BJO (CBRT)

PROVISIONAL ANSWER KEY

Name of the post	**Technical Advisor, Class-1 in the General State Service,under the Climate Change Department**
Advertisement No.	**20/2024-25**
Preliminary Test Held On	**17-12-2024**
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Last Date to Send Suggestion (s)	**23-12-2024**

THE LINK FOR ONLINE OBJECTION SYSTEM WILL START FROM 19-12-2024; 04:00 PM ONWARDS

Instructions / સૂચના

Candidate must ensure compliance to the instructions mentioned below, else objections shall not be considered: -

(1) All the suggestion should be submitted through **ONLINE OBJECTION SUBMISSION SYSTEM** only. Physical or submission through E- Mail of suggestions will not be considered.

(2) Question wise suggestion to be submitted in the prescribed format (proforma) published on the website / online objection submission system.

(3) All suggestions are to be submitted with reference to the Master Question Paper with provisional answer key (Master Question Paper), published herewith on the website / online objection submission system. Objections should be sent referring to the Question, Question No. & options of the Master Question Paper.

(4) Suggestions regarding question nos. and options other than provisional answer key (Master Question Paper) shall not be considered.

(5) Objections and answers suggested by the candidate should be in compliance with the responses given by him in his answer sheet. Objections shall not be considered, in case, if responses given in the answer sheet /response sheet and submitted suggestions are differed.

(6) Objection for each question should be made on separate sheet. Objection for more than one question in single sheet shall not be considered.

ઉમેદવારે નીચેની સૂચનાઓનું પાલન કરવાની તકેદારી રાખવી, અન્યથા વાંધા-સૂચન અંગે કરેલ રજૂઆતો ધ્યાને લેવાશે નહીં

(1) ઉમેદવારે વાંધા-સૂચનો ફક્ત **ઓનલાઈન ઓબ્જેકશન સબમીશન સીસ્ટમ** દ્વારા જ સબમીટ કરવાના રહેશે.રૂબરૂ, ટપાલ અથવા ઈ-મેઈલ દ્વારા આયોગની કચેરીએ મોકલવામાં આવેલ વાંધા-સૂચનો ધ્યાને લેવામાં આવશે નહીં જેની ખાસ નોંધ લેવી.

(2) ઉમેદવારે વાંધા-સૂચનો રજૂ કરવા વેબસાઈટ / ઓનલાઈન ઓબ્જેકશન સબમીશન સીસ્ટમ પર પ્રસિધ્ધ થયેલ નિયત નમૂનાનો જ ઉપયોગ કરવો.

(3) ઉમેદવારે પોતાને પરીક્ષામાં મળેલ પ્રશ્નપુસ્તિકામાં છપાયેલ પ્રશ્નક્રમાંક મુજબ વાંધા-સૂચનો રજૂ ન કરતા તમામ વાંધા-સૂચનો વેબસાઈટ પર પ્રસિધ્ધ થયેલ પ્રોવિઝનલ આન્સર કી (માસ્ટર પ્રશ્નપત્ર) ના પ્રશ્નક્રમાંક મુજબ અને તે સંદર્ભમાં રજૂ કરવા.

(4) માસ્ટર પ્રશ્નપત્રમાં નિર્દિષ્ટ પ્રશ્ન અને વિકલ્પ સિવાયના વાંધા-સૂચનો ધ્યાને લેવામાં આવશે નહીં.

(5) ઉમેદવારે પ્રશ્નના વિકલ્પ પર વાંધો રજૂ કરેલ છે અને વિકલ્પ રૂપે જે જવાબ સૂચવેલ છે એ જવાબ ઉમેદવારે પોતાની ઉતરવહીમાં આપેલ હોવો જોઈએ. ઉમેદવારે સૂચવેલ જવાબ અને ઉતરવહીનો જવાબ ભિન્ન હશે તો ઉમેદવારે રજૂ કરેલ વાંધા-સૂચનો ધ્યાને લેવાશે નહીં.

(6) એક પ્રશ્ન માટે એક જ વાંધા-સૂચન પત્રક વાપરવું. એક જ વાંધા-સૂચનો પત્રકમાં એકથી વધારે પ્રશ્નોની રજૂઆત કરેલ હશે તો તે અંગેના વાંધા-સૂચનો ધ્યાને લેવાશે નહીં.

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001. **Which of the following best describes climate change?**

(A) Changes in global weather patterns over short periods

(B) Long-term alteration in temperature, precipitation, and other atmospheric conditions

(C) Random fluctuations in weather without any specific trend

(D) Seasonal changes in climate observed annually

002. **Who is credited with predicting the impact of greenhouse gases on Earth's temperature in the late 19th century?**

(A) Charles Keeling **(B) James Hansen**

(C) Milutin Milankovitch **(D) Svante Arrhenius**

003. **What are paleoclimates?**

(A) Climate conditions from Earth's geological past

(B) Modern climate patterns

(C) Seasonal climate variations

(D) Oceanic temperature anomalies

004. **What are sunspots, and why are they relevant to climate change?**

(A) Areas of increased solar activity affecting Earth's climate

(B) Surface features on Earth related to volcanic activity

(C) Cold regions of the Sun that cause global cooling

(D) Atmospheric phenomena linked to ozone depletion

005. **What event is referred to as the Younger Dryas?**

(A) A period of rapid cooling following a warm interglacial period

(B) The extinction of large mammals during the Ice Age

(C) An era of intense volcanic activity affecting climate

(D) A prolonged period of drought

006. **What caused the Paleocene–Eocene Thermal Maximum (PETM)?**

(A) Increased volcanic activity

(B) Massive release of methane into the atmosphere

(C) Melting of Permafrost

(D) All of the above

007. **The Holocene Climatic Optimum was characterized by:**

(A) Colder and drier conditions **(B) Increased glaciation**

(C) Warmer and wetter conditions **(D) Severe volcanic eruptions**

008. **Past estimates of temperature rises often included which primary proxy data?**

