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**PRESIDENCY UNIVERSITY
BENGALURU**

SCHOOL OF ENGINEERING

MID TERM EXAMINATION

Winter Semester: 2021 - 22

Course Code: PET 1005

Course Name: Geology for Engineers

Program & Sem: B.Tech. / II

Date: 13/May/2022

Time: 01:30 PM – 03:00 PM

Max Marks: 50

Weightage: 25%

Instructions:

- (i) Read the all questions carefully and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) All the questions are compulsory.

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries FIVE marks.

(4Qx5M=20M)

1. Write the correct answer.

- (a) The age of the Earth is 4,600,000,000 years. Express this number in exponential notation.
- (b) List at least two types of weathering.
- (c) Explain erosion.
- (d) Deposition is the geological process whereby material is added to a landform. This is the process by which wind and water create a deposit, through the laying down of granular material that has been eroded and transported from another geographical location. Whether the above statement is "True" or "False".
- (e) Define diagenesis.

(C.O.No.1) [Knowledge Level]

2. Choose the correct answer.

- (a) Some scientists estimate that age of the universe is about 1.37×10^{10} years. Which choice below correctly expresses this value?
 - (i) 13,700,000,000 years
 - (ii) 13,710,000,000 years
 - (iii) 1,370,000,000,000 years
 - (iv) 1,371,000,000,000,000 years
- (b) Liquid water is _____.
 - (i) a rock
 - (ii) a mineral
 - (iii) not a mineral
 - (iv) an ore
- (c) The minerals constituting the major bulk of rock are commonly called _____.
 - (i) essential minerals
 - (ii) rock forming minerals
 - (iii) major minerals
 - (iv) accessory minerals

- (d) _____ are also known as primary rocks as they were the first-formed rocks on the earth.
- (i) Igneous rocks (ii) Sedimentary rocks
(iii) Metamorphic rocks (iv) Meta-Sedimentary rocks

- (e) Beddings or stratifications are very common features observed in _____.
- (i) Igneous rocks (ii) Sedimentary rocks
(iii) Metamorphic rocks (iv) Meta-Sedimentary rocks

(C.O.No. 2) [Knowledge Level]

3. Match the information in Column A and Column B.

Column A	Column B
(a) The shape of the earth	(i) catastrophic theories.
(b) The actual shape of the earth may be considered as a leveled surface formed by the imaginary water level of the sea running through the earth conformably following its outer surface. This smoothed out surface forms a body of complex shape of the earth	(ii) liquids and solid.
(c) Primary wave (or P-wave) can travel through	(iii) is the principle that states that all geologic change occurs suddenly.
(d) According to one group of researchers, the material is pulled out of the sun by an external force such as gravitational pull resulting from the dynamic encounter or near-collision of the sun with another sun. These are known as	(iv) is called the geoid.
(e) Catastrophism	(v) solids only.
	(vi) evolutionary theories.
	(vii) is defined as an oblate spheroid.

(C.O.No. 1) [Knowledge Level]

4. Fill in the blank with an appropriate word.

- (a) The study of minerals is known as _____.
- (b) Schistosity and gneissosity are two common features observed in _____ rocks.
- (c) The rocks formed due to alteration or metamorphism of either igneous rock or sedimentary rock at high temperature and high pressure are called _____ rocks.
- (d) There may be a few minerals within a rock, occurring in a very small proportion but their presence or absence is not significant in consideration of naming the rock or the position of the rock in the classification are called _____ minerals.
- (e) _____ is defined broadly as a natural aggregate of minerals occurring in some definite proportion and formed through some geological processes on or below the earth's surface.

(C.O.No. 2) [Knowledge Level]

Part B [Thought Provoking Questions]

Answer all the Questions. Each question carries SEVEN marks.

