BNR
PROVISIONAL ANSWER KEY

Name of the post	**Assistant Environment Engineer, Class-2 (GPCB)**
Advertisement No.	**79/2024-25**
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THE LINK FOR ONLINE OBJECTION SYSTEM WILL START FROM 14-05-2025 ; 10:00 AM ONWARDS

Instructions / સૂચના

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

(1) Candidates have to pay fees of Rs.100/- for each objection. The fees can be paid from the link given herewith.

(2) The Candidate will be able to submit objection only after payment of the fees. The generation of the receipt will only be considered as final submission.

(3) The Candidate must retain the receipt of the payment of the fees. The fees, once paid, will not be refunded under any circumstances.

(4) All the objections should be submitted through **ONLINE OBJECTION SUBMISSION SYSTEM** only. Physical or submission through any other means will not be considered.

(5) All objections are to be submitted with reference to the Master Question Paper published with provisional answer key, published herewith on the website / online objection submission system. Objections should be sent referring to the Question No. & options of the Master Question Paper. Objections regarding question nos. and options other than provisional answer key (Master Question Paper) shall not be considered.

(6) 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 objections are differed.

(7) Supportive document to the objection must be uploaded, without which objection will not be considered.

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

(1) ઉમેદવારે દરેક વાંધા દીઠ રૂપિયા ૧૦૦/-ફી ભરવાની રહેશે. જે ફી આ સાથે આપેલ લીંક ઉપરથી ભરી શકાશે.

(2) ફી ભર્યા બાદ જ વાંધો સબમીટ થઈ શકશે. ફી ભર્યાની આખરી પહોંચ જ આખરી સબમીશન ગણાશે.

(3) ફી ભર્યાની પહોંચ ઉમેદવારે સાચવી રાખવાની રહેશે. એક વાર ભરેલ ફી કોઈ પણ પરિસ્થિતિમાં પરત આપવામાં આવશે નહિ.

(4) વાંધા ફક્ત **ઓનલાઈન ઓબ્જેકશન સબમીશન સીસ્ટમ** દ્વારા જ સબમીટ કરવાના રહેશે. રૂબરૂ, ટપાલ અથવા ઈ-મેઈલ કે અન્ય કોઈ રીતે આયોગને મોકલવામાં આવેલ વાંધા ધ્યાને લેવામાં આવશે નહીં, જેની ખાસ નોંધ લેવી.

(5) ઉમેદવારે પોતાને પરીક્ષામાં મળેલ પ્રશ્નપુસ્તિકામાં છપાયેલ પ્રશ્નક્રમાંક મુજબ વાંધા-સૂચનો રજૂ ન કરતાં, તમામ વાંધા-સૂચનો વેબસાઈટ પર પ્રસિધ્ધ થયેલ પ્રોવિઝનલ આન્સર કી (માસ્ટર પ્રશ્નપત્ર) ના પ્રશ્નક્રમાંક મુજબ અને તે સંદર્ભમાં રજૂ કરવા. માસ્ટર પ્રશ્નપત્રમાં નિર્દિષ્ટ પ્રશ્ન અને વિકલ્પ સિવાયના વાંધા ધ્યાને લેવામાં આવશે નહીં.

(6) ઉમેદવારે પ્રશ્નના વિકલ્પ પર વાંધો રજૂ કરેલ છે અને વિકલ્પ રૂપે જે જવાબ સૂચવેલ છે એ જવાબ ઉમેદવારે પોતાની ઉત્તરવહીમાં આપેલ હોવો જોઈએ. ઉમેદવારે સૂચવેલ જવાબ અને ઉત્તરવહીનો જવાબ ભિન્ન હશે તો ઉમેદવારે રજૂ કરેલ વાંધા ધ્યાને લેવાશે નહીં.

(7) વાંધા માટે સંદર્ભ જોડવો આવશ્યક છે, જેના વિના વાંધો ધ્યાને લેવામાં આવશે નહીં.

Website link for online objection submission system: https://www.formonline.co.in/GPSC_TRACK/SearchPage.aspx

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1. **Article 253 empowers Parliament to enact laws for implementing international environmental treaties. How does this provision interact with India's federal structure?**

   (i) It overrides state legislatures on treaty-related environmental matters.

   (ii) It requires unanimous approval from all the states for treaty implementation.

   (iii) It allows the states to opt out of international environmental commitments.

   (iv) It limits Parliament's role to advisory guidelines only.

   (A) Only (i) **(B) (i) and (ii)**

   (C) (ii) and (iii) **(D) (i), (ii), (iii) and (iv)**

2. **Consider the following statements about constitutional provisions for environmental protection:**

   (i) Both Article 51A (g) and Article 48A are legally enforceable in courts.

   (ii) Article 48A imposes obligations on the State, while Article 51A (g) applies to citizens.

   Which of the above statement(s) is/are correct?

   (A) Only (i) **(B) Only (ii)**

   (C) Both (i) and (ii) **(D) Neither (i) nor (ii)**

3. **Which of the following statement(s) is/are true regarding UN-REDD Programme?**

   (i) It was launched in 2008 as a collaborative initiative of FAO, UNDP and UNEP.

   (ii) It covers four regions: Africa, Asia-Pacific, Latin America and Caribbean

   (iii) It supports stakeholder engagement, including indigenous people and forest-dependent communities.

   (iv) Its primary focus is to provide financial incentives exclusively for afforestation in developed countries.

   (A) (i) and (ii) **(B) (ii) and (iii)**

   (C) (i), (ii) and (iii) **(D) (i), (ii), (iii) and (iv)**

4. **Which of the following statement(s) is/are true for REDD+?**

   (i) It is a voluntary climate mitigation framework developed by the United Nations Framework Convention on Climate Change (UNFCCC).

   (ii) REDD stands for 'Reducing emissions from deforestation and forest degradation in developing countries'.

   (iii) The '+' refers the framework's emission reduction strategies.

   (A) (i) and (ii) **(B) (ii) and (iii)**

   (C) (i) and (iii) **(D) (i), (ii) and (iii)**

5. Which of the following statement(s) is/are true regarding Rotterdam Convention?

(i) Rotterdam Convention's primary objective is to ensure that hazardous chemicals are not exported to countries without their explicit consent through a Prior Informed Consent (PIC) procedure.

(ii) Unlike the Basel Convention, the Rotterdam Convention explicitly regulates the transboundary movement of hazardous wastes to prevent dumping in developing countries.

(iii) A unique feature of the Rotterdam Convention is its focus on eliminating persistent organic pollutants (POPs) through a global phase-out schedule, similar to the Stockholm Convention.

(A) Only (i)
(B) (i) and (ii)
(C) (ii) and (iii)
(D) (i), (ii) and (iii)

6. Which of the following statement(s) is/are true regarding the National Environment Policy 2006?

(i) It draws authority from Article 48A (Directive Principles of State Policy) and Article 51A(g) (Fundamental Duties).

(ii) It emphasizes the "Right to Life" under Article 21 as a legal basis for environmental protection.

(iii) The policy was formulated to comply with the Stockholm Convention on Persistent Organic Pollutants.

(A) Only (i)
(B) (i) and (ii)
(C) (ii) and (iii)
(D) (i), (ii) and (iii)

7. Which of the following are explicit objectives of the National Environment Policy 2006?

(i) Intragenerational equity: Ensuring livelihood security for the poor.

(ii) Intergenerational equity: Balancing needs of present and future generations.

(iii) Reducing carbon emissions by 50% by 2030.

(A) Only (i)
(B) (i) and (ii)
(C) (ii) and (iii)
(D) (i), (ii) and (iii)

8. The National Environment Policy 2006 incorporates which of the following?

(i) Common but differentiated responsibilities

(ii) Polluter Pays Principle

(iii) Precautionary Principle

(A) Only (i)
(B) (i) and (ii)
(C) (ii) and (iii)
(D) (i), (ii) and (iii)

9. According to the principle of Economic Efficiency in environmental conservation,

(i) Environmental resources must be assigned economic value.

(ii) This economic value should override social and cultural values in decision-making.

(iii) Alternative courses of action must weigh environmental costs equally with other economic costs.

Which of the above statement(s) is/are correct?

(A) Only (i) (B) (i) and (ii)

(C) (i) and (iii) (D) (i), (ii) and (iii)

10. Which of the following statement(s) is/are correct regarding liability regimes under the National Environment Policy 2006?

(i) In a fault-based liability regime, a party is held liable if it breaches a preexisting legal duty, for example, an environmental standard.