(A) Ice core samples **(B) Ocean and Lake sediments**

(C) Pollen grains **(D) All of the above**

009. **Oceanic Anoxic Events are associated with:**

(A) An increase in atmospheric oxygen

(B) Global cooling events

(C) The depletion of oxygen in ocean waters

(D) Sunspot activity

010. **The Keeling Curve, initiated in 1958, demonstrates:**

(A) Seasonal patterns in temperature **(B) Fluctuations in methane concentrations**

(C) Oceanic salinity variations **(D) Long-term atmospheric CO_2 levels increasing**

011. What process powers stars like the Sun?

(A) Nuclear fusion of hydrogen into helium (B) Combustion

(C) Chemical reactions (D) Gravitational collapse

012. Which of the following forms the highest percentage of anthropogenic emission?

(A) F-gases (B) N_2O

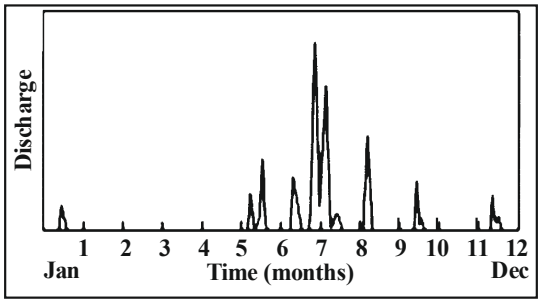
(C) CH_4 (D) CO_2

013. Anticipating the adverse effects of climate change and taking appropriate action to prevent or minimize the damage are referred to as _____ measures.

(A) Mitigative (B) Adaptative

(C) Either adaptative or mitigative (D) None of these

014. In the near past (1980-2020), the average annual temperature over India in _____ with a rate of _____.



(A) Decreasing, 1°C (B) Decreasing, 0.15°C

(C) Increasing, 0.15°C (D) Increasing, 1°C

015. Which region of the Earth is known as the "Ring of Fire"?

(A) Bay of Bengal (B) Pacific Ocean

(C) Indian Ocean (D) Atlantic Ocean

016. What causes the Earth's equatorial bulge?

(A) Gravitational pull from the Moon (B) Uneven heat distribution

(C) Earth's rotation (D) Plate tectonics

017. Why are there different time zones across the Earth?

(A) Variation in Earth's speed (B) Earth's orbital shape

(C) Variation in altitude (D) Rotation of the earth

018. What is the significance of the Earth's axial tilt?

(A) Affects Earth's gravity (B) Determines the speed of rotation

(C) Defines equatorial and polar regions (D) None of these

019. Which is the saltiest body of water on Earth?

(A) Red Sea (B) Caspian Sea

(C) Dead Sea (D) Coral Sea

020. What are/is the ecological role(s) of grasslands?

(A) Flood Control (B) Climate regulation

(C) Biodiversity support (D) All of the above

021. What is the primary composition of Earth's atmosphere by volume?

(A) 78% Oxygen, 21% Nitrogen (B) 78% Nitrogen, 21% Oxygen

(C) 50% Oxygen, 50% Nitrogen (D) 100% Carbon Dioxide

022. Which atmospheric layer contains the ozone layer?

(A) Troposphere (B) Mesosphere

(C) Thermosphere (D) Stratosphere

023. What type of radiation is primarily absorbed by greenhouse gases?

(A) Ultraviolet radiation (B) Visible light

(C) Infrared radiation (D) X-rays

024. What is the term for the change in temperature with altitude under dry conditions?

(A) Wet adiabatic lapse rate (B) Isothermal layer

(C) Dry adiabatic lapse rate (D) Temperature inversion

025. Which instrument is used to measure atmospheric pressure?

(A) Hygrometer (B) Barometer

(C) Anemometer (D) Thermometer

026. What is the primary force driving geostrophic winds?

(A) Gravity (B) Friction

(C) Coriolis effect (D) Solar radiation

027. What is an unstable atmospheric condition characterized by?

(A) Air parcels returning to their original position

(B) Air parcels continuing to rise or sink

(C) Temperature inversion

(D) Horizontal airflow

028. Which process transports heat vertically in the atmosphere?

(A) Convection (B) Radiation

(C) Conduction (D) Geostrophic flow

029. What causes turbulence in the atmosphere?

(A) Uniform temperature (B) Vertical wind shear

(C) Absence of clouds (D) High ozone concentration

030. Which gas has the longest atmospheric lifetime?

(A) Methane (CH_4) (B) Carbon Dioxide (CO_2)

(C) Water Vapor (H_2O) (D) Nitrous Oxide (N_2O)

031. What is the main reason for temperature inversion in the lower atmosphere?

(A) Evaporation from water bodies (B) Strong winds mixing the atmosphere

(C) Solar heating of the upper troposphere (D) Rapid cooling of the Earth's surface at night

032. Which type of radiation dominates Earth's emitted radiation to space?

(A) Visible radiation (B) Infrared radiation

(C) Ultraviolet radiation (D) Microwave radiation

033. Gradient wind is a result of the balance between which forces?

(A) Pressure gradient force (B) Coriolis force

(C) Centrifugal force (D) All of the above

034. What is the typical residence time of methane (CH_4) in the atmosphere?

(A) Approximately 1 year (B) Approximately 10 years

(C) Approximately 50 years (D) Approximately 100 years

035. How does the thermohaline circulation impact atmospheric systems?
(A) By directly altering the ozone layer
(B) By redistributing heat across the globe
(C) By causing temperature inversions
(D) By accelerating chemical reactions in the troposphere

036. Which atmospheric component(s) determine its optical thickness?
(A) Aerosols
(B) Water vapor
(C) Oxygen
(D) All of the above

037. Cumulonimbus clouds are associated with _____.
(A) Mild weather
(B) Fair weather
(C) Extreme weather
(D) None of the above

038. What is the dry adiabatic lapse rate?
(A) 3.6° C/km
(B) 9.2° C/km
(C) 9.8° C/km
(D) None of the above

039. Which atmospheric layer has the greatest density of air molecules?
(A) Troposphere
(B) Stratosphere
(C) Mesosphere
(D) Thermosphere