(2Qx7M=14M)

5. The plate tectonics theory provides a unifying explanation for earthquakes, volcanoes, mountain building, moving continents, and many other manifestations of the Earth's dynamic nature. Like most great, unifying scientific ideas, the plate tectonics theory is simple. Briefly, it describes the Earth's outer layer, called the lithosphere, as a shell of the hard, strong rock. This shell is broken into seven large (and several smaller) segments called tectonic plates. They are also called lithospheric plates, and the two terms are interchangeable. The tectonic plates float on the layer below, called the asthenosphere. The asthenosphere, like the lithosphere, is rock. But the asthenosphere is so hot that 1 to 2 percent of it is melted. As a result, it is plastic, and weak. The lithospheric plates glide slowly over the asthenosphere like sheets of ice drifting across a pond. Continents and ocean basins make up the upper parts of the plates. As a tectonic plate glides over the asthenosphere, the continents and oceans move with it. Most of the Earth's major geological activity occurs at plate boundaries, the zones where tectonic plates meet and interact. Illustrate any two of the consequences of plate tectonics processes.

(C.O.No. 1) [Comprehension Level]

6. A mineral is a naturally occurring inorganic solid with definite chemical composition and a crystalline structure. Chemical composition and crystalline structure are the two most important properties of a mineral because they distinguish any mineral from all others. Geologists have identified thousands of minerals. In fact, new minerals are discovered and named all the time. Most of the newly discovered minerals are rare and have no practical use. The wide variety of minerals makes it difficult to define exactly what a mineral is. However, geologists do study certain characteristics that identify minerals. Is there any exception to the definition of the mineral? Explain your answer logically.

(C.O.No. 2) [Comprehension Level]

Part C [Problem Solving Questions]

Answer all the Questions. Each question carries EIGHT marks.

(2Qx8M=16M)

7. Direct observation of the interior of the earth is not possible as the interior becomes hotter with depth which is convincingly indicated by the volcanic eruptions. The earth's body comprises several layers which are like shells resting one above the other. These layers are distinguished by their physical and chemical properties, particularly, their thickness, depth, density, temperature, metallic content, and rocks. The layered structure of the earth developed during the process of its transformation from a hot gaseous state to the present state. During these processes, the heavier material sank down and the lighter material floated up, and consequently because of the differential densities of the material constituting the earth, they got separated and formed layers of different densities. Identify and briefly discuss any one method that logically proved that the earth has a layered internal structure.

(C.O.No. 1) [Application Level]

8. The rocks are the primary constituents of the earth's crust and three types of rocks are commonly found, viz. (i) Igneous Rocks, (ii) Sedimentary Rock, and (ii) Metamorphic rock. The first crust was formed from the solidification of hot and molten silicate melts called magma. These rocks are described as igneous rocks. With the evolution of the atmosphere, hydrosphere, and biosphere, these rocks, at a later period were subjected to various types of surface processes operated by the natural agents like wind, running water, and organisms. This led at first to weathering and erosion of primary rocks, transportation of the eroded products, and finally their deposition as sediment layers within some natural depressions on the surface (basins) where the materials were gradually consolidated and lithified. In this way, a new type of rock was produced called sedimentary rock which is obviously a secondary product from the primary igneous rock. As these rocks were formed, at places, they went down towards and deeper levels of the crust due to pressure of the newly born younger sedimentary rock layers. At the deeper level of crust, the rock suffers from the different physic-chemical environments (higher pressure and temperature) so that the mineral within the sedimentary rocks formed in the surface condition, became unstable. In such a condition, the rock suffered some physical and chemical changes in its original characteristics with the change in mineral composition. This process of transformation below the surface, taking place in a solid state is called metamorphism and this new group of secondary rocks is called metamorphic rocks. With further burial, the temperature became so high that the rock began to melt producing magma which on crystallization again gave rise to igneous rock. Is there any process that explains the life cycle of rocks? If yes, then explain that cycle.

(C.O.No. 2) [Application Level]



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**PRESIDENCY UNIVERSITY
BENGALURU**

SCHOOL OF ENGINEERING

MID TERM EXAMINATION

Winter Semester: 2021 - 22

Course Code: PET 1005

Course Name: Geology for Engineers

Program & Sem: B.Tech. / II

Date: 13/May/2022

Time: 01:30 PM – 03:00 PM

Max Marks: 50

Weightage: 25%

Instructions:

- (i) *Read the all questions carefully and answer accordingly.*
- (ii) *Question paper consists of 3 parts.*
- (iii) *All the questions are compulsory.*

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries FIVE marks.