(ii) Strict liability imposes an obligation to compensate the victim for harm resulting from actions or failure to take action, which may not necessarily constitute a breach of any law or duty of care.

(A) Only (i) (B) Only (ii)

(C) Both (i) and (ii) (D) Neither (i) nor (ii)

11. Which of the following statements are correct regarding Bonn Convention?

(i) It aims to conserve terrestrial, aquatic and avian migratory species throughout their range.

(ii) It operates under the aegis of the United Nations Development Programme (UNDP).

(iii) India signed the Raptor MoU with the Bonn Convention to conserve migratory birds of prey.

(A) (i) and (ii) (B) (ii) and (iii)

(C) (i) and (iii) (D) (i), (ii) and (iii)

12. Which of the following statement(s) is/are true regarding Vienna Convention and Montreal Protocol focusing ozone pollution?

(i) The Vienna Convention is legally binding, while the Montreal Protocol is not.

(ii) The Vienna Convention laid the foundation for international cooperation, while the Montreal Protocol set the targets for reducing ozone-depleting substances.

(A) Only (i) (B) Only (ii)

(C) Both (i) and (ii) (D) Neither (i) nor (ii)

13. Which of the following statement(s) is/are true regarding Convention on Wetlands?

(i) The Convention on Wetlands was adopted in the Iranian city of Ramsar in 1971 and came into force in 1975.

(ii) The Convention uses a broad definition of wetlands and includes lakes and rivers, however excludes underground aquifers.

(iii) India has 89 Ramsar sites.

(A) (i) and (ii)
(B) (ii) and (iii)
(C) (i) and (iii)
(D) (i), (ii) and (iii)

14. Which of the following statement(s) is/are true regarding Extended Producer Responsibility?

(i) It is a policy approach that makes producers responsible for their products along the entire lifecycle including the post-consumer stage.

(ii) It helps achieve environmental goals such as recycling targets.

(iii) It generates funding from consumers that help to pay for the collection, sorting and recycling of waste products.

(A) Only (i)
(B) (i) and (ii)
(C) (ii) and (iii)
(D) (i), (ii) and (iii)

15. Which of the following statement(s) is/are true for Annex-I countries defined by United Nations Framework Convention on Climate Change (UNFCCC)?

(i) It refers to a group of industrialized nations and economies in transition.

(ii) These countries are primarily developed-nations that committed to take the lead in reducing greenhouse gas (GHG) emissions under the Montreal Protocol.

(A) Only (i)
(B) Only (ii)
(C) Both (i) and (ii)
(D) Neither (i) nor (ii)

16. Which of the following statement(s) is/are true regarding Acid Rain?

(i) It is a broad term that includes any form of precipitation with acidic components such as sulfuric or nitric acid that fall to the ground from the atmosphere.

(ii) In addition to rain, it can include snow, fog, hail or even dust that is acidic.

(A) Only (i)
(B) Only (ii)
(C) Both (i) and (ii)
(D) Neither (i) nor (ii)

17. Which of the following statement(s) is/are true?

(i) Normal rain has a pH of about 5.6; it is slightly acidic because carbon dioxide (CO_2) dissolves into it forming weak carbonic acid.

(ii) Acid rain usually has a pH between 4.2 and 4.4.

(A) Only (i) (B) Only (ii)

(C) Both (i) and (ii) (D) Neither (i) nor (ii)

18. Which of the following statement(s) is/are true regarding Global Warming?

(i) Global warming is the long-term heating of Earth's surface observed since the pre-industrial period (between 1850 and 1900) due to human activities, primarily fossil fuel burning, which increases heat-trapping greenhouse gas levels in Earth's atmosphere.

(ii) This term is not interchangeable with the term 'climate change'.

(A) Only (i) (B) Only (ii)

(C) Both (i) and (ii) (D) Neither (i) nor (ii)

19. Which of the following is/are correct the examples of Carbon Pricing – a price on carbon pollution as a means of bringing down emissions and drive investment into cleaner options?

(i) Emissions Trading Systems (ii) Carbon Taxes

(A) Only (i) (B) Only (ii)

(C) Both (i) and (ii) (D) Neither (i) nor (ii)

20. Which of the following statement(s) is/are correct regarding Carbon Footprint?

(i) A carbon footprint is the total amount of greenhouse gases (GHGs) released by an individual, organization, product or activity.

(ii) A carbon footprint quantifies the emissions of various GHGs including carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) among others.

(iii) Only direct emissions of the GHG are considered for the estimation of the Carbon Footprint.

(A) (i) and (ii) (B) (i) and (iii)

(C) (ii) and (iii) (D) (i), (ii) and (iii)

21. Which of the following statement(s) is/are true?

(i) Halogen source gases directly react with ozone in the stratosphere.

(ii) Lifetime of the principal Ozone Depleting Substances largely vary from 1 to 100 years.

(A) Only (i) (B) Only (ii)

(C) Both (i) and (ii) (D) Neither (i) nor (ii)

22. Which of the following statement(s) is/are true regarding Radiative Forcing (RF)?

(i) It is one way to measure greenhouse gases and other climate drivers.

(ii) RF indicates the difference between how much of the sun's energy gets absorbed by the earth and how much is released into space as a result of any one climate driver.

(iii) A climate driver with a negative RF value indicates that it has a warming effect on the plane.

(A) (i) and (ii)
(B) (ii) and (iii)
(C) (i) and (iii)
(D) (i), (ii) and (iii)

23. Which factors are primarily considered for estimating the Global Warming Potential of a Gas?

(i) Molecular weight

(ii) Abundance

(iii) Radiative efficiency

(iv) Atmospheric lifetime

(A) (i) and (ii)
(B) (iii) and (iv)
(C) (i), (ii) and (iii)
(D) (i), (ii), (iii) and (iv)

24. What does Global Warming Potential (GWP_{100}) represent?

(A) Total heat absorbed by a gas over 100 years.

(B) A gas's heat-trapping ability related to CO_2 over 100 years.

(C) The effect of 100 gases in global warming.

(D) None of the above

25. Which of the following statement(s) is/are true regarding climate change?

(i) Climate change refers to long-term shifts in temperatures and weather patterns.

(ii) Such shifts can be natural due to changes in the sun's activity or large volcanic eruptions.

(iii) Since 1800s, human activities have been the main driver of climate change, primarily due to the burning of fossil fuels like coal, oil and gas.

(A) (i) and (ii)
(B) (i) and (iii)
(C) (ii) and (iii)
(D) (i), (ii) and (iii)

26. Which of the following play(s) an important role in the hydrological cycle?

(i) Sun

(ii) Coriolis force

(A) Only (i)
(B) Only (ii)
(C) Both (i) and (ii)
(D) Neither (i) nor (ii)

27. Which of the following statement(s) is/are true regarding Relative Humidity?

(i) The amount of moisture present in air when expressed as mass per unit volume is known as relative humidity.

(ii) It gives an idea of the extent to which air is saturated.

(A) Only (i)
(B) Only (ii)
(C) Both (i) and (ii)
(D) Neither (i) nor (ii)

28. Which of the following are rain bearing clouds?

(A) Cumulonimbus clouds
(B) Cirrus clouds
(C) Alto-stratus clouds
(D) Stratus clouds

29. Which of the following statement(s) is/are true?

(i) The probable maximum precipitation is defined as the maximum depth of precipitation for a given duration that may possibly occur on a given catchment at any time of the year.

(ii) Such precipitation would result from the possible severest storm that may result from the worst possible combination of hydrological and meteorological conditions in that area.

(A) Only (i)
(B) Only (ii)
(C) Both (i) and (ii)
(D) Neither (i) nor (ii)

30. Runoff hydrograph for a river constitutes of

(i) surface runoff

(ii) base flow

(A) Only (i)
(B) Only (ii)
(C) Both (i) and (ii)
(D) Neither (i) nor (ii)

31. Bowen Ratio is the ratio of _____

(A) Sensible heat flux to Latent heat flux
(B) Latent heat flux to Sensible heat flux
(C) Absorbed Solar radiation to Reflected Solar radiation
(D) Conductive heat transfer to Convective heat transfer

32. Langley is the unit of measurement for

(A) permeability
(B) solar radiation
(C) infiltration
(D) thickness of cloud

33. A vegetated farmland area would likely have a Bowen Ratio

(A) Close to zero (e.g., 0.1 – 0.3)

(B) Around 1.0

(C) Greater than 5.0

(D) Negative during daytime

34. Which of the following instruments can measure relative humidity?

(i) Thermograph

(ii) Hydrograph

(iii) Thermohydrograph

(A) Only (i)

(B) (i) and (ii)

(C) (ii) and (iii)

(D) (i), (ii) and (iii)

35. Vadose zone is

(i) the zone between the ground surface and the water table.