040. What is the key principle behind measuring atmospheric pressure with a mercury barometer?
(A) Temperature expansion of mercury
(B) Buoyancy of air in the mercury
(C) Gravity acting on the air column
(D) Weight of the mercury column balanced by air pressure

041. What tool is primarily used to study subsurface ocean currents?
(A) Sonar
(B) Satellite imagery
(C) Tidal gauges
(D) Flowmeters

042. What is the main focus of Green Infrastructure in water management?
(A) Building artificial reservoirs
(B) Managing stormwater sustainably
(C) Increasing evaporation rates
(D) Expanding urban sprawl

043. How can volcanic activity contribute to short-term cooling of the Earth?
(A) By releasing methane
(B) By releasing ash and aerosols into the stratosphere
(C) By causing earthquakes
(D) By reducing solar radiation

044. Which climate factor is most influential in soil formation?
(A) Temperature
(B) Wind speed
(C) Rainfall
(D) Both (A) and (C)

045. How does soil erosion impact climate change?
(A) By releasing stored carbon into the atmosphere
(B) By increasing the Earth's albedo
(C) By trapping CO_2 in the soil
(D) By altering ocean circulation patterns

046. Which soil type has the highest capacity to store carbon?
(A) Sandy soil
(B) Clayey soil
(C) Peaty soil
(D) Loamy soil

047. What is the primary role of permafrost in the carbon cycle?

(A) Absorbing CO_2 from the atmosphere

(B) Storing large amounts of organic carbon

(C) Increasing nitrogen fixation rates

(D) Preventing methane release

048. How does the melting of sea ice contribute to climate feedback?

(A) By decreasing the Earth's albedo

(B) By increasing global ocean salinity

(C) By causing volcanic eruptions

(D) By absorbing more sunlight in polar regions

049. How does the nitrogen cycle influence climate change?

(A) By fixing CO_2 in the soil

(B) By altering precipitation patterns

(C) By releasing nitrous oxide

(D) By increasing oceanic oxygen levels

050. What is the primary human activity disrupting the carbon cycle?

(A) Deforestation

(B) Fossil fuel combustion

(C) Industrial agriculture

(D) All of the above

051. Soil degradation is caused by _____.

(A) Erosion

(B) Fertilizer

(C) Excess precipitation

(D) All of the above

052. What is an active soil formation factor?

(A) Climate

(B) Relief

(C) Parent Material

(D) Time

053. Clastic and Chemical are types of _____ rocks.

(A) Igneous

(B) Sedimentary

(C) Metamorphic

(D) Primitive

054. Which of the following statement(s) are TRUE?

(A) Granite is a Plutonic rock.

(B) Volcanic rocks are generally coarse gained.

(C) Both (A) and (B)

(D) None of These

055. Quartz is made of which elements?

(A) Silicon and potassium

(B) Oxygen and sodium

(C) Oxygen and Silicon

(D) Silicon and Iron

056. The common elements present in the earth's crust follows which order?

(A) O > Si > Fe > Al

(B) O > Al > Si > Fe

(C) O > Si > Al > Fe

(D) Si > O > Al > Fe

057. What is the atomic number and atomic mass of Deuterium?

(A) 1 and 1

(B) 1 and 2

(C) 2 and 1

(D) 2 and 2

058. Which of the following is alkaline earth element?

(A) Uranium

(B) Aluminium

(C) Oxygen

(D) Calcium

059. Isolated silicate structures are referred to as _____.

(A) Pyroxene

(B) Micas

(C) Amphiboles

(D) None of the above

060. Which of the following is NOT a characteristic of mineral?
(A) Naturally occurring
(B) Organic
(C) Solid Elements
(D) Definite chemical composition

061. The main limitation of ex-situ conservation for Rare, Endangered and Threatened species is:
(A) Difficulty in genetic analysis
(B) Loss of ecological and evolutionary context
(C) Lack of funding for such programs
(D) Inability to protect seeds or gametes

062. Under warmer climates, a major risk for wind energy management is:
(A) Decreased solar radiation
(B) Higher geothermal gradients
(C) Changes in wind patterns
(D) Increased hydropower potential

063. Which region is likely to have the highest solar energy potential?
(A) Tropical regions
(B) Polar regions
(C) Temperate regions
(D) Coastal areas

064. Which of the following accurately links energy sources and their greenhouse gas emissions?
(A) Solar → High CO_2 emissions during production
(B) Natural Gas → Methane emissions during extraction
(C) Biomass → Zero emissions at all stages
(D) Wind → Continuous CO_2 emissions during operation

065. Which condition makes biomass energy non-carbon neutral?
(A) Sourcing biomass from reforested areas
(B) Relying on agricultural waste for energy
(C) Using biomass combustion without carbon capture
(D) Maintaining long supply chains for biomass transport

066. Which technology is considered crucial for both energy production and carbon sequestration?
(A) Wind turbines
(B) Photovoltaic cells
(C) Geothermal heat pumps
(D) Carbon capture and storage (CCS)

067. A major environmental risk of geothermal energy extraction is:
(A) Groundwater contamination with harmful minerals
(B) Increased CO_2 emissions
(C) Rapid depletion of underground heat sources
(D) Dependence on fossil fuels

068. Which is a major challenge in integrating renewable energy sources into the power grid?
(A) Overproduction of fossil fuels
(B) Intermittent energy supply from sources like wind and solar
(C) Long transmission line lifespan
(D) Lack of hydropower facilities

069. Which is a direct health risk caused by climate change?
(A) Reduced life expectancy
(B) Decreased atmospheric oxygen
(C) Decline in urban population
(D) Increased vector-borne diseases

070. How does climate change impact crop cycles?
(A) Lengthens growing seasons universally
(B) Shortens or disrupts growing seasons
(C) Stabilizes agricultural production
(D) Reduces soil nutrient availability globally

071. Layers of the geosphere based on the chemical composition are _____.

(A) Crust, mantle and core
(B) Lithosphere, mesosphere and core
(C) Lithosphere, mantle and core
(D) Crust, mesosphere and core

