Booklet Sr. No.

Question Booklet Set

A

Candidate's Name _____

Father's Name _____

Date of Birth : ⬜⬜ ⬜⬜ ⬜⬜⬜⬜
          D D   M M   Y Y Y Y

OMR Response Sheet No. _____ **Roll No.** _____

Candidate's Signature :

(Please sign in the box)

[Total Questions : **120**]

[Time Allowed : **2** Hours]

INSTRUCTIONS

1. The candidate shall NOT open this booklet till the time they are told to do so by the Invigilation Staff. However, in the meantime, the candidate can read these instructions carefully and subsequently fill the appropriate columns given above in CAPITAL letters. The candidate may also fill the relevant boxes 1 to 9 of the Optical Mark Reader (OMR) response sheet, supplied separately.

2. Use only blue or black **ball point pen** to fill the relevant columns on this page as well as in OMR sheet. Use of Ink pen or any other pen is not allowed.

3. Other than filling credentials/information in specific space allotted above, do not write anything else on the Test Booklet. Space for rough work is provided at the end. The candidate shall be liable for any adverse effect if the information given above is wrong or illegible or incomplete.

4. Each candidate is required to attempt 120 questions in 120 minutes, except for orthopedically/visually impaired candidates, who would be given 40 extra minutes, for marking correct responses on the OMR sheet.

5. The question paper booklet has **24** pages.

6. The candidates, when allowed to open the question paper booklet, must first check the entire booklet to confirm that the booklet has complete number of pages, the pages are printed correctly and there are no blank or torn pages. In case there is any such error in the question paper booklet then the candidate should IMMEDIATELY bring this fact to the notice of the Invigilation Staff and obtain a new booklet of the same series as given earlier.

7. The serial number of the new Question booklet, if issued for some reason, should be entered in the relevant column of the OMR. The Invigilation Staff must make necessary corrections in their record regarding the change in the serial no. of Question booklet.

8. The paper consists of total 480 Marks. Each question shall carry 4 marks. There are four options for each question and the candidate has to mark the MOST APPROPRIATE answer on the OMR response sheet.

9. There is **negative marking** (1 mark for each question) for questions wrongly answered by the candidate.

10. If a candidate gives more than one answer, it will be treated as a wrong answer even if one of the given answers is correct. There will be same penalty, as above, to that question.

11. If Question is left blank, i.e. question remains unattempted, there will be no penalty for that question.

12. Use of Electronic/Manual Calculator is prohibited.

13. The candidate **MUST READ INSTRUCTIONS BEHIND THE OMR SHEET** before answering the questions and check that two carbon copies attached to the OMR sheet are intact.

1. The hydraulic loading in the high-rate trickling filters should be in the range of $(m^3/d/m^2)$:

(a) 150 – 180

(b) 100 – 130

(c) 50 – 80

(d) 10 – 30

2. Consider the following statements:

1. The Trickling filter is used for the biological treatment of both domestic sewage and industrial waste.

2. Reciprocating screens are used for removal of oversized materials from municipal solid waste.

Which of the above statements is/are correct?

(a) 1 only   (b) 2 only   (c) Both 1 and 2   (d) Neither 1 nor 2

3. Which of the following statements is/are *incorrect* regarding landfills?

1. Trench landfilling, area landfilling, slope landfilling are different types of landfills.

2. Leachate is a coloured liquid that comes out of sanitary landfills.

3. High concentration of ammonia is produced in facultative decomposition stage.

Choose the correct option:

(a) 1 and 2 only

(b) 2 and 3 only

(c) 3 only

(d) None is incorrect

4. The C/N ratio for composting should be in the range of:

(a) 50:1   (b) 25:1   (c) 75:1   (d) 100:1

5. Which is *not* a composting method?

(a) Windrow method

(b) Static Pile method

(c) In-vessel method

(d) In-circular method

6. The BOD5 in the leachate is seen in the range as (mg/lt):

(a) 2,000 – 30,000

(b) 31,000 – 40,000

(c) 40,000 – 50,000

(d) more than 50,000

7. The physical tests of water include the following:

(a) Temperature, Colour and Turbidity

(b) Specific gravity, Colour and Turbidity

(c) pH, Specific gravity and Temperature

(d) Hardness, pH, and Temperature

8. The chlorides should be in the range for water supply (domestic):

    (a)   up to 250 ppm   (b)   up to 500 ppm

    (c)   up to 750 ppm   (d)   up to 1000 ppm

9. The detention time in sedimentation tank can be obtained by:

    (a)   Perimeter of the tank / Rate of flow of water

    (b)   Rate of flow of water / Perimeter of the tank

    (c)   Capacity of the tank / Rate of flow of water

    (d)   Rate of flow of water / Capacity of the tank

10. The main variables of the activated sludge process are:

    (a)   loading rate, mixing regime and flow scheme

    (b)   output, biological regime and pH

    (c)   biological regime, pH, density

    (d)   pH, density, hardness

11. Consider the following statements regarding Rotating Biological Contactor:

    1.   Rotating biological contactor treatment technology of wastewater is based on the attached growth process.

    2.   Rotating biological contactor (RBC) is sensitive to temperature.

    3.   It has low capital cost.

    Which of the above statements is/are correct?

    (a)   1 only

    (b)   1 and 2 only

    (c)   3 only

    (d)   1, 2 and 3

12. Consider the following statements:

    1.   Peak factor for the sewer design is the ratio of maximum flows to average flows.

    2.   The minimum size of public sewer in plains should not be less than 150 mm.

    Which of the above statements is/are correct?

    (a)   1 only

    (b)   2 only

    (c)   Both 1 and 2

    (d)   Neither 1 nor 2

13. The maximum velocity in circular section is developed when the proportionate depth is:

(a) 0.91   (b) 0.81   (c) 0.71   (d) 0.61

14. If the mean precipitation over a region is calculated as 200 mm, and there are 5 stations with recorded precipitation values of 180 mm, 220 mm, 190 mm, and 210 mm, what is the value of the missing fifth station?

(a) 200 mm   (b) 210 mm   (c) 220 mm   (d) 230 mm

15. Using the normal-ratio method, estimate the missing rainfall (P4) for a station given the following data: Station 1 ($P1 = 80$ mm, $N1 = 90$), Station 2 ($P2 = 120$ mm, $N2 = 110$), Station 3 ($P3 = 100$ mm, $N3 = 105$), and the normal annual rainfall of the missing station ($N4 = 100$).

(a) 98 mm   (b) 100 mm   (c) 102 mm   (d) 105 mm

16. Given a unit hydrograph with a peak flow of 100 m^3/s for a rainfall excess of 2 mm, what is the peak flow for a rainfall excess of 5 mm?

(a) 100 m^3/s   (b) 150 m^3/s   (c) 200 m^3/s   (d) 250 m^3/s

17. Using the S-curve method, a 6-hour unit hydrograph has a peak flow of 80 m^3/s. What is the peak flow for a 12-hour unit hydrograph derived from this 6-hour unit hydrograph?

(a) 40 m^3/s   (b) 80 m^3/s   (c) 120 m^3/s   (d) 160 m^3/s

18. Consider the following statements:

1. A unit hydrograph is helpful in estimating the runoff from a basin.
2. The time between the peak rainfall and the peak discharge in a hydrograph is referred to as recession limb.
3. An instantaneous unit hydrograph (IUH) represents the peak discharge of a river.
4. The primary factor that differentiates a unit hydrograph from an instantaneous unit hydrograph (IUH) is the duration of effective rainfall.

Which of the above statements are correct?