(4Qx5M=20M)

1. Write the correct answer.

- (a) The age of the Earth is 4,600,000,000 years. Express this number in exponential notation.
- (b) List at least two types of weathering.
- (c) Explain erosion.
- (d) Deposition is the geological process whereby material is added to a landform. This is the process by which wind and water create a deposit, through the laying down of granular material that has been eroded and transported from another geographical location. Whether the above statement is "True" or "False".
- (e) Define diagenesis.

(C.O.No.1) [Knowledge Level]

2. Choose the correct answer.

(a) Some scientists estimate that age of the universe is about 1.37×10^{10} years. Which choice below correctly expresses this value?

- (i) 13,700,000,000 years (ii) 13,710,000,000 years
(iii) 1,370,000,000,000 years (iv) 1,371,000,000,000,000 years

(b) Liquid water is _____.

- (i) a rock (ii) a mineral
(iii) not a mineral (iv) an ore

(c) The minerals constituting the major bulk of rock are commonly called _____.

- (i) essential minerals (ii) rock forming minerals
(iii) major minerals (iv) accessory minerals

(d) _____ are also known as primary rocks as they were the first-formed rocks on the earth.

- (i) Igneous rocks
- (ii) Sedimentary rocks
- (iii) Metamorphic rocks
- (iv) Meta-Sedimentary rocks

(e) Beddings or stratifications are very common features observed in _____.

- (i) Igneous rocks
- (ii) Sedimentary rocks
- (iii) Metamorphic rocks
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(C.O.No. 2) [Knowledge Level]

3. Match the information in Column A and Column B.

Column A	Column B
(a) The shape of the earth	(i) catastrophic theories.
(b) The actual shape of the earth may be considered as a leveled surface formed by the imaginary water level of the sea running through the earth conformably following its outer surface. This smoothed out surface forms a body of complex shape of the earth	(ii) liquids and solid.
(c) Primary wave (or P-wave) can travel through	(iii) is the principle that states that all geologic change occurs suddenly.
(d) According to one group of researchers, the material is pulled out of the sun by an external force such as gravitational pull resulting from the dynamic encounter or near-collision of the sun with another sun. These are known as	(iv) is called the geoid.
(e) Catastrophism	(v) solids only.
	(vi) evolutionary theories.
	(vii) is defined as an oblate spheroid.

(C.O.No. 1) [Knowledge Level]

4. Fill in the blank with an appropriate word.

- (a) The study of minerals is known as _____.
- (b) Schistosity and gneissosity are two common features observed in _____ rocks.
- (c) The rocks formed due to alteration or metamorphism of either igneous rock or sedimentary rock at high temperature and high pressure are called _____ rocks.
- (d) There may be a few minerals within a rock, occurring in a very small proportion but their presence or absence is not significant in consideration of naming the rock or the position of the rock in the classification are called _____ minerals.
- (e) _____ is defined broadly as a natural aggregate of minerals occurring in some definite proportion and formed through some geological processes on or below the earth's surface.

(C.O.No. 2) [Knowledge Level]

Part B [Thought Provoking Questions]

Answer all the Questions. Each question carries SEVEN marks.

(2Qx7M=14M)

5. The plate tectonics theory provides a unifying explanation for earthquakes, volcanoes, mountain building, moving continents, and many other manifestations of the Earth's dynamic nature. Like most great, unifying scientific ideas, the plate tectonics theory is simple. Briefly, it describes the Earth's outer layer, called the lithosphere, as a shell of the hard, strong rock. This shell is broken into seven large (and several smaller) segments called tectonic plates. They are also called lithospheric plates, and the two terms are interchangeable. The tectonic plates float on the layer below, called the asthenosphere. The asthenosphere, like the lithosphere, is rock. But the asthenosphere is so hot that 1 to 2 percent of it is melted. As a result, it is plastic, and weak. The lithospheric plates glide slowly over the asthenosphere like sheets of ice drifting across a pond. Continents and ocean basins make up the upper parts of the plates. As a tectonic plate glides over the asthenosphere, the continents and oceans move with it. Most of the Earth's major geological activity occurs at plate boundaries, the zones where tectonic plates meet and interact. Illustrate any two of the consequences of plate tectonics processes.

