaked in 1984 in Bhopal was

- **A** Methyl isocynate
- **B** Methyl isocyanite
- **C** Methyl isocyanides
- **D** Methyl isochromate

1.1f The largest decrease in total ozone of 60-70% as Ozone hole occurred over

A Arctic
B Antarctica
C Tropic
D Temperate

1.1g The process of ozone formation in the stratosphere first involves the formation of atomic oxygen (o) from the photolytic decomposition of molecular oxygen (O_2) at the wavelength

A 422 nm
B 242nm
C Both a and b
D None of the above

1.1h Level of ozone is measured in

A Dobson Units
B Hertz
C Meters
D Centimetres

1.1i Temperature range in the Thermosphere-the edge of the atmosphere is

A 20° C -30° C
B 200° C -300° C
C 100° C -200° C
D -92° C to 1200° C

1.1j Meteorological phenomenon occurs in which layer

A Ionosphere
B Stratosphere
C Troposphere
D Mesosphere

1.2 Answer the Following: (MCQ/Short Question/Fill in the Blanks) **[05]**

1.2a Give three example of ozone depleting substances.

1.2b _____is related to natural steady sate concentration of stratospheric ozone.

1.2c _____is the coldest of the atmospheric layers.

1.2d _____layer extending between 250-300km contain the highest concentration of ions.

1.2e The great smog of London occurred in the year_____.

Q.2 Short Notes (Attempt any two) **[06]**

A Explain different types of Lapse rate.
B Describe three types of atmospheric stability with diagram.
C Illustrate radiation inversion and subsidence inversion.

Q.3 Explain in detail (Attempt any two) **[14]**

A What is atmosphere? Discuss the structure and composition of atmosphere.
B Discuss any two air pollution episodes.

C Elaborate on process involving formation and depletion of ozone in atmosphere.

Section-II (Total Marks - 30)

Q.1 Short Questions [10]

1.1 Objectives [05]

1.1a Incoming solar radiation is the name given to the energy received by the earth which in short is termed as

A Heat budget
B Insolation
C Conduction
D Radiation

1.1b Wind is created when the Earth's surface heats up

A Evenly
B Unevenly
C Both A and B
D Only A

1.1c Air naturally travels from high pressure to low pressure areas, resulting in _____air movement.

A Vertical
B Horizontal
C Diagonal
D Both B and C

1.1d The vertical extent to which the mixing takes place varies

A Diurnally
B From day to day
C Seasonally
D All of the above

1.1e Pollutants emitted in to the atmosphere are mixed thoroughly with the surrounding air and _____in the atmosphere.

A Trapped
B Diluted
C Mixed
D Dispersed

1.1f Which factor does not cause variations in insolation?

A Rotation of earth on its axis
B Angle of inclination of the sun's rays
C Length of the night
D Transparency of the atmosphere

1.1g Atmospheric stability is characterized by which temperature gradient?

A Horizontal
B Vertical
C Both A and B
D Only B

1.1h Valleys and low lying areas are particularly affected by
A Diurnal inversions
B Radiation Inversions
C Nocturnal inversions
D Subsidence Inversions

1.1i _____are important because they help us understand under what conditions there will be higher concentrations of pollutants at ground level.
A Plume height
B Plume rise
C Plume types
D Plume width

1.1j Which plume is associated with clear daytime conditions accompanied by strong solar heating, large thermal turbulence and light winds?
A Trapped plume
B Looping plume
C Fanning plume
D Coning plume

1.2 Answer the Following: (MCQ/Short Question/Fill in the Blanks) **[05]**

1.2a If plume density is similar to that of the surrounding atmosphere, the plume does not travels parallel to ground. (True/False)

1.2b _____ is the name given to the middle latitude cell marked by sinking motion near 30 degrees and rising motion near 60 degrees latitude.

1.2c _____ helps Earth to hold on to some of the energy it gets from the Sun so the energy doesn't all leak back out into space.

1.2d Atmospheric motion is controlled by the interplay between the pressure-gradient force and the _____.

1.2e The greater the vertical extent, larger will be the volume of atmosphere available to dilute the pollutants. (True/False)

Q.2 Short Notes (Attempt any two) **[06]**

A With a diagram explain stack height.
B Describe Mixing height using a diagram.
C Define Atmospheric Stability. What are the meteorological aspects of air pollutant dispersion?

Q.3 Explain in detail (Attempt any two) **[14]**

A Describe wind rose? What is the importance of plume rise.
B Explain atmospheric circulation models.
C Explain subadiabatic /stable atmospheric stability with diagram.