(a) 1 and 4 only

(b) 2 and 3 only

(c) 1, 3 and 4 only

(d) 1, 2 and 4 only

19. Consider the following statements:

1. Darcy's law governs the flow of groundwater through porous media.

2. According to Darcy's Law, the flow rate (Q) through a porous medium is proportional to the hydraulic conductivity (K) of the medium and the hydraulic gradient (i).

3. According to Darcy's law the discharge is inversely proportional to the length of path.

Which of the above statements are correct?

(a) 1 and 2 only

(b) 2 and 3 only

(c) 1 and 3 only

(d) 1, 2 and 3

20. Consider the following statements:

1. The settling velocity of a spherical particle in still water is given by Stoke's law.

2. The self-purification of streams can be modelled using Streeter Phelps model.

Which of the above statements is/are ***incorrect***?

(a) 1 only

(b) 2 only

(c) Both 1 and 2 are incorrect

(d) Neither 1 nor 2 is incorrect

21. Which of the following is an infiltration index?

(a) Evaporation index

(b) Phi index

(c) Runoff coefficient

(d) Manning's coefficient

22. Which of the following best describes the initial abstraction (Ia) in the SCS-CN method?

(a) The total runoff

(b) The initial loss of rainfall due to interception, infiltration, and surface storage

(c) The evaporation loss

(d) The peak discharge

23. Consider the following statements:

1. Erosion from the watershed is the primary cause of sedimentation in reservoirs.

2. Spillway capacity is the term for the maximum amount of water that can be supplied by a reservoir without failure over a specified period.

Which of the above statements is/are correct?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

24. The initial rate of infiltration of a watershed is estimated as 2.1 in/h, the final capacity is 0.2 in/h, and the time constant, k, is 0.4 h-1. What is the infiltration capacity at t = 2h ? (Use Horton's Infiltration Equation)

(a) 1.95 in/h

(b) 1.55 in/h

(c) 1.75 in/h

(d) 1.05 in/h

25. Consider the following statements in context of aquifers and aquifer parameters:

1. A confined aquifer is a type of aquifer which is directly recharged by surface water.

2. The term "specific yield" refers to the volume of water that can be drained by gravity.

3. When designing tube wells for water extraction from a confined aquifer, the most crucial parameter for determining the optimal spacing between wells to avoid excessive drawdown is the transmissivity of the aquifer.

Which of the above statements are correct?

(a) 1 and 2 only

(b) 2 and 3 only

(c) 1 and 3 only

(d) 1, 2 and 3

26. If a rain gauge records 50 mm of rain in a day, how much water is collected in litres per square meter?

(a) 5 L/m^2

(b) 50 L/m^2

(c) 500 L/m^2

(d) 5000 L/m^2

27. A catchment of area 120 ha has a time of concentration of 30 min and runoff coefficient of 0.4. If a storm of duration 45 min results in 3.0 cm of rain over the catchment, estimate the resultant peak flow rate.

(a) 5.33 m^3/s (b) 5.01 m^3/s (c) 6.02 m^3/s (d) 6.22 m^3/s

28. If a tube well is constructed to a depth of 50 m and it draws water from an aquifer with a saturated thickness of 30 m, what is the effective depth of the well?

(a) 20 m (b) 30 m (c) 50 m (d) 80 m

29. A small catchment of area 300 ha received a rainfall of 12.5 cm in 3 hours. At the outlet of the catchment the measured runoff lasted for 10 hours with an average discharge value of 3.125 m^3/s. The stream was dry before and after the runoff event. What is the runoff coefficient?

(a) 0.1 (b) 0.2 (c) 0.3 (d) 0.6

30. Which parameter significantly influences the initial steepness of the infiltration capacity curve in a soil infiltration model?

(a) The soil's porosity

(b) The antecedent moisture content of the soil

(c) The surface roughness of the land

(d) The depth of the groundwater table

31. A region has recorded annual maximum rainfall data for 30 years. Using the Gumbel distribution, the mean annual maximum rainfall is found to be 150 mm, and the standard deviation is 20 mm. Calculate the 100-year return period rainfall.