(C.O.No. 1) [Comprehension Level]

6. A mineral is a naturally occurring inorganic solid with definite chemical composition and a crystalline structure. Chemical composition and crystalline structure are the two most important properties of a mineral because they distinguish any mineral from all others. Geologists have identified thousands of minerals. In fact, new minerals are discovered and named all the time. Most of the newly discovered minerals are rare and have no practical use. The wide variety of minerals makes it difficult to define exactly what a mineral is. However, geologists do study certain characteristics that identify minerals. Is there any exception to the definition of the mineral? Explain your answer logically.

(C.O.No. 2) [Comprehension Level]

Part C [Problem Solving Questions]

Answer all the Questions. Each question carries EIGHT marks.

(2Qx8M=16M)

7. Direct observation of the interior of the earth is not possible as the interior becomes hotter with depth which is convincingly indicated by the volcanic eruptions. The earth's body comprises several layers which are like shells resting one above the other. These layers are distinguished by their physical and chemical properties, particularly, their thickness, depth, density, temperature, metallic content, and rocks. The layered structure of the earth developed during the process of its transformation from a hot gaseous state to the present state. During these processes, the heavier material sank down and the lighter material floated up, and consequently because of the differential densities of the material constituting the earth, they got separated and formed layers of different densities. Identify and briefly discuss any one method that logically proved that the earth has a layered internal structure.

(C.O.No. 1) [Application Level]

8. The rocks are the primary constituents of the earth's crust and three types of rocks are commonly found, viz. (i) Igneous Rocks, (ii) Sedimentary Rock, and (ii) Metamorphic rock. The first crust was formed from the solidification of hot and molten silicate melts called magma. These rocks are described as igneous rocks. With the evolution of the atmosphere, hydrosphere, and biosphere, these rocks, at a later period were subjected to various types of surface processes operated by the natural agents like wind, running water, and organisms. This led at first to weathering and erosion of primary rocks, transportation of the eroded products, and finally their deposition as sediment layers within some natural depressions on the surface (basins) where the materials were gradually consolidated and lithified. In this way, a new type of rock was produced called sedimentary rock which is obviously a secondary product from the primary igneous rock. As these rocks were formed, at places, they went down towards and deeper levels of the crust due to pressure of the newly born younger sedimentary rock layers. At the deeper level of crust, the rock suffers from the different physic-chemical environments (higher pressure and temperature) so that the mineral within the sedimentary rocks formed in the surface condition, became unstable. In such a condition, the rock suffered some physical and chemical changes in its original characteristics with the change in mineral composition. This process of transformation below the surface, taking place in a solid state is called metamorphism and this new group of secondary rocks is called metamorphic rocks. With further burial, the temperature became so high that the rock began to melt producing magma which on crystallization again gave rise to igneous rock. Is there any process that explains the life cycle of rocks? If yes, then explain that cycle.

(C.O.No. 2) [Application Level]



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**PRESIDENCY UNIVERSITY
BENGALURU**

SCHOOL OF ENGINEERING

END TERM EXAMINATION

Winter Semester: 2021 - 22

Course Code: PET1005

Course Name: Geology for Engineers

Program & Sem: B.Tech. & II

Date: 1st July 2022

Time: 01:00 PM to 04:00 PM

Max Marks: 100

Weightage: 50%

Instructions:

(iv) Read the all questions carefully and answer accordingly.

(v) Question paper consists of 3 parts.

(vi) All the questions are compulsory.

Part A [Memory Recall Questions]

Answer all the questions. Each question carries TEN marks.

(4Qx10M = 40M)

1: Choose the correct answer.

(a) _____ explains the geometry of different landforms.

(i) Geopgraphy

(ii) Structural Geology

(iii) Paleontology

(iv) Geomorphology

(b) The equatorial radius of the Earth is _____ km.

(i) 6342

(ii) 6378

(iii) 5231

(iv) 6351

(c) _____ helps us to understand the origin of the universe including our solar system and earth. This branch leads us towards another branch called Astronomy. The branch astronomy further leads us towards Astrophysics which is derived from Physics.

(i) Geochemistry

(ii) Paleontology

(iii) Cosmology

(iv) Potamology

(d) The age of the Earth is established as _____ billion years.

(i) 4500

(ii) 4.2

(iii) 4.7

(iv) 4.5

(e) _____ can be defined as the process that causes the removal of disintegrated / decomposed rock material from their place of formation.

(i) Weathering

(ii) Transportation

(iii) Erosion

(iv) Deposition

(f) _____ is a branch dealing with physical properties of different rocks, their origin, chemical and mineralogical composition and their mode of occurrences.