(ii) called the zone of aeration.

(A) Only (i)

(B) Only (ii)

(C) Both (i) and (ii)

(D) Neither (i) nor (ii)

36. Unconfined aquifer is also known as

(i) Free aquifer

(ii) Phreatic aquifer

(iii) Nonartesian aquifer

(A) Only (i)

(B) (i) and (ii)

(C) (ii) and (iii)

(D) (i), (ii) and (iii)

37. Through which natural passage, ground water can move to ground surface and produce spring?

(i) faults

(ii) sinkholes

(A) Only (i)

(B) Only (ii)

(C) Both (i) and (ii)

(D) Neither (i) nor (ii)

38. _____ is a saturated geological formation which is poorly permeable and hence does not yield water freely to wells.

(A) Aquiclude

(B) Aquitard

(C) Aquifuge

(D) Leaky aquifer

39. The quantity of water stored by an aquifer and the quantity of water released by it depends on the nature and composition of the aquifer which are quantified through which of the following parameters?

(i) porosity

(ii) specific yield

(iii) storage coefficient

(iv) permeability

(v) transmissivity

(A) (i), (ii) and (v)
(B) (ii) and (iv)
(C) (i), (ii) and (iii)
(D) (i), (ii), (iii), (iv) and (v)

40. Which of the following statement(s) is/are true?

(i) The safe yield of a groundwater basin is defined as the amount of water which can be withdrawn from it annually without producing any undesirable effect.

(ii) Any withdrawal in excess of the safe yield is called critical yield.

(A) Only (i)
(B) Only (ii)
(C) Both (i) and (ii)
(D) Neither (i) nor (ii)

41. In a completely dry atmosphere, which would be the third-most abundant gas present?

(A) Argon
(B) Carbon dioxide
(C) Methane
(D) Nitrous oxide

42. What is the upper limit of the contribution of water vapour to the composition of atmosphere?

(A) 2%
(B) 4%
(C) 8%
(D) 10%

43. Why does temperature increase with height in the stratosphere?

(A) Absorption of solar radiation by carbon dioxide

(B) Heat released during ozone formation

(C) Compression of air molecules at higher altitudes

(D) Reflection of sunlight by clouds

44. Which of the following statement(s) is/are true?

(i) Ozone can be destroyed through various chemical reactions with free radicals like hydroxyl (OH), nitric oxide (NO), chlorine (Cl) and bromine (Br) atoms.

(ii) The formation and destruction of ozone in the stratosphere is often described by the Chapman cycle.

(A) Only (i)
(B) Only (ii)
(C) Both (i) and (ii)
(D) Neither (i) nor (ii)

45. The hydroxyl radical (OH·) is often called the "detergent of the atmosphere" because it

(A) Reflects sunlight back into space and increases the vertical movement of air

(B) Breaks down pollutants like methane and ozone

(C) Increases cloud formation

(D) Increases precipitation

46. How is wind frequency typically shown in a wind rose?

(A) By the color of the segments

(B) By the length of the spokes

(C) By the number of spokes

(D) By the thickness of the circles

47. Which of the following is/are affected by the change in temperature?

(i) Relative Humidity

(ii) Absolute Humidity

(iii) Specific Humidity

(A) Only (i)

(B) (i) and (ii)

(C) Only (iii)

(D) (i), (ii) and (iii)

48. Which of the following statement(s) is/are true regarding Dew Point?

(i) It is the temperature the air needs to be cooled (at constant pressure) in order to produce a relative humidity of 100%

(ii) The more moisture the air contains, the higher its dew point.

(A) Only (i)

(B) Only (ii)

(C) Both (i) and (ii)

(D) Neither (i) nor (ii)

49. Which of the following statement(s) is/are true regarding Wet Bulb Temperature?

(i) It is defined as the temperature of a parcel of air cooled to saturation (100% relative humidity) by the evaporation of water into it with the latent heat supplied by the parcel.

(ii) It is the highest temperature that can be reached under current ambient conditions by the evaporation of water only.

(A) Only (i)

(B) Only (ii)

(C) Both (i) and (ii)

(D) Neither (i) nor (ii)

50. Wet Bulb Globe Temperature considers which of the following parameters?

(i) temperature

(ii) humidity

(iii) wind speed

(iv) sunlight

(A) (i) and (ii)

(B) (i) and (iii)

(C) (i), (ii) and (iv)

(D) (i), (ii), (iii) and (iv)

51. Which of the following statement(s) is/are correct regarding Coal Grading?

(i) The gradation of non-coking coal is based on Gross Calorific Value (GCV).

(ii) The gradation of coking coal is based on ash content.

(A) Only (i)

(B) Only (ii)

(C) Both (i) and (ii)

(D) Neither (i) nor (ii)

52. What does the octane rating of petrol indicate?

(A) The energy content per liter of fuel

(B) The fuel's resistance to premature combustion

(C) The purity of petrol

(D) The viscosity of petrol

53. What is the primary difference between regular and premium petrol?

(A) Premium petrol has a higher octane rating.

(B) Premium petrol contains more detergents.

(C) Premium petrol has lower sulfur content.

(D) Premium petrol is more refined.

54. At what temperature is Liquefied Natural Gas (LNG) used for transportation?

(A) – 273.15°C

(B) – 162°C

(C) – 50°C

(D) 0°C

55. Why is mercaptan added to natural gas?

(i) To detect leaks through odour

(ii) To prevent pipeline corrosion

(iii) To increase energy content

(A) Only (i)

(B) (i) and (ii)

(C) (ii) and (iii)

(D) (i), (ii) and (iii)

56. Which of the following applications of green hydrogen are correct?

(i) Direct use as fuel in internal combustion engines

(ii) Blending with natural gas for power generation

(iii) Use in hydrogen fuel cells for vehicles

(A) Only (i)
(B) (i) and (ii)
(C) (ii) and (iii)
(D) (i), (ii) and (iii)

57. Wind power is the generation of electricity from wind. If wind speed doubles, then the power output will increase by

(A) 2 times
(B) 4 times
(C) 6 times
(D) 8 times

58. Which of the statement(s) is/are true for wind power?

(i) Power output is related to the local air density which is a function of altitude, pressure and temperature.

(ii) Dense air exerts more pressure on the rotors which reduces the power output.

(A) Only (i)
(B) Only (ii)
(C) Both (i) and (ii)
(D) Neither (i) nor (ii)

59. Which working fluid is commonly used in a closed-cycle Ocean Thermal Energy Conversion system?

(A) Freshwater
(B) Ammonia
(C) Salt water
(D) Carbon dioxide

60. Hydropower projects are classified as large and small hydro projects based on their sizes. Different countries have different size criteria to classify Small Hydropower projects. In India, Hydropower plants with capacity of _____ or below are classified as Small Hydro.

(A) 5 MW
(B) 10 MW
(C) 25 MW
(D) 50 MW

61. Under Indian regulations, which of the following criteria would classify a waste as hazardous?

(i) The waste is listed as a specific hazardous waste in the rules (e.g. Schedule I listing).

(ii) The waste exceeds certain concentration limits of toxic constituents in leachate or total content.

(iii) The waste exhibits hazardous characteristics like flammability, toxicity, reactivity etc.

(A) Only (i)
(B) Only (ii)
(C) Only (i) and (ii)
(D) (i), (ii) and (iii)

62. Under Indian hazardous waste regulations, a generator is permitted to store hazardous waste onsite for a standard period without special permission. However, when special conditions exist, such as for small quantity generators or for facilities located in remote areas, a generator may be granted an extension by the regulatory authority. What is the maximum number of days that hazardous waste may be stored onsite if such an extension is approved?

(A) 30 days
(B) 90 days
(C) 180 days
(D) 365 days

63. In hazardous waste management, the manifest system is a critical tool. Which of the following statements are true regarding manifest?

(i) Manifest is a shipping document that travels with hazardous waste from the point of generation, through transportation to the final treatment, storage and disposal facility (TSDF).

(ii) It is necessary that each party in the chain of custody including the generator, signs and keeps a copy of the manifest for tracking purposes.

(A) Only (i)
(B) Only (ii)
(C) Both (i) and (ii)
(D) Neither (i) nor (ii)

64. An electroplating unit generates wastewater high in toxic hexavalent chromium (Cr^{6+}), What is the most appropriate treatment strategy for this hazardous waste stream?