(Gumbel distribution formula $X_T = \mu + K_T \cdot \sigma$, where $K_T = -ln(-ln(1-1/T))$, μ is the mean, σ is the standard deviation, and T is the return period.)

(a) 175 mm (b) 190 mm

(c) 210 mm (d) 230 mm

32. A catchment area of 200 square kilometers experiences a rainfall event with an intensity of 40 mm/hr lasting for 3 hours. Assuming a runoff coefficient of 0.7 and using the Rational Method, calculate the peak discharge in cubic meters per second.

(a) 1,555 m^3/s

(b) 2,800 m^3/s

(c) 3,111 m^3/s

(d) 4,444 m^3/s

33. For a given watershed, the curve number (CN) is calculated based on land use, soil type, and antecedent moisture condition (AMC). If the AMC changes from dry to wet, what is the expected effect on the curve number?

(a) The curve number decreases

(b) The curve number remains unchanged

(c) The curve number increases

(d) The curve number first decreases, then increases

34. In a watershed with varying land uses, which method of runoff estimation is the most sensitive to changes in land cover, particularly with respect to impervious surfaces?

(a) Rational method

(b) SCS Curve Number method

(c) Green-Ampt infiltration model

(d) Unit hydrograph method

35. Which method is most appropriate for determining the yield of a reservoir where inflow exhibits significant seasonal variability?

(a) Mass curve analysis

(b) Sequent Peak Algorithm

(c) Frequency analysis of inflows

(d) Sediment rating curve analysis

36. Which technique/method is used to measure dissolved oxygen in water?

(a) Winkler method

(b) Turbidity method

(c) Streeter method

(d) LaGrange method

37. Which of the following is *not* an example of a natural buffer system?

(a) Carbonic acid-bicarbonate buffer system

(b) Phosphate buffer system

(c) Ammonia buffer system

(d) Potassium bicarbonate buffer system

38. Which of the following statements is true about MSW treatment techniques?

1. Composting of MSW is most commonly aerobic

2. Bio methanation of MSW is most commonly aerobic

Choose the correct option:

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

39. Which of the following statements is correct regarding solid waste management rules framed by the Government of India?

   (a) Municipal Solid Wastes (Management & Handling) Rules were first notified in 2010

   (b) Disposing construction and demolition waste is a part Solid waste Management rules 2017

   (c) Solid Waste management rules notified in 2016 mandated source segregation of waste

   (d) India doesn't have any Solid waste management rules

40. Which of the following statements is **not** true?

   (a) CNG is stored in high-pressure cylinders.

   (b) CNG has less energy density compared to LNG.

   (c) PNG is commonly used for long-distance transportation of natural gas across oceans.

   (d) CNG infrastructure is less expensive and more widely available compared to LNG infrastructure.

41. In the context of water resource management, what does the term "aquifer overdraft" refer to?

   (a) The enhancement of aquifer recharge rates through artificial methods

   (b) The excessive withdrawal of groundwater leading to long-term depletion

   (c) The increase in groundwater storage due to reduced extraction

   (d) The balance between groundwater recharge and discharge

42. Which of the following orders correctly represents the environment-related acts in India based on their first enactment date, from the earliest to the latest?

   (a) Water (Prevention and Control of Pollution) Act, Air (Prevention and Control of Pollution) Act, Environment (Protection) Act, Biological Diversity Act.

   (b) Water (Prevention and Control of Pollution) Act, Biological Diversity Act, Air (Prevention and Control of Pollution) Act, Environment (Protection) Act.

   (c) Water (Prevention and Control of Pollution) Act, Environment (Protection) Act, Air (Prevention and Control of Pollution) Act, Biological Diversity Act.

   (d) Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Environment (Protection) Act, Biological Diversity Act.

43. Which of the following statements is **_not_** true about nuclear waste management?

(a) High-level radioactive waste requires isolation for thousands of years to prevent radiation exposure to humans and the environment.