(i) Mineralogy

(ii) Potamology

(iii) Petrology

(iv) Palmology

- (g) _____ deals with the operation of major tectonic processes within the earth resulting in such events like earthquakes, volcanisms, orogenesis and mountain building etc.
 (i) Structural Geology (ii) Geomorphology
 (iii) Siesmology (iv) Geotectonics
- (h) _____ wave can travel through both solids and liquid.
 (i) S (ii) L
 (iii) R (iv) P
- (i) The difference between equatorial radius and polar radius is _____ km.
 (i) 29 (ii) 26
 (iii) 21 (iv) 34
- (j) _____ deals with the chemical behavior of rocks, minerals and the environment under which they were formed. It is derived from the study of chemistry.
 (i) Chemistry (ii) Chemical Engineering
 (iii) Geochemistry (iv) Chemical Sciences

(C.O.No. 1) [Knowledge]

2: Match the information in Column A and Column B.

Column A	Column B
(a) A mineral is a naturally occurring	(i) are minerals with inhomogeneity.
(b) The minerals constituting the major bulk of a rock	(ii) Phanerozoic rocks
(c) The rocks formed due to solidification of magma are called	(iii) sedimentary rocks
(d) The processes of transformation of one type of rock to the other that started from the very initial stage of the solid earth	(iv) metamorphic rocks.
(e) Precious gemstones like diamonds, rubies, sapphires and emeralds	(v) are inorganic solid with definite chemical composition and a crystalline structure.
(f) Asphalt (bitumen), petroleum, mercury and natural gas	(vi) essential minerals.
(g) Fossils are common features of	(vii) structural geology
(h) Schistosity and gneissosity are two common features	(viii) igneous rocks
(i) Amethyst, smoky quartz, citrine, cat's eye, aventurine quartz	(ix) is called rock cycle.
(j) Interlocking texture common; equigranular or inequigranular; glass often present in	(x) are synthetically produced under controlled laboratory conditions.
	(xi) are commonly called rock forming minerals.
	(xii) are semisolids, liquids or gases, yet are treated as minerals.

(C.O.No. 2) [Knowledge]

3: Fill in the blank with appropriate single word.

- (a) A single _____ may be of any thickness from a few millimetres to a metre or more.
- (b) A geologic structure is any feature produced by rock _____.
- (c) The study and correlations of _____ layers is called stratigraphy.
- (d) The _____ strata are said to be Dipping Strata.
- (e) _____ is a tool used for the measurement of dip and strike in the field.
- (f) An outlier is an island of rock left by the _____ of an escarpment and now found entirely surrounded in a plan by older rocks.
- (g) A _____ is a fracture along which rock on one side has moved relative to rock on the other side.
- (h) A _____ is the distance that rocks on opposite sides of a fault have moved. Movement along a fault may be gradual, or the rock may move suddenly, generating an earthquake.
- (i) Miners referred to the side that hung over their heads as the _____ wall and the side they walked on as the foot wall. These names are commonly used to describe both ore veins and faults.
- (j) A _____ is a fracture in rock and is therefore similar to a fault, except that in a joint rocks on either side of the fracture have not moved.

(C.O.No. 3) [Knowledge]

4: (a) Compare the ocean basins to the continents based on their relative levels.

(b) Discuss Continental Margins.

[5M + 5M]

(C.O.No. 4) [Knowledge]

Part B [Thought Provoking Questions]

Answer all the questions. Each question carries TEN marks.

(4Qx10M = 40M)

5: The principal theories which have been advanced to explain the origin of the earth can be divided into two groups. All these theories have in common the idea that the planets evolved from the sun. They differ as to the manner in which it occurred. According to one group, the material is pulled out of the sun by an external force such as gravitational pull resulting from the dynamic encounter or near-collision of the sun with another sun. These are known as catastrophic theories. On the other hand, the second group claim that the planets became isolated masses of matter as the material of the solar system condenses into the sun. These are known as natural or evolutionary theories. Summarize any two of the existing theories/hypotheses that explains the evolution of earth.