(A) Utilize ultrafiltration membranes to separate Cr^{6+} without any chemical modification.

(B) Chemically reduce Cr^{6+} to Cr^{3+} using a reducing agent, then raise the pH to precipitate chromium hydroxide.

(C) Apply biological treatment by introducing specialized microorganisms to reduce Cr^{6+} followed by coagulation.

(D) Directly stabilize the wastewater using Portland cement-based solidification without prior chemical reduction.

65. A common Hazardous Waste Treatment, Storage and Disposal Facility (TSDF) typically performs all of the following, except

(i) Stabilization/solidification of certain wastes to render them less leachable.

(ii) Incineration or other treatment of organic hazardous wastes.

(iii) Engaging in advanced recovery processes to reclaim and transform hazardous wastes into commercially viable secondary raw materials for consumer product manufacturing.

(A) Only (i)
(B) (i) and (ii)
(C) Only (iii)
(D) (i), (ii) and (iii)

66. According to the regulatory guidelines for hazardous waste incineration, which of the following statements accurately describes the design and operating conditions for the secondary combustion chamber?

(i) The chamber must achieve a minimum temperature of 1100°C with a gas residence time of at least 2 seconds, determined by averaging the readings from three detectors positioned within the chamber.

(ii) Provided that continuous monitoring over a two-week period under critical feed conditions consistently demonstrates compliance, the State Pollution Control Board may recommend a relaxation of the operating parameters. Such relaxation allows the temperature to drop below 950°C or the gas residence time to fall below 1.5 seconds.

(A) Only (i)

(B) Only (ii)

(C) Both (i) and (ii)

(D) Neither (i) nor (ii)

67. Which of the following best describes the principle of thermal desorption as compared to incineration for hazardous waste treatment?

(A) Thermal desorption achieves complete oxidation of hazardous constituents by heating waste in an oxygen-rich environment leaving only inert ash.

(B) Thermal desorption volatilizes hazardous compounds at relatively low temperatures without complete combustion; the volatiles are then collected for secondary treatment.

(C) Thermal desorption employs catalytic biological reactions instead of relying on thermal energy to break down organic contaminants.

(D) Thermal desorption first precools the waste using cryogenic techniques before slowly heating it to selectively release volatile contaminants.

68. Under Indian Hazardous Waste Management Rules, a waste is considered corrosive if

(i) it is aqueous and has a pH less than or equal to 2 or greater than or equal to 12.5.

(ii) a liquid waste that corrodes steel (SAE 1020) at a rate greater than 6.35 mm per year at 55°C.

(A) Only (i)

(B) Only (ii)

(C) Both (i) and (ii)

(D) Neither (i) nor (ii)

69. Which of the following statement(s) is/are true regarding the biological process for the hazardous waste treatment?

(i) the presence of metals like cadmium or lead typically inhibits microbial activity.

(ii) pretreatment or removal of these metals is necessary to ensure effective biological treatment.

(A) Only (i)

(B) Only (ii)

(C) Both (i) and (ii)

(D) Neither (i) nor (ii)

70. An electroplating industry generates sludge from its effluent treatment plant that contains high levels of zinc and iron. According to Indian regulations, how should this sludge be managed?

(i) The sludge should be classified as hazardous waste due to its high metal content (zinc and iron).

(ii) The sludge must be disposed of at a designated, authorized disposal facility in accordance with the authorization conditions.

(iii) If feasible, the sludge can be utilized for resource recovery instead of disposal. This could involve extracting metals like zinc and iron for reuse or other industrial applications.

(A) Only (i)
(B) (i) and (ii)
(C) (ii) and (iii)
(D) (i), (ii) and (iii)

71. Which of the following factor(s) support the utilization of sewage sludge for land application instead of incinerating it or sending it to a TSDF?

(i) Treated sewage sludge contains valuable nutrients (like nitrogen and phosphorus) that can improve soil fertility if contaminants are within safe limits.

(ii) Sewage sludge will never contain any toxic substances, so it's always safe to use it on crops without restrictions.

(iii) Indian regulations mandate that all sewage sludge must be used as fertilizer.

(A) Only (i)
(B) (i) and (ii)
(C) (ii) and (iii)
(D) (i), (ii) and (iii)

72. The Bio-Medical Waste Management Rules 2016 (including later amendments) called for the phase-out of certain materials in healthcare to reduce toxin release upon incineration. Which material was targeted to be phased out within two years of the rule's notification?

(A) Glass syringes to be replaced with polymer-based alternatives due to fragility concerns.

(B) Stainless steel surgical instruments, aiming to switch to less corrosion-prone alloys to reduce toxic emissions if incinerated.

(C) Chemically-bleached paper packaging for medicines, to minimize chlorine-based emissions during disposal.

(D) Chlorinated plastic bags, gloves and blood bags for handling biomedical waste.

73. The e-Waste (Management) Rules 2022 have significantly broadened the scope of what is classified as 'e-waste.' Which of the following items, which was not clearly covered in earlier regulatory frameworks, is now included as e-waste under these updated rules?

(i) End-of-life solar photovoltaic panels/modules.

(ii) Used lead-acid batteries from vehicles.

(A) Only (i)
(B) Only (ii)
(C) Both (i) and (ii)
(D) Neither (i) nor (ii)

74. Which of the following biomedical wastes is excluded from the scope of the Biomedical Waste Management Rules 2016?

(A) Radioactive waste from oncology departments.

(B) Human anatomical waste from surgery.

(C) Microbiological laboratory waste.

(D) Discarded sharps (needles, scalpel blades).

75. Which of the following batteries is not considered in the Battery Waste Management Rules, 2022?

(i) rechargeable lithium batteries (ii) single-use batteries

(A) Only (i) (B) Only (ii)

(C) Both (i) and (ii) (D) Neither (i) nor (ii)

76. The base of the liner system of a landfill shall be at least _____ above the highest anticipated ground water table level.

(A) 1 m (B) 2 m

(C) 3 m (D) 4 m

77. What is the permissible emission limit for dioxins and furans from hazardous waste incinerators in India?

(A) 1.0 ng TEQ/Nm³ (B) 0.5 ng TEQ/Nm³

(C) 0.1 ng TEQ/Nm³ (D) 0.05 ng TEQ/Nm³

78. CPCB guidelines require that leachate from a hazardous waste landfill must be tested regularly for multiple pollutants. Which of these parameters is generally not considered a standard leachate monitoring parameter?

(A) pH (B) Chemical Oxygen Demand (COD)

(C) Total hardness (D) Heavy metals

79. According to CPCB's recommended design criteria for hazardous waste landfills, what is the minimum recommended thickness for the top clay/soil cover over the final-capped landfill?

(A) 150 mm (B) 250 mm

(C) 600 mm (D) 1,500 mm

80. The Biomedical Waste Management Rules, 2016 restricts Health Care Facilities (HCFs) from establishing onsite or captive treatment facilities if a Common Bio-medical Waste Treatment Facility (CBWTF) is available within a distance of

(A) 50 km (B) 75 km

(C) 100 km (D) 150 km

81. CPCB guidance on 'co-incineration' (e.g., in cement kilns) requires specific pre-processing of hazardous waste. What is the main purpose of pre-processing?

(A) To reduce the ash content below 0.1%

(B) To make the waste odourless before feeding into the kiln

(C) To ensure that the waste does not contain any chlorine compounds

(D) To ensure uniform consistency and calorific value for optimal kiln operation

82. As per CPCB guidelines, how long should post-closure monitoring of a secured landfill (for hazardous waste) typically continue after final closure?

(A) No monitoring is needed once capping is complete

(B) One post-monsoon season

(C) 5 years

(D) 30 years

83. For Class A type Hazardous Waste, what is the concentration limit for the different waste constituents?

(A) 5 mg/kg

(B) 50 mg/kg

(C) 5,000 mg/kg

(D) 50,000 mg/kg

84. The current Occupational Safety and Health Administration (OSHA), permissible exposure limit (PEL) for carbon monoxide is _____as an 8-hour time-weighted average

(A) 5 ppm

(B) 50 ppm

(C) 100 ppm

(D) 500 ppm

85. As per Solid Waste Management Rules, 2016, which are the duties of Urban Local Bodies (ULBs)?

(i) Frame bye-laws incorporating the provisions of the SWM Rules, 2016

(ii) Promote setting up of decentralised compost plant or biomethanation plant at suitable locations in the markets or in the vicinity of markets ensuring hygienic conditions

(iii) Wrap securely the used sanitary waste like diapers, sanitary pads etc., in the pouches provided by the manufacturers or brand owners of these products or in a suitable wrapping material

(iv) Establish waste deposition centres for wet wastes and give direction for waste generators to deposit such wastes at this centre for its safe disposal

Select the correct option:

(A) Only (i)

(B) (i) and (ii)

(C) (iii) and (iv)

(D) (i), (ii), (iii) and (iv)

86. Under the Solid Waste Management Rules, 2016, which of the following are correctly matched with their corresponding duties or obligations?