072. Which of the following statement(s) in FALSE?

(A) Outer core is molten
(B) Mesosphere is predominantly solid
(C) Asthenosphere is weak and ductile
(D) None of the above

073. How many major lithospheric plates form the earth's surface?

(A) 5
(B) 7
(C) 12
(D) 17

074. Match List I with List II and select the correct answer using the codes given below the Lists:

List I	List II
a. Diverging	1. Constructive
b. Converging	2. Conservative
c. Sliding	3. Destructive

(A) a – 2, b – 3, c – 1
(B) a – 1, b – 3, c – 2
(C) a – 3, b – 1, c – 2
(D) None of the above

075. Central Indian Ridge line is example of which type of plate boundary?

(A) Diverging
(B) Collision
(C) Sliding
(D) Subduction

076. The Grand Canyon was formed by which of the following processes?

(A) Wind only
(B) Water only
(C) Wind and water only
(D) Wind, water and erosion.

077. Percentage of gases except water vapour in the atmosphere are _____.

(A) N > O > H > CO_2
(B) N > O > CO_2 > H
(C) O > N > H > CO_2
(D) O > N > CO_2 > H

078. Maximum amount of water vapour is found in which type of climatology?

(A) Cold-dry
(B) Cold-wet
(C) Hot-dry
(D) Hot-wet

079. 97% of the total weight of the atmosphere is limited upto which height?

(A) 10 km
(B) 30 km
(C) 50 km
(D) 100 km

080. Most of the weather is confined to which layer of the atmosphere?

(A) Thermosphere
(B) Ionosphere
(C) Troposphere
(D) Mesosphere

081. What is radiative forcing?

(A) The difference between solar energy absorbed by Earth and energy radiated back to space
(B) The process of balancing Earth's energy budget
(C) The increase in Earth's temperature due to albedo changes
(D) The cooling effect caused by aerosols in the atmosphere

082. Aerosols have a cooling effect on the Earth's climate primarily through which mechanism?

(A) Increasing Earth's albedo
(B) Absorbing infrared radiation
(C) Enhancing the greenhouse effect
(D) Increasing longwave radiation

083. **Which organization monitors greenhouse gasses using advanced spectrometry technologies like MEDUSA GC-MS?**

(A) World Meteorological Organization (WMO)

(B) Advanced Global Atmospheric Gases Experiment (AGAGE)

(C) National Oceanic and Atmospheric Administration (NOAA)

(D) Intergovernmental Panel on Climate Change (IPCC)

084. **What is the primary source of tropospheric ozone, which contributes to radiative forcing?**

(A) Natural volcanic activity

(B) Chemical reactions involving nitrogen oxides (NO“) and volatile organic compounds (VOCs)

(C) Emissions of chlorofluorocarbons (CFCs)

(D) Methane emissions from wetlands

085. **Which of the following gasses are commonly used as anesthetics but are also potent greenhouse gasses?**

(A) Desflurane, Isoflurane, and Sevoflurane **(B) Halon and CFC-12**

(C) Nitrous oxide and methane **(D) Xenon and argon**

086. **What is the role of plants in reducing greenhouse gas emissions?**

(A) Absorbing methane from the atmosphere

(B) Acting as carbon sinks by absorbing CO_2 during photosynthesis

(C) Emitting aerosols to cool the atmosphere

(D) Producing radiative forcing

087. **Which of the following gasses has the highest Global Warming Potential (GWP) over a 100-year period?**

(A) Carbon dioxide (CO_2)

(B) Methane (CH_4)

(C) Nitrous oxide (N_2O)

(D) Hydrofluorocarbons (HFCs)

088. **What is the primary contribution of aerosols to climate change?**

(A) Depleting stratospheric ozone

(B) Direct cooling by reflecting sunlight

(C) Enhancing cloud formation and warming the planet

(D) Increasing radiative forcing

089. **What is the primary source of anthropogenic nitrous oxide emissions?**

(A) Fossil fuel combustion **(B) Agricultural practices involving fertilizers**

(C) Industrial production of refrigerants **(D) Deforestation**

090. **Which greenhouse gas is measured with the help of a mass spectrometer?**

(A) Carbon dioxide **(B) Methane**

(C) Nitrous oxide **(D) All of the above**

091. **Basaltic magma is formed by partial melting of _____.**

(A) mantle rocks **(B) continental crust**

(C) asthenosphere **(D) None of these**

092. What are the different stages in formation of Clastic rocks?

(A) Generation, transportation, lithification

(B) Weathering, erosion, lithification

(C) Weathering, erosion, compaction and cementation

(D) All of the above

093. Which of the following statements is TRUE?

1. Mudstone is made of clay.

2. Shale is made of clay.

3. Conglomerate is made of sand particles.

(A) 1 and 2 only (B) 1 and 3 only

(C) 2 and 3 only (D) 1, 2 and 3

094. Which of the following is an example of chemical sedimentary rock.

(A) Limestone (B) Chert

(C) Both (A) and (B) (D) None of these

095. Which of the following statements is TRUE?

1. Marble is a metamorphic rock.

2. Marble is formed by regional metamorphism.

3. Marble is formed from Sandstone.

(A) 1 and 2 only (B) 1 and 3 only

(C) 1 only (D) 1, 2 and 3

096. Match List I with List II and select the correct answer using the codes given below the Lists:

List I	List II
a. Sandstone	1. Mica Schist
b. Limestone	2. Marble
c. Mudstone	3. Quartzite