(b) Deep geological repositories are considered one of the safest methods for the long-term storage of high-level nuclear waste.

(c) Low-level radioactive waste can be safely disposed of in near-surface disposal facilities without any further treatment.

(d) Nuclear waste reprocessing can reduce the volume of high-level waste but does not eliminate the need for long-term storage solutions.

44. Which soil characteristic is most likely to increase ammonia volatilization following fertilizer application?

(a) Low soil moisture content

(b) High soil organic matter

(c) High cation exchange capacity

(d) High soil pH

45. Which of the following statements about ecosystems is **_not_** true?

(a) Liebig's law states that growth only occurs at the rate permitted by the most non-limiting factor.

(b) The Ramsar Convention was signed in 1971 and became effective in 1975.

(c) The carrying capacity of a population is determined by its limiting resources and represents the maximum number of individuals that an ecosystem can support based on available resources under specific conditions.

(d) A Red Data Book is a document that keeps a record of all the endangered species of animals, plants, and fungi in a country or a state.

46. Which of the following factors is least likely to affect the efficiency of a rooftop water heater?

(a) Sunlight exposure

(b) Tilt and orientation

(c) Water quality

(d) Type of roofing material used

47. Which of the following statements is **_not_** true?

(a) The Environment (Protection) Act made Environmental Impact Assessment statutory.

(b) Screening is a step to identify and prioritize the key environmental issues and impacts to be addressed in the Environmental Impact Assessment.

(c) Pollution Control Boards may also participate in EIA of a project.

(d) The Environmental Impact Assessment 2006 divides the projects into three categories.

48. Which of the following statements is ***not*** true?

(a) The Convention on Long-range Transboundary Air Pollution (CLRTAP) is an international treaty that specifically addresses CO_2 across national boundaries.

(b) 1985 Helsinki Protocol, 1994 Oslo Protocol and 1999 Gothenburg Protocol fall under the Convention on Long-range Transboundary Air Pollution (CLRTAP).

(c) One of the principles in Rio Declaration states that environmental issues are best handled with the participation of all concerned citizens, at the relevant level.

(d) Acid rains can damage leaves and bark, making trees more susceptible to disease and pests.

49. Based on the information from the graph below:
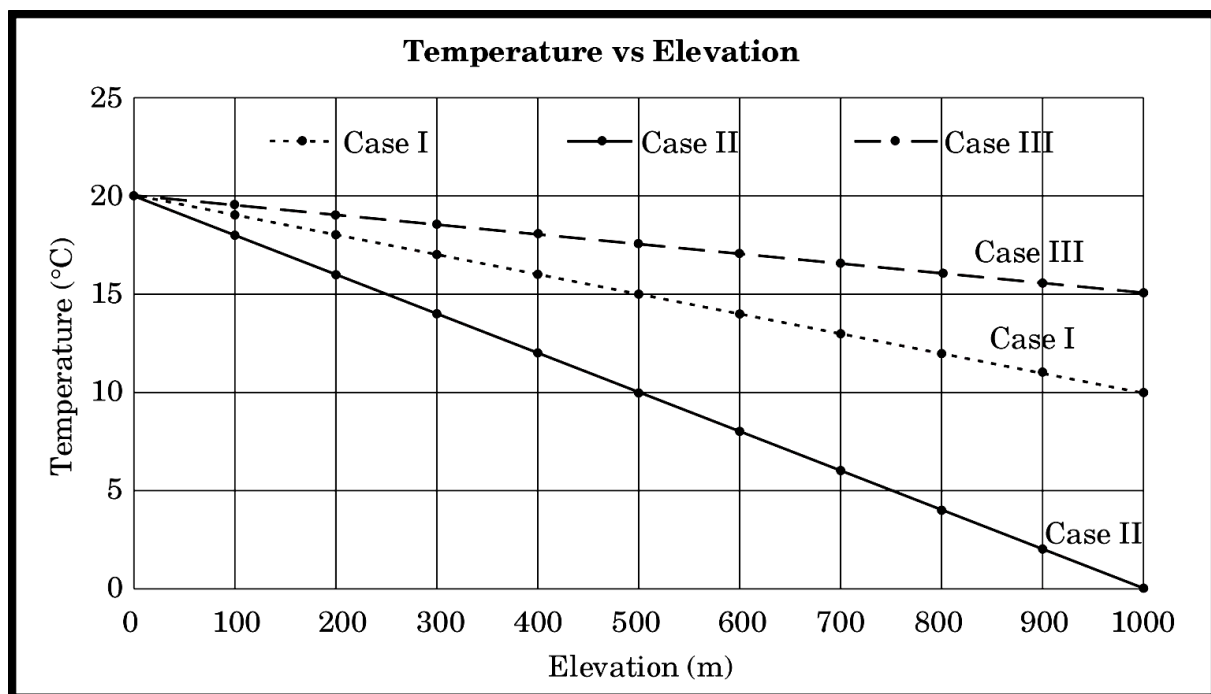
Choose the correct statement:

(a) Case 1 closely represents neutral conditions

(b) Case 2 closely represents neutral conditions

(c) Case 3 closely represents neutral conditions

(d) Both cases 1 and 2 closely represent neutral conditions

50. Consider the following statements:

1. Gravimetric method is used to measure Respirable Particulate Matter.

2. Chemiluminescence is the method used to measure Ozone.

Which of the above statements is/are ***incorrect***?

(a) 1 only   (b) 2 only

(c) Both 1 and 2   (d) Neither 1 nor 2

51. Consider the following statements about Catalytic converters:

1. Catalytic converters primary target Carbon monoxide, nitrogen dioxides and hydrocarbons in vehicle exhaust systems.

2. A catalytic convertor helps in reducing nitrogen oxides (NOx) in vehicle emissions by converting NOx into nitrogen and oxygen through a reduction reaction.

3. Aluminum and copper are typically used as catalysts in catalytic converters to facilitate the conversion of harmful gases.

Which of the above statements is/are correct?

(a) 1 only

(b) 1 and 2 only

(c) 3 only

(d) 1 and 3 only

52. How does the air-fuel ratio in spark ignition engines influence the emission of pollutants?

(a) A lean air-fuel mixture (excess air) typically reduces carbon monoxide and hydrocarbon emissions but may increase nitrogen oxides emissions.

(b) A rich air-fuel mixture (excess fuel) reduces all emissions due to complete combustion.

(c) A stoichiometric air-fuel ratio (ideal balance) maximizes particulate matter emissions.

(d) The air-fuel ratio has no impact on emissions as long as the engine is properly tuned.

53. In the context of VOC emission control, consider the following statements:

1. Installation of carbon capture and storage systems is often implemented to limit VOC emissions from automotive refueling operations.

2. The primary purpose of using an activated carbon adsorption system is to capture and concentrate VOCs for subsequent disposal or recovery.

Which of the above statements is/are correct?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

54. A factory emits a pollutant continuously from a stack at a rate of 200 g/s. The wind speed at the stack of 40 m height is 5 m/s. Assuming that plume rise is negligible, the plume spread parameters at a downwind distance of 500 m in the horizontal (y) and vertical (z) directions are 100 m and 50 m, respectively. The ground-level concentration of the pollutant along the centerline at that distance is _____.

(a) 1.85 mg/m^3

(b) 2.3 mg/m^3

(c) 1.85 µg/m^3

(d) 2.3 µg/m^3

55. A factory emits a pollutant continuously from a stack of 40 m height. The wind speed at the stack is 5 m/s. Assuming that plume rise is negligible, the plume spread parameters at a downwind distance of 500 m in the horizontal (y) and vertical (z) directions are 80 m and 35 m, respectively. If the ground-level concentration of the pollutant along the centerline at that distance is 0.0355 g/m³, the factory emits a pollutant continuously from a stack at a rate of _____.