(i) Manufacturers or brand owners provide financial assistance to local authorities for the establishment of waste management system

(ii) Urban Local Bodies monitor the compliance of the standards as prescribed or laid down and treatment technology

(iii) State Pollution Control Board or Pollution Control Committee investigates and analyses all old open dumpsites and existing operational dumpsites for their potential of biomining and bioremediation

(iv) Secretary-in-charge, Urban Development will notify buffer zone for the solid waste processing and disposal facilities of more than five tons per day

Select the correct option:

(A) (i) and (ii)
(B) (ii) and (iii)
(C) (iii) and (iv)
(D) (i) and (iv)

87. As per the Solid Waste Management Rules, 2016, which of the following entities shall be classified as Bulk Waste Generators under the rules?

(i) A privately-owned university campus generating 120 kg of municipal solid waste per day

(ii) A local government office building generating 95 kg of waste per day an average

(iii) A hospital generating 110 kg of solid waste daily (excluding biomedical waste)

(iv) A multi-tenant commercial complex generating 150 kg of solid waste per day

(v) A residential apartment complex generating 90 kg of waste daily, occupied by 200 people

Select the correct option:

(A) (i), (iii) and (iv)
(B) (i), (ii) and (v)
(C) (ii), (iii) and (v)
(D) (i), (ii), (iii), (iv) and (v)

88. Evaluate the following statements regarding the "Buffer Zone" as defined under the Solid Waste Management Rules, 2016.

(i) A buffer zone is mandatory around all solid waste processing and disposal facilities, irrespective of their processing capacity.

(ii) The buffer zone must lie within the total area allotted for the solid waste management facility.

(iii) For facilities with installed capacity of more than 5 TPD, a buffer zone is to be demarcated as a no-development area.

iv) Responsibility for identification and notification of the buffer zone lies with the State Pollution Control Board under the rules.

Which of the above statements are correct?

(A) (i), (ii) and (iii) only
(B) (ii) and (iii) only
(C) (i) and (iv) only
(D) All of the above

89. In the municipal solid waste processing, which of the following statement(s) regarding vermicomposting is/are correct?

(i) Vermicomposting is recognized as a method for processing biodegradable waste under the definition of composting in the SWM Rules, 2016.

(ii) Vermicomposting is suitable for handling mixed municipal waste streams with minimal segregation.

(iii) Earthworms used in vermicomposting are sensitive to high temperatures, toxins and heavy metals, which can be present in unsegregated waste.

(iv) Vermicomposting is explicitly promoted in the SWM Rules for decentralized waste management in residential colonies and institutions.

Select the correct option:

(A) Only (i), (iii) and (iv)
(B) Only (ii) and (iv)
(C) Only (i) and (ii)
(D) All of the above

90. As per Solid Waste Management Rules, 2016 and the defined "waste hierarchy", which of the following best reflects the correct prioritization of waste management actions in order of preference?

(A) Landfilling > Energy Recovery > Recycling > Reuse > Reduction > Prevention
(B) Energy Recovery > Reuse > Prevention > Recycling > Reduction > Landfilling
(C) Prevention > Reduction > Reuse > Recycling > Recovery > Disposal
(D) Reuse > Recycling > Reduction > Prevention > Recovery > Landfilling

91. A municipality generates 120 MT/day of municipal solid waste, of which 30% goes to landfill after treatment. If the waste is compacted to a density of 800 kg/m³ in a daily landfill cell of size 10 m × 10 m and a 10 cm daily cover is applied, then what is the total daily height of the landfill (waste + cover)?

(A) 25 cm
(B) 35 cm
(C) 45 cm
(D) 55 cm

92. As per the Plastic Waste Management Rules, 2016 (as amended), which of the following correctly qualify as End-of-Life Disposal of plastic waste?

(i) Use of plastic waste as a feedstock for pyrolysis to generate oil

(ii) Use of plastic waste in cement kiln co-processing

(iii) Disposal the waste plastic in an engineered landfill

(iv) Use of plastic waste in road construction as per Indian Road Congress guidelines

Choose the correct option:

(A) (i) and (ii)
(B) (i), (ii) and (iv)
(C) (ii), (iii) and (iv)
(D) (i), (ii), (iii) and (iv)

93. As per the Solid Waste Management Rules, 2016, which of the following statements regarding waste-to-energy processes is/are correct?

(i) Non-recyclable solid wastes with calorific value < 1500 Kcal/kg should not be sent to landfills.

(ii) Authorization from State Pollution Control Board is not required if the waste-to-energy plant has provisions for air and water pollution prevention.

(iii) Refuse Derived Fuel (RDF) is a preferred option for energy recovery from high calorific value waste.

(iv) Co-processing of high calorific waste is allowed in cement kilns or thermal power plants.

Choose the correct option:

(A) (i), (iii) and (iv)
(B) (i) and (iii)
(C) (iii) and (iv)
(D) (i), (ii), (iii) and (iv)

94. According to the Construction and Demolition Waste Management Rules, 2016, which of the following applications is explicitly mentioned as a potential use for materials derived from processed construction and demolition waste?

(A) As a structural component in load-bearing walls of only up to 50 storied buildings.

(B) For the manufacturing of high-grade cement.

(C) As a drainage layer in the leachate collection system at the bottom of a sanitary landfill.

(D) In the construction of airport runways designed only for light aircraft.

95. According to the Construction and Demolition Waste Management Rules, 2016, which of the following best defines "construction and demolition waste"?

(A) Waste generated solely from the erection of new buildings and infrastructure

(B) The discarded materials originating only from the tearing down of existing structures using mechanical force

(C) The waste comprising of building materials, debris and rubble resulting from construction, remodeling, repair and demolition of any civil structure

(D) Leftover materials such as concrete, soil, steel and wood that are segregated at a construction site for potential reuse

96. According to the Construction and Demolition Waste Management Rules, 2016, which of the following entities is explicitly included in the definition of a "waste generator"?

(A) Any individual who hires a plumber for repairs.

(B) A private contractor undertaking construction of a two-bedroom building.

(C) Indian Railways undertaking the construction of a new railway line.

(D) A local authority that collects and transports construction and demolition waste.

97. Carry bag made of virgin or recycled plastic, shall not be less than _____ microns in thickness according to the Plastic Waste Management (Amendment) Rules, 2021, as of today.

(A) 40 microns
(B) 50 microns
(C) 75 microns
(D) 120 microns

98. According to the Plastic Waste Management (Amendment) Rules, 2021, what is the minimum permissible Grams per Square Meter (GSM) for non-woven plastic carry bags, effective from 30th September 2021?

(A) 50 GSM
(B) 60 GSM
(C) 100 GSM
(D) 120 GSM

99. Which of the following best describes 'Extended Producer's Responsibility' as defined in the Plastic Waste Management Rules?

(A) The responsibility of the local body to manage all plastic waste generated within its jurisdiction.
(B) The shared responsibility between manufacturers, importers and brand owners for minimizing plastic waste generation.
(C) The responsibility of a producer for the environmentally sound management of a product until the end of its life.
(D) The obligation of waste generators to segregate plastic waste at the source

100. According to the Plastic Waste Management (Amendment) Rules, 2021, which of the following constitutes a "Non-woven plastic bag"?

(A) A plastic bag made from a continuously extruded plastic film.
(B) A plastic bag composed of distinct layers of different plastic materials bonded together.
(C) A plastic bag made up of plastic sheet or web-structured fabric of entangled plastic fibers or filaments bonded together by mechanical, thermal or chemical means.
(D) A biodegradable plastic bag designed to decompose naturally in the environment.

101. According to the Plastic Waste Management (Amendment) Rules, 2021, what is the defining characteristic of a "Single-use plastic commodity"?

(A) It is made entirely of biodegradable plastic.
(B) It is intended to be used only once for the same purpose before disposal or recycling.
(C) It is any plastic item with a thickness of less than 50 microns.
(D) It is plastic packaging used for only one product.