(A) a – 1, b – 2, c – 3 (B) a – 3, b – 2, c – 1

(C) a – 2, b – 1, c – 3 (D) a – 2, b – 3, c – 1

097. Eolian parent material (mass from which the soil has formed) is transported by _____.

(A) Wind (B) Gravity

(C) Water (D) Ice

098. Time that nature devotes to the formation of the soils is termed as _____.

(A) Senile time (B) Virile time

(C) Regolithic time (D) Pedologic time

099. Which layer of soil primarily comprises of very coarsely broken-up bedrock.

(A) O Horizon (B) E Horizon

(C) C Horizon (D) A Horizon

100. Highly weathered tropical soil are referred to as _____.

(A) Oxisols (B) Gelisols

(C) Andisols (D) None of the above

101. Cyclones derive their primary energy from:

(A) Ocean currents (B) Condensation of moist air over warm waters

(C) Wind shear at higher altitudes (D) Variations in solar radiation

102. What distinguishes droughts from arid climates?

(A) Droughts are short-term, while arid climates are long-term

(B) Droughts occur only in high-latitude areas

(C) Arid climates are human-induced, while droughts are natural

(D) Arid climates have variable rainfall, while droughts have none

103. What is the minimum sea surface temperature generally required for the formation of tropical cyclones?

(A) 20°C (B) 26.5°C

(C) 30°C (D) 35°C

104. Hurricanes and typhoons are regionally specific names for tropical cyclones. What distinguishes their naming?

(A) Intensity (B) Wind speed

(C) Geographic location (D) Atmospheric pressure

105. Which of the following is not a typical consequence of El Niño events?

(A) Droughts in Australia

(B) Heavy rainfall in South America

(C) Cooling of sea surface temperatures in the Pacific Ocean

(D) Disruption of marine ecosystems due to reduced upwelling

106. Which heat-related illness occurs when the body's temperature regulation fails, leading to dangerously high body temperatures?

(A) Heat exhaustion (B) Heat stroke

(C) Dehydration (D) Hypothermia

107. Which isotope is commonly analyzed in ice cores to infer past temperatures?

(A) Carbon-12 (B) Oxygen-18

(C) Nitrogen-15 (D) Hydrogen-1

108. Dansgard-Oeschger events refer to:

(A) Periodic oscillations in solar activity

(B) Long-term cooling trends in the Holocene

(C) Shifts in tectonic plate boundaries

(D) Abrupt climate warming episodes during glacial periods

109. Heinrich events are characterized by:

(A) Rapid sea level rise due to polar ice melting

(B) Large-scale iceberg discharges into the North Atlantic

(C) Extreme drought events in the tropics

(D) Sudden volcanic eruptions causing cooling

110. What is the key atmospheric condition required for thunderstorm formation?

(A) High air pressure (B) Stable air masses

(C) Unstable air and moisture (D) Strong solar radiation

111. Which of the following is a transport component of the hydrologic cycle?

(A) Depression Storage (B) Soil Moisture

(C) Infiltration (D) Groundwater

112. Part of the runoff which moves laterally through the upper crust of the geosphere and returns to the surface with least lag time at some location away from the point of infiltration is referred to as _____.

(A) Ground runoff
(B) Surface runoff
(C) Delayed interflow
(D) Prompt interflow

113. Which of the following statements in TRUE?

(A) Unit hydrograph is a flood hydrograph for 1cm rainfall.
(B) Unit hydrograph is a flood hydrograph for 1cm rainfall excess.
(C) Unit hydrograph is a direct runoff hydrograph for 1cm rainfall.
(D) Unit hydrograph is a direct runoff hydrograph for 1cm rainfall excess.

114. The annual hydrograph for a typical stream shown in the following figure represents which type of stream?

(A) Perennial Stream
(B) Intermittent Stream
(C) Ephemeral Stream
(D) None of the above

115. In the rational method for estimation of peak discharge,

(A) peak discharge is directly proportional to basin area.
(B) peak discharge is inversely proportional to basin area.
(C) peak discharge is inversely proportional to rainfall intensity.
(D) None of the above

116. Which of the following are characteristics of river basins smaller than 250 Km^2?

(A) More heterogenous as compared to larger basins
(B) More linear as compared to larger basins
(C) Less sensitive to high-intensity, short-duration rainfall events
(D) Dominant land phase and relatively less channel phase

117. This drainage pattern developed on rocks uniformly resistant to erosion with joints and faults at right angles are referred to as,

(A) Dendritic
(B) Parallel
(C) Rectangular
(D) Trellis

118. Which of the following are characteristics of agricultural river basin?

(A) Dynamic rate of infiltration and high depression storage
(B) Constant rate of infiltration and high depression storage
(C) Dynamic rate of infiltration and low depression storage
(D) Constant rate of infiltration and low depression storage

119. 2013 flash flood in Uttarakhand was a compound extreme caused by a combination of,

(A) First heavy rainfall and the then high discharge in Damoder River
(B) First heavy rainfall and then breach of glacial lake
(C) First breach of glacial lake and then heavy rainfall
(D) First high discharge in Mandakini River and then heavy rainfall

120. Which of the following statements is TRUE?

(A) Southern Peninsular comprises of both Exorheic and Endorheic River basins.
(B) Southern Peninsular only comprises of Exorheic River basins.
(C) Southern Peninsular only comprises of Endorheic River basins.
(D) Southern Peninsular only comprises of Arheic River basins.

121. Which of the following is NOT a significant barrier to the adoption of carbon capture and storage (CCS) technology?

(A) High installation and operational costs

(B) Public opposition to underground storage sites

(C) Lack of suitable geological formations for storage

(D) Inefficiency in capturing methane emissions

122. Emission performance standards like EURO 6 target which of the following pollutants?

(A) Carbon dioxide (CO_2)

(B) Methane (CH_4)

(C) Particulate matter (PM) and nitrogen oxides (NOx)

(D) Chlorofluorocarbons (CFCs)

