Chapter-12
World Climate and Climate Change

1. Multiple choice questions.

Question 1(i).

Which one of the following is suitable for Koeppen's "A" type of climate?

(a) High rainfall in all the months

(b) Mean monthly temperature of the coldest month more than freezing point

(c) Mean monthly temperature of all the months more than 18°C

(d) Average temperature for all the months below 10° C.

Answer:

(a) High rainfall in all the months

Question 1(ii).

Koeppen's system of classification of climates can be termed as:

(a) Applied

(b) Systematic

(c) Genetic

(d) Empirical.

Answer:

(d) Empirical

Question 1(iii).

Most of the Indian Peninsula will be grouped according to Koeppen's system under:

(a) "Af"

(b) "BSh"

(c) "Cfb"

(d) "Am"

Answer:

(d) “Am”

Question 1(iv).

Which one of the following years is supposed to have recorded the warmest temperature the world over?

(a) 1990

(b)1998

(c) 1885

(d) 1950.

Answer:

(b) 1998

Question 1(v).

Which one of the following groups of four climates represents humid conditions?

(a) A—B—C—E

(b) A—C—D—E

(c) B—C—D—E

(d) A—C—D—F

Answer:

(b) A—C—D—E

2. Answer the following questions in about 30 words.

Question 2(i).

Which two climatic variables are used by Koeppen for classification of the climate?

Answer:

It is an empirical classification based on the variables mean annual and mean monthly temperature and precipitation data. He introduced the use of capital and small letters to designate climatic groups and types. Although developed in 1918 and modified over a period of time, Koeppen’s scheme is still popular and in use. Koeppen recognised five major climatic groups, four of them are based on temperature and one on precipitation. Koeppen identified a close relationship between the distribution of vegetation and climate. He selected certain values of temperature and precipitation and related them to the distribution of vegetation and used these values for classifying the climates.

Question 2(ii).

How is the “genetic” system of classification different from the “empirical one”?

Answer:

Empirical classification is based on observed data, particularly on temperature and precipitation while genetic classification attempts to organise climates according to their causes.

Question 2(iii).

Which types of climates have very low range of temperature?

Answer:

Tropical wet climate has very low range of temperature. It is found near the equator. The major areas are the Amazon Basin in South America, western equatorial Africa and the islands of East Indies. Significant amount of rainfall occurs in every month of the year as thunder showers in the afternoon. The temperature is uniformly high and the annual range of temperature is negligible. The maximum temperature on any day is around 30°C while the minimum temperature is around 20°C.

Tropical evergreen forests with dense canopy cover and large biodiversity are found in this climate.

Question 2(iv).

What type of climatic conditions would prevail if the sunspots increase?

Answer:

Sunspots are dark and cooler patches on the sun which increase and decrease in a cyclical manner. According to some meteorologists, when the number of sunspots increase, cooler and wetter weather and greater storminess occur. A decrease in sunspot numbers is associated with warm and drier conditions.

3. Answer the following questions in about 150 words.

Question 3(i).

Make a comparison of the climatic conditions between the “A” and “B” types of climate.

Answer:

Af	Tropical Wet	No dry season. The driest month has at least 60 mm (2.4”) of rain. Rainfall is generally evenly distributed throughout the year. All average monthly temperatures are greater than 18°C (64°F).
Am	Tropical Monsoon	Pronounced wet season. Short dry season. There are one or more months with less than 60 mm (2.4”). All average monthly temperatures are greater than 64°F (18°C). Highest annual temperature occurs just prior to the rainy season.
Aw	Tropical Wet and Dry Climate	Winter dry season. There are more than two months with less than 60 mm (2.4”). All average monthly temperatures are greater than 18°C (64°F).
BSh	Subtropical Dry Semiarid (Steppe)	Low-latitude dry. Evaporation exceeds precipitation on average but is less than potential evaporation. Average temperature is more than 18°C (64°F).
BSk	Mid-latitude Dry Semiarid (Steppe)	Mid-latitude dry. Evaporation exceeds precipitation on average but is less than potential evaporation. Average temperature is less than 18°C (64°F).
BWh	Subtropical Dry Arid (Desert)	Low-latitude desert. Evaporation exceeds precipitation on average but is less than half potential evaporation. Average temperature is more than 18°C (64°F). Frost is absent or infrequent.
BWk	Mid-latitude Dry Arid (Desert)	Mid-latitude desert. Evaporation exceeds precipitation on average but is less than half potential evaporation. Average temperature is less than 18°C (64°F). Winter has below freezing temperatures.

Question 3(ii).

What type of vegetation would you find in the “C” and “A” type(s) of climate?

Answer:

Group A: Tropical Humid Climates Tropical humid climates exist between Tropic of Cancer and Tropic of Capricorn. The sun being overhead climate hot and humid. Annual range of temperature is very low and annual rainfall is high. The tropical group is divided into three types, namely:

1. Af- Tropical wet climate;
2. Am – Tropical monsoon climate;
3. Aw- Tropical wet and dry climate.

Group C: Warm temperate (mid-throughout the year and the presence of Inter Tropical Convergence Zone (ITCZ) make the

latitude) climates extend from 30° – 50° of latitude mainly on the eastern and western margins of continents. These climates generally have warm summers with mild winters. They are grouped into four types:

1. Humid subtropical, i.e. dry in winter and hot in summer (Cwa);
2. Mediterranean (Cs);
3. Humid subtropical, i.e. no dry season and mild winter (Cfa);
4. Marine west coast climate (Cfb).

Question 3(iii).

What do you understand by the term "Greenhouse Gases"? Make a list of greenhouse gases.

Answer:

The term greenhouse is derived from the analogy to a greenhouse used in cold areas for preserving heat. A greenhouse is made up of glass. The glass which is transparent to incoming short wave solar radiation is opaque to outgoing long wave radiation. The glass, therefore, allows in more radiation and prevents the long wave radiation going outside the glass house, causing the temperature inside the glasshouse structure warmer . than outside.

Greenhouse gases are those gases which cause global warming and result in rise in atmospheric temperature. These gases absorb long wave radiation. The processes that warm the atmosphere are often collectively referred to as the greenhouse effect.

Greenhouse Gases(GHGs): The primary GHGs of concern today are carbon dioxide ($C0_2$), Chlorofluorocarbons (CFCs), methane (CH_4), nitrous oxide (N_20) and ozone (0_3). Some other gases such as nitric oxide (NO) and carbon monoxide (CO) easily react with GHGs and affect their concentration in the atmosphere. The effectiveness of any given GHG molecule will depend on the magnitude of the increase in its concentration, its life time in the atmosphere and the wavelength of radiation that it absorbs.