102. The overall heat transfer coefficient in a heat exchanger increases with

(A) Increase in wall thickness
(B) Fouling on the surface
(C) Higher fluid velocity
(D) Lower fluid conductivity

103. Which of the following laws is used to determine the rate of evaporation?

(A) Fourier's law
(B) Stefan-Boltzmann law
(C) Dalton's law
(D) Fick's law

104. Stoichiometric calculations are based on the principle of

(A) Energy balance
(B) Material balance
(C) Chemical equilibrium
(D) Chemical kinetics

105. The critical thickness of insulation for a sphere depends on its

(i) Radius
(ii) Thermal conductivity
(iii) Convective heat transfer coefficient

(A) Only (i)
(B) (i) and (ii)
(C) (ii) and (iii)
(D) (i), (ii) and (iii)

106. A double pipe heat exchanger is primarily used for

(A) High temperature operations
(B) Low flow rates
(C) Corrosive fluids
(D) High pressure drops

107. In evaporation, the boiling point elevation is caused by

(A) Heat loss
(B) Vapor pressure reduction
(C) Solute presence
(D) Low pressure

108. Steam distillation is particularly useful for substances that

(A) are soluble in water
(B) are thermally stable
(C) have high boiling point and are water-insoluble
(D) are highly volatile

109. The main purpose of a reflux in fractional distillation is to

(A) Increase pressure
(B) Improve separation
(C) Decrease temperature
(D) Dilute the mixture

110. The rate of mass transfer is directly proportional to

(A) Molecular weight
(B) Surface area
(C) Pressure drop
(D) Temperature only

111. In adsorption, the breakthrough curve represents

(A) Temperature vs time
(B) Pressure vs time
(C) Adsorbate concentration vs time at the outlet
(D) Solvent concentration vs pressure

112. Stripping is a mass transfer operation where

(i) Solute is removed from liquid
(ii) Solvent is removed
(iii) Gas is condensed

(A) Only (i)
(B) (i) and (ii)
(C) (ii) and (iii)
(D) (i), (ii) and (iii)

113. The efficiency of a distillation column increases with

(A) Increasing the diameter
(B) Decreasing the number of trays
(C) Higher reflux ratio
(D) Using packed column only

114. Drying rate during the falling rate period is controlled by

(A) Heat transfer
(B) Mass transfer
(C) Air velocity
(D) Temperature only

115. In batch distillation, the composition of the distillate

(A) Remains constant
(B) Changes with time
(C) Is always the same
(D) Depends on condenser

116. Steam recovery in absorption can be improved by

(A) Using chilled water
(B) Using high pressure
(C) Reboiling
(D) Multistage systems

117. The slope of the operating line in absorption is determined by

(A) Flow rates
(B) Pressure
(C) Temperature
(D) Molecular weight

118. A heat exchanger has hot and cold streams. If the hot stream enters at 150°C and exits at 100°C and the cold stream enters at 30°C, then what can you expect for the temperature of the cold stream at the outlet under ideal conditions (100% efficiency)?

(A) 65°C
(B) 70°C
(C) 80°C
(D) 100°C

119. In a distillation column, if the feed consists of 50% component A and 50% component B and the distillate consists of 70% A, then what is the most likely effect of increasing the reflux ratio on the purity of the distillate?

(A) It will increase
(B) It will decrease
(C) It will remain the same
(D) It will first increase, then decrease

120. In a drying process, if the material starts with 40% moisture content (wet basis) and ends with 10% moisture content, then what is the general trend in moisture removal during the constant-rate period?

(A) Moisture removal is slow and steady
(B) Moisture removal is rapid at first, then decreases
(C) Moisture removal remains constant throughout
(D) No moisture is removed in the constant-rate period

121. In a countercurrent heat exchanger, if the hot fluid enters at a higher temperature than the cold fluid, then what is the general relationship between the temperatures of the two fluids at the exit?

(A) The temperature difference between the fluids decreases
(B) The temperature of the cold fluid will always be higher than the hot fluid
(C) The fluids reach thermal equilibrium
(D) The temperature difference between the fluids increases

122. In a mass transfer operation, if the concentration of the solute in the feed is 0.4 mol/L and the equilibrium concentration in the solvent is 0.1 mol/L, then what is the likely effect of increasing the flow rate of the solvent?

(A) The solute will be transferred more efficiently
(B) The solute transfer will slow down
(C) The solute concentration in the gas phase will increase
(D) The solute concentration in the feed will increase

123. If the initial moisture content of a drying material is 50% (wet basis) and the final moisture content is 20%, then what can be inferred about the drying rate in the falling-rate period?

(A) The drying rate remains constant

(B) The drying rate decreases over time

(C) The drying rate increases over time

(D) The drying rate is constant until the material reaches equilibrium

124. In a batch crystallization process, if the solute concentration in the feed is 50% and the final concentration after crystallization is 20%, then how would you describe the overall crystallization efficiency?

(A) very high (B) high

(C) moderate (D) low

125. In a continuous evaporation process, a liquid is evaporated at a rate of 5 kg/h. The initial moisture content is 30% and the equilibrium moisture content is 10%. What is the rate at which the moisture is removed from the liquid?

(A) 1 kg/h (B) 2 kg/h

(C) 3 kg/h (D) 4 kg/h

126. During a mass balance calculation on a continuous reactor, the feed rate is 100 kg/h and the output rate is 120 kg/h. If the accumulation term is zero, then what is the rate of reaction in the reactor?

(A) 10 kg/h (B) 20 kg/h

(C) 100 kg/h (D) 120 kg/h

127. In a distillation column, the overhead product consists of 40% A and 60% B, while the bottom product consists of 90% A and 10% B. The feed flow rate is 200 kg/h. What is the mass flow rate of A in the overhead product?

(A) 40 kg/h (B) 50 kg/h

(C) 60 kg/h (D) 80 kg/h

128. In a crystallization process, the solute concentration in the feed solution is 30%. After crystallization, the solute concentration decreases to 10%. If 1000 kg of feed is processed, then how much solute is removed from the solution?

(A) 200 kg (B) 300 kg

(C) 400 kg (D) 500 kg

129. In a packed bed absorption column, the inlet gas flow rate is 500 Nm^3/h and the solute concentration in the gas stream is 0.05 mol/m^3. The solvent flow rate is 1000 kg/h and the solute concentration in the liquid solvent is 0.02 mol/kg. What is the overall mass transfer efficiency?

(A) 10% (B) 20%

(C) 40% (D) 60%

130. A reactor operates at steady-state conditions. The input of a reactant is 200 mol/h and the output is 150 mol/h. What is the rate of conversion of the reactant in the reactor?

(A) 10%
(B) 25%
(C) 50%
(D) 75%

131. A batch distillation process separates two components, A and B. The feed composition is 60% A and 40% B. If the distillation column operates with a reflux ratio of 2, then how will the purity of the distillate change as the reflux ratio is increased?

(A) Purity decreases
(B) Purity increases
(C) Purity remains unchanged
(D) Purity first increases, then decreases

132. Which of the following statement(s) is/are true for Biosparging?

(i) It is a remediation technique that uses air or oxygen to clean up contaminated soil and groundwater.
(ii) This process increases oxygen levels in the groundwater which speed up the rate at which bacteria break down the contaminants.

(A) Only (i)
(B) Only (ii)
(C) Both (i) and (ii)
(D) Neither (i) nor (ii)

133. Mycoremediation is a form of bioremediation that utilizes _____to clean up contaminated environments.

(A) Protozoa
(B) Bacteria
(C) Fungi
(D) Algae

134. Which of the following is a type ex-site bioremediation?

(A) Composting
(B) Biostimulation
(C) Bioaugmentation
(D) Bioventing

135. Name the scientist who coined the term 'Ecology'.

(A) Eugene Odum
(B) Alexander von Humboldt
(C) Ernst Haeckel
(D) Arthur Tansley

136. Which of the following statement(s) is/are true for K-selected species in population ecology?

(i) They are those adapted to stable environments where competition for resources is high and their populations tend to be near the carrying capacity (K) of their habitat.
(ii) They are characterized by slower growth rates, delayed reproduction, low reproductive output and significant parental care, leading to higher survival rates of their offspring.