123. In the context of climate mitigation, the term "negative emissions" refers to:

(A) Reducing emissions from industrial processes

(B) Capturing and removing greenhouse gasses from the atmosphere

(C) Reducing emissions to levels below pre-industrial levels

(D) Increasing renewable energy generation to offset emissions

124. What is a carbon offset?

(A) A penalty for exceeding emission limits

(B) A mechanism to finance renewable energy projects

(C) A reduction in emissions used to compensate for emissions elsewhere

(D) A permit allowing companies to emit more than their allocation

125. The concept of a global carbon budget refers to:

(A) The financial costs of climate adaptation strategies

(B) The maximum allowable emissions to limit global warming below a target

(C) The revenue generated by carbon taxes globally

(D) The economic impact of carbon markets on developing countries

126. What percentage of the global carbon budget has already been used as of recent estimates?

(A) Less than 30%

(B) Approximately 50%

(C) More than 75%

(D) 100%

127. A primary criticism of the voluntary carbon market is:

(A) Excessive regulation by international bodies

(B) Overreliance on mandatory emission caps

(C) Lack of transparency and enforcement mechanisms

(D) High barriers to entry for small firms

128. Sclerochronology primarily examines growth patterns in:

(A) Marine and freshwater organisms

(B) Fossilized plants

(C) Tree bark layers

(D) Glacial ice cores

129. What does CER stand for in the context of carbon markets?

(A) Carbon Emission Reduction

(B) Carbon Equity Rights

(C) Climate Exchange Ratio

(D) Certified Emission Reduction

130. What type of carbon offset project typically involves methane capture?

(A) Wind farm installation

(B) Afforestation initiatives

(C) Landfill gas-to-energy projects

(D) Geothermal energy systems

131. Iron ore fields can be primarily found in which of the following states?

(A) Jharkhand and Orissa
(B) Gujarat and Maharashtra
(C) Punjab and Haryana
(D) Bihar and UP

132. Gujarat is rich in which of the following critical mineral?

(A) Titanium
(B) Barite
(C) Cobalt
(D) Gallium

133. The process of Dose-Response Evaluation in environmental risk assessment helps determine,

(A) Best methods for pollution control
(B) Link between the level of exposure to a hazard and the resulting health effects
(C) Economic costs of pollution
(D) Ethics behind environmental policies

134. Reference data or ground truth data is used for which of the following purpose in remote sensing?

1. Real-time processing of satellite images
2. Verification of information extracted from remote sensing data
3. Calibration of a sensor

(A) 1 only
(B) 1 and 2 only
(C) 2 and 3 only
(D) 1, 2 and 3

135. In microwave remote sensing, the L-band provides scattering information primarily from _____.

(A) Fine leaf structures
(B) Soil surface
(C) Vegetation canopy
(D) None of the above

136. Range resolution in radar remote sensing is NOT a function which of the following?

(A) Velocity of light
(B) Pulse width
(C) Backscatter intensity
(D) All of the above

137. Key Components of Spatial data quality in GIS include _____.

(A) Lineage and Completeness
(B) Temporal accuracy
(C) Positional accuracy
(D) All of the above

138. Identify the correct sequence of the following data products of Indian satellites according to their spatial resolutions,

1) Cartosat -2 PAN
2) Oceansat- 2 OCM
3) Resourcesat-2 AWIFS
4) IRS-ID LISS-3

(A) 2 > 3 > 4 > 1
(B) 2 > 3 > 1 > 4
(C) 3 > 2 > 4 > 1
(D) 2 > 3 > 1 > 4

139. Match List I with List II and select the correct answer using the codes given below the Lists:

List I (wavelength)	List II (response)
a. 0.76-0.90 µm	1. Absorption band of healthy green vegetation
b. 0.63-0.69 µm	2. Green reflectance of healthy vegetation
c. 2.08-2.35 µm	3. Sensitive to turgidity in amount of water in plants
d. 1.53-1.75 µm	4. For discrimination of geology

(A) a – 1, b – 4, c – 2, d – 3
(B) a – 1, b – 3, c – 4, d – 2
(C) a – 2, b – 3, c – 4, d – 1
(D) a – 1, b – 2, c – 3, d – 4

140. Arrange the following elements of image interpretation into decreasing complexity: -

1. Location
2. Tone
3. Association
4. Pattern
5. Texture

(A) 3, 4, 5, 1, 2
(B) 3, 4, 5, 2, 1
(C) 3, 5, 4, 2, 1
(D) 4, 3, 5, 2, 1

141. What is "adaptive capacity"?

(A) The ability to adjust to climate impacts, minimize damage, and capitalize on opportunities
(B) The ability to mitigate emissions effectively
(C) A measure of economic loss due to climate impacts
(D) The efficiency of disaster management policies

142. Equity plays a crucial role in adaptive capacity because:

(A) It ensures only high-risk areas are prioritized
(B) It focuses on equal distribution of resources among all groups
(C) Vulnerable populations are often disproportionately impacted by climate change
(D) It prevents the privatization of adaptation measures

143. What is the purpose of National Adaptation Programs of Action (NAPAs)?

(A) To reduce greenhouse gas emissions at the national level
(B) To implement global mitigation policies for developed countries
(C) To set biodiversity conservation targets for local governments
(D) To identify urgent and immediate adaptation needs of least developed countries

144. What is a key challenge in integrating climate variability into adaptation strategies?

(A) Lack of local knowledge
(B) Inability to predict extreme weather events
(C) Difficulty in distinguishing short-term variability from long-term climate change
(D) High costs of adaptation technologies

145. What is a key feature of Strategic Environmental Assessment (SEA) in adaptation planning?

(A) It focuses on reducing carbon emissions in energy projects
(B) It evaluates the environmental impacts of policies, plans, and programs with a focus on climate risks
(C) It exclusively targets biodiversity conservation
(D) It provides immediate solutions for climate-related emergencies

146. How can disaster risk reduction (DRR) plans be linked to climate change adaptation?

(A) By focusing on rapid disaster response rather than long-term resilience
(B) By concentrating only on reducing greenhouse gas emissions
(C) By addressing the underlying vulnerabilities and reducing exposure to climate-induced risks
(D) By prioritizing large-scale geoengineering solutions

147. What are the three key components of vulnerability assessment?

(A) Magnitude, Variability, and Resilience
(B) Risk, Uncertainty, and Adaptability
(C) Thresholds, Impacts, and Responses
(D) Sensitivity, Adaptability, and Vulnerability

148. Integrated scenarios in climate impact assessment combine:
(A) Artificial experiments and statistical tools
(B) Impact thresholds and monetary measures
(C) Climate and socioeconomic changes
(D) Climate variability and sensitivity analysis