(C.O.No. 1) [Comprehension]

6: Geologists have identified thousands of minerals. In fact, new minerals are discovered and named all the time. The wide variety of minerals makes it difficult to define exactly what a mineral is. Most of the newly discovered minerals are rare and have no practical use. Chemical composition and crystal structure determine a mineral's properties, including density, shape, hardness, and color. Because each mineral forms under specific conditions, examining minerals helps scientists understand the history of the earth and the other planets within our solar system. However, geologists do study certain characteristics that identify minerals.

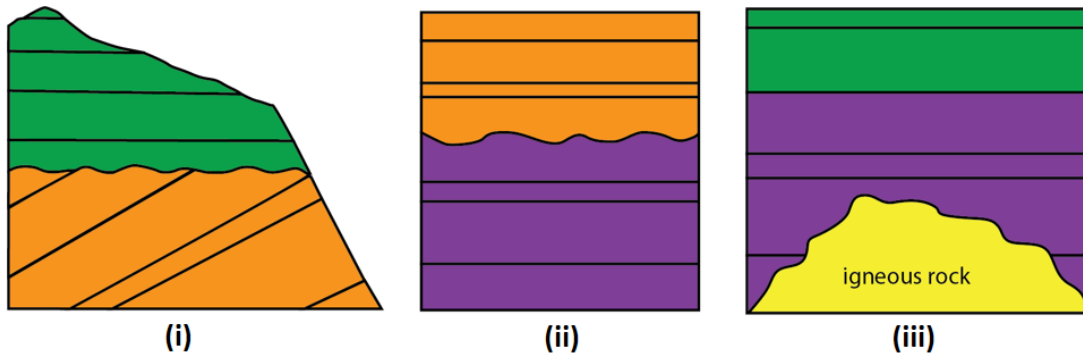
(a) Is the study of minerals playing any role in day-to-day human life? Explain your answer logically.

(b) List down the common methods used to identify minerals.

[6M + 4M]

(C.O.No. 2) [Comprehension]

7: An unconformity is a buried erosional or non-depositional surface separating two rock masses or strata of different ages, indicating that sediment deposition was not continuous. Schematic diagrams of different types of unconformities are displayed below.



- (a) Identify the types of unconformities displayed above.
 (b) Explain the formation of any two unconformities identified above with diagrams. [3M + 7M]
 (C.O.No. 3) [Comprehension]

8: Except for steep areas of the continental slope and areas near the crest of the mid-ocean ridge, the ocean floor is covered with sediment. Part of this material has been deposited by turbidity currents, and the rest has slowly settled to the seafloor from above. The thickness of this carpet of debris varies greatly. In some trenches, which act as traps for sediments originating on the continental margin, accumulations may approach 10 kilometers (6 miles). In general, however, sediment accumulations are considerably less.

- (a) Classify the seafloor sediments as per their origin.
 (b) Compare the seafloor sediments classified above based on their origin. [2.5M + 7.5M]
 (C.O.No. 4) [Comprehension]

Part C [Problem Solving Questions]

Answer both the question. The question carries TEN marks. (2Qx10M = 20M)

9 Geomorphology is the systematic study of forms and the interpretation of them as records of past history. Certain agents function to bring about gradation and result in changes in landforms. These may be called geomorphic agents, such as rivers, wind, glaciers, sea waves etc. Each geomorphic agent functions in a peculiar way and as a result, it produces erosional and depositional landforms that are characteristic of that agent. It is therefore possible to recognize the origin of landforms although the process by which they formed may have ceased to operate; it is because 'geomorphic process leaves their imprint upon landforms'.

- (a) List down the common geomorphological features created by the rivers during the mature stage.
 (b) Explain any two geomorphological features created by the rivers during the mature stage. [2M + 8M]
 (C.O.No. 3) [Application]

10 Climate is the average weather in a given area over a longer period of time. A description of a climate includes information on, e.g. the average temperature in different seasons, rainfall, and sunshine. Also a description of the (chance of) extremes is often included. Climate change is any systematic change in the long-term statistics of climate variables such as temperature, precipitation, pressure, or wind sustained over several decades or longer. Climate change can be due to natural external forces (changes in solar emission or changes in the earth's orbit, natural internal processes of the climate system) or it can be human-induced. The classical period used for describing a climate is 30 years, as defined by the World Meteorological Organization (WMO). Articulate long-term climate change with a suitable example.

(C.O.No. 4) [Application]