(A) Only (i)
(B) Only (ii)
(C) Both (i) and (ii)
(D) Neither (i) nor (ii)

137. Which of the following regions in India is not a biodiversity hotspot?

(A) Western Ghats
(B) Himalayas
(C) Malabar Hills
(D) Indo-Burman region

138. Match the following Biosphere Reserves in India with their location (state).

No.	Biosphere Reserves	No.	State
(i)	Nokrek	a	Arunachal Pradesh
(ii)	Manas	b	Andhra Pradesh
(iii)	Dehang-Dibang	c	Meghalaya
(iv)	Seshachalam	d	Assam

(A) i – c, ii – d, iii – a, iv – b
(B) i – c, ii – a, iii – d, iv – b
(C) i – b, ii – d, iii – a, iv – c
(D) i – c, ii – b, iii – a, iv –d

139. Which of the following factors can delay or prevent Eutrophication?

(A) Increasing pH
(B) Increasing sunlight
(C) increasing phosphorus content
(D) None of these

140. Which of the following plants can be used as biocontrols for Eutrophication?

(A) Eischhornia Crassipes
(B) Eugemia Caryophyllata
(C) Euphorbia Hirta
(D) Echium Pininan

141. The disappearance of lichens from a region is an indicator of

(A) high levels of SO_2 in the ambient air
(B) high levels of NO_2 in the ambient air
(C) high levels of heavy metals in soil
(D) increase in the soil pH

142. The weightage of Biological Oxygen Demand (BOD) and Fecal Coliform (FC) for estimating the Total severity score (Z) for categorizing the river stretch (Category I - V) based on the intensity of pollution is

(A) BOD : 70%, FC : 30%
(B) BOD : 60%, FC : 40%
(C) BOD : 50%, FC : 50%
(D) BOD : 30%, FC : 70%

143. If the Total severity score (Z) of the water in a river stretch estimated by considering the BOD and Fecal Coliform is 45, then it will be classified as

(A) critically-polluted
(B) severely-polluted
(C) moderately-polluted
(D) less polluted

144. An aeration basin with a volume of 600 m^3 contains mixed liquor with suspended solid concentration of 1000 mg/L. The amount of mixed liquor suspended solids in the tank is

(A) 500 kg
(B) 250 kg
(C) 600 kg
(D) 400 kg

145. If the population of a city is 2 lakh and average water consumption is 200 lpcd, then the capacity of the Sewage Treatment Plant should be

(A) 108 MLD
(B) 72 MLD
(C) 60 MLD
(D) 40 MLD

146. Electrical conductivity (EC) of water and Total Dissolved Solids (TDS) are interrelated. The EC will

(A) decrease with the increase in the TDS
(B) increase with the increase in the TDS
(C) decrease initially and then increase with the increase in the TDS
(D) increase initially and then decrease with the increase in the TDS.

147. Zero hardness of water is achieved by

(A) using lime soda process
(B) excess lime treatment
(C) ion exchange method
(D) using excess alum dosage

148. Which one of the following filters should be recommended for the water supply project in rural areas?

(A) Pressure filter
(B) Slow sand filter
(C) Diatomaceous filter
(D) Rapid sand filter

149. Which one of the following is not a specific criterion for calculating surface overflow rate in sedimentation tank design?

(A) Total quantity of water to be treated
(B) Total surface area available in the tank
(C) Total length of the tank
(D) Total depth of the tank

150. Chlorides from water can be removed by

(i) Reverse osmosis

(ii) Distillation

(iii) Chemical coagulation

(A) Only (i)
(B) (i) and (ii)
(C) (ii) and (iii)
(D) (i), (ii) and (iii)

151. For water supply to a medium town, what is the daily variation factor?

(A) 1.5
(B) 1.8
(C) 2.5
(D) 2.7

152. For estimating the concentration of _____ in wastewater, Ferroin indicator is used.

(A) Chemical oxygen demand
(B) Ammoniacal nitrogen
(C) Nitrate nitrogen
(D) Phenols

153. The acceptable limit of which of the following parameters in drinking water is above 100 mg/lit?

(i) Total Hardness

(ii) Chloride

(iii) Sulphate

(iv) Nitrate

(A) (i) and (ii)
(B) (ii) and (iii)
(C) (i), (ii) and (iii)
(D) (i), (ii), (iii) and (iv)

154. Which of the following is an example of organic pollutant?

(A) Detergents
(B) Heavy metals
(C) Nitrates
(D) Phosphates

155. Heavy metals such as lead and mercury in water, primarily affect

(A) Cardiovascular system
(B) Nervous system
(C) Digestive system
(D) Skeletal system

156. Which of the following bacteria is commonly used as an indicator of fecal contamination in water?

(A) Salmonella

(B) Escherichia Coli

(C) Clostridium

(D) Vibrio cholerae

157. The F/M ratio (Food to Microorganism) in an activated sludge process influences

(A) Sedimentation tank design

(B) Oxygen transfer efficiency

(C) Sludge age and microbial population dynamics

(D) Inorganic solids concentration

158. In wastewater microbiology, the term "endogenous respiration" refers to

(A) Oxygen consumption by influent solids

(B) Death and decay of microbial biomass under low food conditions

(C) Respiration by plant roots in constructed wetlands

(D) Sulfate reduction under anaerobic conditions

159. Which unit process is responsible for breaking down macromolecular substances under anaerobic conditions?

(A) Methanogenesis

(B) Hydrolysis

(C) Acidogenesis

(D) Acetogenesis

160. The removal of color and refractory organics in wastewater is achieved by

(A) Extended aeration

(B) Advanced oxidation processes (AOPs)

(C) Activated carbon adsorption

(D) Lime softening

161. In wastewater treatment, which parameter is the most associated with color and odor issues?

(A) BOD

(B) Sulfides

(C) Phenols

(D) Nitrates

162. Sludge bulking in secondary clarifiers can be controlled chemically by

(A) Sodium hydroxide

(B) Alum

(C) Ferric chloride

(D) Hydrogen peroxide

163. In biological nutrient removal, denitrification occurs under

(A) Aerobic conditions

(B) Anoxic conditions

(C) Anaerobic conditions

(D) Oxidative-reductive zones

164. UV disinfection is ineffective when

(A) TDS < 500 mg/L
(B) Turbidity > 5 NTU
(C) COD < 50 mg/L
(D) DO > 4 mg/L

165. The Monod equation is used to model

(A) Adsorption of pollutants
(B) Chemical oxidation reactions
(C) Microbial growth kinetics
(D) Oxygen transfer in packed towers

166. Permissible oil and grease level for inland wastewater disposal is

(A) 5 mg/L
(B) 10 mg/L
(C) 20 mg/L
(D) 30 mg/L

167. Who is authorized for granting 'Consent to Establish' and 'Consent to Operate' under the Water Act?

(A) Central Pollution Control Board
(B) National Green Tribunal
(C) State Pollution Control Board
(D) Ministry of Environment, Forest and Climate Change

168. In spray drying, the feed is generally

(A) Solid
(B) Dilute solution
(C) Slurry or concentrated liquid
(D) Gas

169. The permissible limit of Nickel in drinking water as per BIS (IS 10500:2012) is

(A) 0.02 mg/L
(B) 0.05 mg/L
(C) 0.2 mg/L
(D) 0.5 mg/L

170. For which of these elements, the permissible concentration in drinking water is less than 1.0 mg/lit?

(i) Copper
(ii) Selenium
(iii) Iron
(iv) Zinc

(A) (i) and (ii)
(B) (ii) and (iii)
(C) (i), (ii) and (iii)
(D) (i), (ii), (iii) and (iv)

171. High levels of ammonia in wastewater indicate

(A) Presence of nitrates

(B) Anaerobic decomposition of nitrogenous matter

(C) Aerobic activity

(D) Low BOD

172. Freundlich isotherm is more applicable to

(A) Monolayer adsorption

(B) Multilayer heterogeneous surfaces

(C) Ionic exchange

(D) Gaseous diffusion

173. Which of the following statement(s) is/are true regarding the ambient air quality?

(i) 24 hourly or 8 hourly or 1 hourly monitored values, as applicable, shall be complied with 90% of the time in a year.

(ii) 10% of the time, they may exceed the limits but not on two consecutive days of monitoring.

(A) Only (i)

(B) Only (ii)

(C) Both (i) and (ii)

(D) Neither (i) nor (ii)

174. Which of the following statement(s) is/are true regarding the ambient air quality standards?

(i) 24 hours averaged concentration for SO_2 in residential areas is 80 $\mu g/m^3$

(ii) Annual averaged concentration for PM2.5 in ecological sensitive years is 40 $\mu g/m^3$

(A) Only (i)

(B) Only (ii)

(C) Both (i) and (ii)

(D) Neither (i) nor (ii)

175. In a Gaussian Plume Model, what is the unit of σ_y which is the standard deviation of the plume concentration in the horizontal direction?