149. In the context of climate extremes, a low-probability catastrophic event is characterized by:
(A) High-frequency occurrence and low impact
(B) High uncertainty and significant impact
(C) Low uncertainty and medium impact
(D) High predictability and significant impact

150. What is the purpose of storylines in climate impact assessments?
(A) To create deterministic forecasts of future climate states
(B) To summarize past climate data trends
(C) To validate statistical tools
(D) To explore potential outcomes of multiple plausible scenarios

151. Formation of an oil reservoir requires the unlikely gathering of particular conditions are as follows,
1) A source rock rich in organic material
2) A porous and permeable reservoir rock
3) A cap rock
(A) 1 only
(B) 2 and 3 only
(D) 1 and 2 only
(D) 1, 2 and 3

152. In order of abundance the composition of crude oil is _____.
(A) C > H > S > N
(B) H > C > S > O
(C) H > C > S > N
(D) C > H > O > S

153. Example of saturated hydrocarbon is _____.
(A) Benzene
(B) Olefins
(C) Paraffins
(D) None of these

154. Which of the following statements is TRUE?
1) Oil shale is a sedimentary rock.
2) Oil shale releases a liquid known as shale oil.
3) Oil-bearing shales are underground rock formations that contain trapped petroleum.
(A) 1 only
(B) 2 and 3 only
(D) 1 and 2 only
(D) 1, 2 and 3

155. Mining for oil shale can have damaging effects on the environment due to,
(A) Release carbon dioxide
(B) Contaminate of groundwater
(C) Requires enormous amounts of freshwater
(D) All of the above

156. Planned attempts to mitigate the environmental impacts of mining tar sands are as follows,
1) Using non-potable and recycled water
2) Continuing with open-pit mining
3) Using carbon capture and storage to reduce greenhouse gas emissions
(A) 1 and 2 only
(B) 1 and 3 only
(C) 2 and 3 only
(D) 1, 2 and 3

157. Natural gas moved into large cracks and spaces between layers of overlying rock are referred to as _____.

(A) Conventional Un-associated Gas (B) Unconventional Gas

(C) Conventional Associated Gas (D) Coalbed Methane

158. Processes to expand the amount of gas that a well can access are _____.

(A) Vertical drilling and hydraulic fracturing

(B) Horizontal drilling and hydraulic fracturing

(C) Vertical drilling and acidizing

(D) None of these

159. Which of the following statement(s) is TRUE?

1) Coal and oil are fossil fuels with very complex molecular formations.

2) Natural gas also has complex molecular formation.

3) Burning natural gas emits 30% less carbon dioxide than oil.

4) Burning natural gas emits 45% less carbon dioxide than coal.

(A) 1, 2 and 3 only (B) 2, 3 and 4 only

(C) 1, 3 and 4 only (D) 1, 2, 3 and 4

160. Prospective basins for phase 1 shale oil and gas exploration in India are _____.

(A) Ganga and Krishna basin (B) Ganga and Mahanadi basin

(C) Narmada and Mahanadi basin (D) Cauvery and Tapi basin

161. Which of the following decisions was NOT part of the Kyoto Protocol's flexible mechanisms?

(A) Joint Implementation (B) International Emissions Trading

(C) Adaptation Fund creation (D) Clean Development Mechanism

162. Which of the following statements about the Clean Development Mechanism (CDM) is FALSE?

(A) CDM allows Annex I countries to finance projects in developing nations

(B) CDM projects are required to demonstrate additionality

(C) CDM projects are exclusively focused on renewable energy

(D) CDM is supervised by the CDM Executive Board

163. The Kyoto Protocol's first commitment period ended in:

(A) 2010 (B) 2012

(C) 2015 (D) 2020

164. What amendment to the Kyoto Protocol extended its commitment period?

(A) Doha Amendment (B) Bonn Agreement

(C) Paris Accord (D) Cancun Protocol

165. Which of the following is NOT a subsidiary body under the UNFCCC?

(A) Subsidiary Body for Implementation (SBI)

(B) Subsidiary Body for Scientific and Technological Advice (SBSTA)

(C) Bureau of the Conference of the Parties (COP Bureau)

(D) Intergovernmental Panel on Climate Change (IPCC)

166. Ground-level ozone is considered a greenhouse gas because:

(A) It has high radiative forcing

(B) It contributes to smog formation

(C) It absorbs solar radiation and contributes to the greenhouse effect

(D) It increases eutrophication in aquatic ecosystems

167. Under the Kyoto Protocol, Assigned Amount Units (AAUs) are:

(A) Emission permits allocated to Annex I countries based on their commitments

(B) Financial contributions made by developing countries to support mitigation

(C) Credits earned through renewable energy projects

(D) The amount of carbon offset by forestry projects

168. The "Hot Air" problem in emissions trading under the Kyoto Protocol primarily refers to:

(A) Inflated emission reduction claims from Annex I countries

(B) Excessive issuance of emission allowances due to low baseline emissions

(C) Inefficiencies in the CDM project registration process

(D) Inability to link carbon markets across regions

169. Which of the following is the primary purpose of an environmental audit?

(A) To regulate industrial taxation

(B) To evaluate an organization's environmental impact

(C) To measure a country's GDP

(D) To monitor biodiversity loss

170. Which organization established the Intergovernmental Panel on Climate Change (IPCC)?

(A) WHO **(B)** UNEP and WMO

(C) UNICEF (D) UNFCCC

171. The largest solar park in the world is the _____.

(A) Pavagada solar park (B) Benban solar park

(C) Bhadla solar park (D) Huanghe Hainan solar park

172. Which of the following statement(s) is TRUE?

1) Geothermal energy is extensively tapped along shorelines.

2) Geothermal energy is extensively tapped along plate boundaries.

3) Geothermal energy is generally produced when heat from the cooling magma heats any ground water circulating nearby.

4) The number of sites suitable for geothermal power generation is limited.