(A) $\mu g/m^3$

(B) m/sec

(C) m

(D) it is unitless

176. Which of the following detail(s) is/are needed for air quality modelling for a point source?

(i) internal diameter of the chimney at the top

(ii) height of the chimney from the ground level

(A) Only (i)

(B) Only (ii)

(C) Both (i) and (ii)

(D) Neither (i) nor (ii)

177. If the temperature gradient is – 2°C/100 m, then the appropriate Pasquill Stability class would be

(A) A

(B) B

(C) C

(D) D

178. Which of the following statement(s) is/are true regarding Mixing Height?

(i) It is the height above ground level where pollutants or other substances are dispersed vertically

(ii) A higher mixing height can lead to pollutants accumulating near the surface, resulting in poor air quality

(A) Only (i)
(B) Only (ii)
(C) Both (i) and (ii)
(D) Neither (i) nor (ii)

179. Which of the following statement(s) is/are true regarding the measurement of Respirable Suspended Particulate Matter (PM_{10}) using cyclonic flow technique?

(i) Air is drawn through a size-selective inlet and through a 20.3 cm $\times$ 25.4 cm filter

(ii) The flow rate of the air is kept around 1,000 lit/min.

(A) Only (i)
(B) Only (ii)
(C) Both (i) and (ii)
(D) Neither (i) nor (ii)

180. Which of the following statement(s) is/are true?

(i) Odour Detection Threshold (ODT) is defined as the most minimal concentration of a substance that can be detected by a human nose

(ii) ODT of H_2S is around 0.00047 ppm

(A) Only (i)
(B) Only (ii)
(C) Both (i) and (ii)
(D) Neither (i) nor (ii)

181. Which of the following is the worst plume behavior in terms of air quality at ground level?

(A) Coning
(B) Fanning
(C) Lofting
(D) Fumigation

182. What is/are the reason(s) for IsoKinetic sampling in stack emission monitoring?

(i) To ensure uniform gas temperature during sampling

(ii) To match the sampling velocity with the stack gas velocity

(A) Only (i)
(B) Only (ii)
(C) Both (i) and (ii)
(D) Neither (i) nor (ii)

183. Which of the following is/are the limitation(s) of the air pollution control device 'cyclone collector'?

(i) High maintenance cost because of large number of moving parts

(ii) Low collection efficiency for particles below 5 μ in diameter

(A) Only (i)
(B) Only (ii)
(C) Both (i) and (ii)
(D) Neither (i) nor (ii)

184. Bag filter which is used as an air pollution control device can be cleaned by which of the following methods?

(i) Rapping

(ii) Reverse air flow

(A) Only (i)
(B) Only (ii)
(C) Both (i) and (ii)
(D) Neither (i) nor (ii)

185. In an electrostatic precipitator, what is the optimal range of the gas velocity?

(A) 0.5 – 1.0 m/s
(B) 1.5 – 1.8 m/s
(C) 10 – 13 m/s
(D) 100 – 120 m/s

186. Which of the following statement(s) is/are true regarding Electrostatic Precipitator (ESP)?

(i) Specific Collection Area (SCA) refers to the ratio of the total collection plate area to the volumetric flow rate of gas passing through the precipitator.

(ii) It's a crucial parameter in ESP design as it directly impacts the efficiency of particulate matter collection.

(A) Only (i)
(B) Only (ii)
(C) Both (i) and (ii)
(D) Neither (i) nor (ii)

187. As per Central Pollution Control Board, the minimum stack height for plants which is having the emission of SO_2 is given by the equation $H = 14 (Q)^{0.3}$, where H is the height of the stack (m) and Q is the emission rate of SO_2. What is the unit of Q?

(A) Kg/hr
(B) Ton/day
(C) Ton/hr
(D) Gram/sec

188. For which of the pollutants, the permissible limits for 24-hourly averaged concentration is explicitly mentioned in the National Ambient Air Quality Standards 2009?

(i) $PM_{2.5}$

(ii) Ammonia

(iii) Carbon monoxide

(iv) Ozone

(A) Only (i)
(B) (i) and (ii)
(C) (i) and (iii)
(D) (i), (ii), (iii) and (iv)

189. Which of the following statement(s) is/are true regarding The National Clean Action Programme (NCAP)?

(i) The NCAP launched in 2019, set a target of reducing $PM_{2.5}$ and PM_{10} by 20-30% in 131 cities by 2024, using 2017 as the base year

(ii) This target was later revised to a 40% reduction or achieving National Ambient Air Quality Standards (NAAQS) for PM concentrations by 2025-26

(A) Only (i)
(B) Only (ii)
(C) Both (i) and (ii)
(D) Neither (i) nor (ii)

190. Air pollution has long known to have adverse effect on plants. Damage to leaves takes several forms. In this context, Necrosis refers to

(A) the localized death of plant tissue, often appearing as brown or black spots or areas on the leaves

(B) loss or reduction of the green pigment, chlorophyll

(C) dropping of leaves

(D) downward curvature of the leaf due to higher rate of growth on the upper surface

191. In the Gaussian dispersion equation used for estimating the concentration of an air pollutant due to a point source, the input parameter 'u' is the wind speed at

(A) the height of the stack

(B) 2 m above the ground at the source

(C) 10 m above the ground at the source

(D) 10 m above the ground at the receptor location

192. Ambient Air Sampling for gases can be done by which of the following?

(i) Absorbers

(ii) Adsorbers

(iii) Condensers

(A) Only (i)
(B) (i) and (ii)
(C) (ii) and (iii)
(D) (i), (ii) and (iii)

193. Which of the following statement(s) is/are true for Detritus Tank?

(i) Detritus tank is a sedimentation tank that removes fine particles, like silt and organic matter, from wastewater

(ii) Detritus tanks are grit chambers designed for flow with smaller flow velocity and longer detention periods

(A) Only (i)
(B) Only (ii)
(C) Both (i) and (ii)
(D) Neither (i) nor (ii)

194. Which of the following reactor(s) can have a problem of short circuiting due to density currents?

(i) Plug flow reactor

(ii) Batch reactor

(A) Only (i)
(B) Only (ii)
(C) Both (i) and (ii)
(D) Neither (i) nor (ii)

195. Which of the following statements regarding landfill gas control and ambient air quality monitoring is incorrect as per the Solid Waste Management Rules, 2016?

(A) A gas collection system must be installed to minimize odour, prevent offsite migration of gases and protect vegetation on the rehabilitated landfill surface.

(B) The methane gas concentration at a landfill site should not exceed 50% of the lower explosive limit (LEL) to ensure safety.

(C) Landfill gas should be utilized for thermal applications or power generation where feasible; otherwise, it should be flared and illegal tapping is strictly prohibited.

(D) Regular monitoring of ambient air quality at the landfill site and nearby vicinity is required and the air quality must meet the standards prescribed by the Central Pollution Control Board for industrial areas.

196. Which of the following statement(s) is/are true regarding Source Apportionment Study in Environmental Science?

(i) It is done to evaluate the effectiveness of air pollution control technologies

(ii) It uses receptor modeling, chemical fingerprinting and statistical methods

(A) Only (i)
(B) Only (ii)
(C) Both (i) and (ii)
(D) Neither (i) nor (ii)

197. Which method is most commonly used for the colorimetric determination of residual chlorine in water?

(A) Mohr's method

(B) DPD (N,N-diethyl-p-phenylenediamine) method

(C) Winkler's method

(D) Flame photometry

198. 100 m^3 of sludge holds moisture content of 95%. If its moisture content is reduced to 90%, then the volume of the sludge will reduce to

(A) 95 m^3
(B) 50 m^3
(C) 45 m^3
(D) 40 m^3

199. Which of the following statement(s) is/are true for Ringlemann scale?

(i) It is a scale used for measuring black carbon in ambient air

(ii) The scale has 5 levels of density inferred from a grid of black lines on a white surface which if viewed from a distance, merge into known shades of grey.

(A) Only (i)

(B) Only (ii)

(C) Both (i) and (ii)

(D) Neither (i) nor (ii)

200. What is reverberation time (RT)?

(A) Time taken for sound to travel from source to receiver

(B) Time taken for sound to decay by 60 dB after the source stops

(C) Time taken for sound to reach maximum intensity

(D) Time taken for sound waves to reflect off a surface

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