(A) 1, 3 and 4 only **(B)** 2, 3 and 4 only

(C) 3 and 4 only (D) 1, 2, 3 and 4

173. Most promising sites of geothermal energy are located in which states of India?

(A) Gujrat and Jammu & Kashmir (B) Uttar Pradesh and Kerela

(C) Gujrat and Karnataka (D) Uttar Pradesh and West Bengal

174. Limitations associated with commercial generation of hydropower are _____.

(A) Habitat destruction (B) Alteration of streamflow pattern

(C) Earthquake **(D)** All of the above

175. Energy from the ocean can be harnessed from which of the following sources?

(A) Waves and tides

(B) Temperature difference between deep and shallow waters

(C) Both (A) and (B)

(D) Waves only

176. Which country has the highest capacity of marine renewable energy power generation?

(A) China **(B)** South Korea

(C) Canada (D) France

177. Wind power density at a particular location is _____.

(A) Directly proportional to wind speed and density of air

(B) Directly proportional to wind speed and inversely density of air

(C) Inversely proportional to wind speed and density of air

(D) None of these

178. Which aliphatic alcohol is produced through fermentation of sugars?

(A) Methanol (B) Ethanol

(C) Propanol (D) Butanol

179. Which of the following statement(s) is TRUE?

1) Potential evapotranspiration is higher than or equal to actual evapotranspiration.

2) Reference evapotranspiration is actual evapotranspiration from reference surface.

3) Potential evapotranspiration cannot exceed free surface evaporation under similar climatic conditions.

(A) 1 and 2 only (B) 2 and 3 only

(C) 1 and 3 only (D) 1, 2 and 3

180. Which of the following meteorological factors are used by the *Meher's formula* for estimation of evaporation from surface water bodies?

(A) Wind speed, barometric pressure and incoming radiation

(B) Wind speed, incoming radiation and temperature

(C) Wind speed, actual vapour pressure and incoming radiation

(D) Wind speed and actual vapour pressure and relative humidity

181. Mission LiFE, as launched by India, aims to:

(A) Promote high-tech industries (B) Advance individual sustainable practices

(C) Focus on digital infrastructure (D) Eliminate rural unemployment

182. The Green India Mission (GIM) emphasizes:

(A) Expanding nuclear power infrastructure

(B) Sustainable forest management and afforestation

(C) Providing financial aid to industries

(D) Promoting electric vehicles

183. Environmental jurisprudence in India derives from which constitutional provision?

(A) Article 19 (B) Article 21

(C) Article 25 (D) Article 30

184. In the context of climate change, cost-benefit analysis is challenging due to:

(A) Difficulty in assigning monetary value to ecological benefits

(B) High availability of data on climate impacts

(C) Lack of global cooperation on economic modeling

(D) Simple methodologies for estimating future costs

185. What is the "social cost of carbon"?

(A) The cost of producing renewable energy per ton of CO_2

(B) The marginal damage caused by emitting one ton of CO_2 into the atmosphere

(C) The penalty imposed for non-compliance with carbon taxes

(D) The total investment required to achieve net-zero emissions

186. Which sensor type is most commonly used for detecting vegetation biomass from space?

(A) Microwave sensors (B) Infrared sensors

(C) Ultraviolet sensors (D) X-ray sensors

187. What does GIS stand for?

(A) General Information System (B) Geospatial Information Science

(C) Geographic Information Systems (D) Global Integrated Systems

188. Which of the following is NOT a GIS platform used for climate change monitoring?

(A) Landsat (B) MODIS

(C) Google Earth Engine (D) Hadoop

189. How are infrared sensors typically used in remote sensing?

(A) To map ocean temperatures

(B) To measure surface temperatures and detect vegetation health

(C) To analyze soil composition

(D) To track carbon emissions in the atmosphere

190. What is a major advantage of microwave remote sensing in climate change studies?

(A) It requires clear skies for accurate data

(B) It can penetrate cloud cover and provide data in all weather conditions

(C) It is used primarily for detecting heat waves

(D) It has high resolution for detecting small surface features

191. Change of land-use can be used as drought management technique for which type of drought?

(A) Meteorological (B) Hydrological

(C) Agricultural (D) Socio-economic

192. What are upstream floods?

(A) Floods that affect small localized areas.

(B) Characterized by especially rapid rise of stream stage.

(C) Floods that affect large stream systems.

(D) None of these

193. Mass movement occurs in a slope when _____.

(A) Shearing stress < friction and angle of repose is low

(B) Shearing stress > friction and angle of repose is high

(C) Shearing stress = friction and no association with angle of repose

(D) the negative log of the electron activity

194. The point on the earth's surface directly above the earthquake's focus is called _____.

(A) Hypocentre (B) Epicentre

(C) Fault (D) None of these

195. When an earthquake occurs, it releases the stored-up energy in seismic waves. Which of the following statement(s) is TRUE?

1) P wave is a surface wave.

2) S wave is a surface wave.

3) Rayleigh is a body wave.

4) Long wave is a body wave.

(A) 1 and 2 only (B) 3 and 4 only

(C) 1, 2, 3 and 4 (D) None of these

196. Under similar conditions,

(A) Dew point temperature is equal to actual temperature.

(B) Dew point temperature is more than actual temperature.

(C) Dew point temperature is less than actual temperature.

(D) There is no association between temperature and dew point temperature.

197. Which of the following factors are used in Köppen climate classification?

(A) Temperature and precipitation

(B) Temperature, precipitation and evaporation

(C) Temperature, precipitation and atmospheric water demand

(D) Temperature, precipitation and vegetation

198. Outgoing energy from earth is emitted as _____.

(A) Short wave, ultraviolet energy

(B) Short wave, infrared energy

(C) Long wave, ultraviolet energy

(D) Long wave, infrared energy

199. Deep water bodies of albedo of _____ and emissivity of _____.

(A) 0.05, 0.97

(B) 0.97, 0.05

(C) 0.05, 0.05

(D) 0.97, 0.97

200. What percentage of incoming radiation is reflected back by clouds as shortwave radiation?

(A) 5

(B) 20

(C) 40

(D) 50