(a) 200 g/s

(b) 2 kg/s

(c) 300 g/s

(d) 3 kg/s

56. Which of the following statements is **not** true according to the National Ambient Air Quality Standards (Central Pollution Control Board, Government of India, notification 2009)?

(a) Annual standard for Sulphur dioxide is greater than its corresponding daily standard.

(b) The hourly averaged standard for Carbon Monoxide is 4 mg/m^3.

(c) The annual averaged standard for $PM_{2.5}$ is 40 µg/m^3.

(d) Mercury is not a part of National Ambient Air Quality Standards.

57. The most important precursors for Ozone formation in ambient air are:

(a) NOx and VOCs

(b) CO_2 and VOCs

(c) CO_2 and NOx

(d) H_2 and NOx

58. Which class of micro-organisms are most active in anaerobic digestion of sludge?

(a) Mesophiles and psychrophiles

(b) Thermophiles and psychrophiles

(c) Thermophiles and mesophiles

(d) Halophiles and mesophiles

59. Algae can be very beneficial, but they cause a problem when they remove:

(a) Iron

(b) Nitrates

(c) Ammonium

(d) Phosphorous

60. The time of contact for chlorination should be at least:

(a) 5 minutes   (b) 20 minutes

(c) 1 hour   (d) 2 hours

61. In the context of water treatment, odour and taste are controlled by:

(a) Disinfection   (b) Aeration

(c) Coagulation   (d) Soda-lime process

62. Which of the following treatment reduce salinity of water?

1. Flash mixing and sedimentation

2. Electrodialysis

3. Reverse Osmosis

4. Freezing

5. Filtration

(a) 1, 2, 3, 4 and 5   (b) 2, 3 and 4 only

(c) 1, 4 and 5 only   (d) 1, 2 and 4 only

63. The rate limiting step for the production of biogas from an anaerobic digestion of sludge is:

(a) Acidification   (b) Alkalisation

(c) Acetogenesis   (d) Methanogenesis

64. Which one of the following relations holds true for the specific growth rate (μ) of a microorganism in the stationary phase?

(a) $\mu = 0$ (b) $\mu = \mu_{max}$

(c) $\mu < 0$ (d) $0 < \mu < \mu_{max}$

65. Coagulation-flocculation with alum is performed:

(a) Immediately before chlorination   (b) Immediately after chlorination

(c) After rapid sand filtration   (d) Before rapid sand filtration

66. The settlement of a particle in the sedimentation tank is **not** affected by:

(a) Velocity of flow   (b) Viscosity of water

(c) Size and shape of solid   (d) Depth of the tank

67. Flocculated particles do **not** change their:

(a) Size   (b) Shape

(c) Weight   (d) Density

68. Which of the following is ***not*** a biological process for destroying organic compounds?

(a) Composting

(b) Trickling Filters

(c) Calcination

(d) Activated sludge

69. Bacteria that can survive with or without free oxygen, are known as:

(a) Aerobic bacteria

(b) Anaerobic bacteria

(c) Facultative bacteria

(d) None of the above

70. Total rainfall in a catchment area of 1200 km^2 during a 6 hour storm is 16 cm while surface runoff due to the storm is 1.2×10^8 m^3. The Φ index is:

(a) 0.1 cm/h

(b) 1.0 cm/h

(c) 0.2 cm/h

(d) Cannot be estimated with the given data

71. Water level in confined well:

(a) Increases with increase in the atmospheric pressure

(b) Decreases with increase in the atmospheric pressure

(c) Does not undergo any change with change in atmospheric pressure

(d) All of these

72. The temperature inside the earth rises by 1°C for the descend of every:

(a) 10 m

(b) 20-25 m

(c) 35-40 m

(d) 50-70 m

73. The assumption in the Thiem formula for discharge from an unconfined aquifer is:

(a) That the flow lines are radial and horizontal

(b) That the flow is turbulent

(c) That the soil is isotropic

(d) That the flow is unsteady

74. Interception Loss is:

(a) More towards the end of a storm

(b) More at the beginning of a storm

(c) Uniform throughout the storm

(d) Low in the beginning of the storm and gradually increases

75. Which of the following is a non-recording rain gauge:

(a) Tipping bucket type rain gauge

(b) Simon's rain gauge

(c) Steven's weighing type rain gauge

(d) Floating type rain gauge

76. Specific yield of an aquifer is:

(a) Proportional to soil porosity

(b) Volume of the water which drains freely

(c) Depends on the soil condition

(d) None of these

77. Consider the following statements:

1. The term "drawdown" refers to the volume of water withdrawn from the aquifer.

2. Discharge per unit of drawdown of a well is called its specific capacity.

3. Specific capacity of a well decreases with time from the start of pumping.

Which of the above statements are correct?

(a) 1 and 2 only   (b) 2 and 3 only

(c) 1 and 3 only   (d) 1, 2 and 3

78. The Air Quality Index (AQI) of a city is 190. It falls under which category?

(a) Very poor   (b) Poor

(c) Moderate   (d) Good

79. The following device works based on the inertial force of the particle:

(a) Fabric filter

(b) Electrostatic precipitator

(c) Cyclone separator

(d) Gravitational settling chamber

80. Concentration of ozone in clean air is _____ppm.

(a) 0.5   (b) 0.1

(c) 0.001   (d) 0.01

81. The aerobic method of composting as practiced in India is called as:

(a) Bangalore method   (b) Mangalore method

(c) Indore method   (d) Nagpur method

82. The volume of voids in a soil mass expressed as percentage of total volume of soil is known as:
   (a) porosity
   (b) voids ratio
   (c) permeability
   (d) specific yield

83. Consider the following statements:
   1. Isohyets are the imaginary lines joining the points of equal rainfall.
   2. Tensiometer is used to measure capillary potential.
   Which of the above statements is/are correct?
   (a) 1 only
   (b) 2 only
   (c) Both 1 and 2
   (d) Neither 1 nor 2

84. In denitrification _____ is converted to _____.
   (a) Ammonia is converted to Nitrate
   (b) Ammonia is converted Nitrite
   (c) Nitrate is converted to Nitrogen
   (d) Nitrite is converted to Nitrate

85. Which of the following is *incorrect* about Gaussian Dispersion Model for air pollution?
   (a) Ambient temperature is not directly used in the Gaussian Dispersion Model.
   (b) It assumes uniform wind speed and direction over the dispersion area.
   (c) Greater stability leads to a wider and more dispersed plume.
   (d) It is used for prediction of concentration of air pollutants from point sources.

86. Global warming potential of Carbon dioxide is:
   (a) 1
   (b) 2
   (c) Infinite
   (d) 0

87. What does the term "biogeochemical cycle" refer to?
   (a) The movement of biotic factors across different biomes.
   (b) The cycling of nutrients and elements through the biotic and abiotic components of the Earth.
   (c) The process by which genetic material is exchanged between species.
   (d) The migration patterns of species across continents.

88. Which of these closely explains the relationship between the size of an ecosystem and its species diversity?
   (a) Competitive Exclusion Principle
   (b) Theory of Evolution by Natural Selection
   (c) Island Biogeography Theory
   (d) Keystone Species Concept

89. In which sphere does the process of weathering primarily occur, and how does it affect the other spheres?

(a) The biosphere; it enriches the soil with organic matter.

(b) The atmosphere; it influences the climate and weather patterns.

(c) The hydrosphere; it contributes to soil erosion and sediment transport.

(d) The lithosphere; it breaks down rocks into soil that supports plant life in the biosphere.

90. What does the term "ecological footprint" specifically measure?

(a) The total land area required to produce the resources consumed and absorb the waste generated by an individual, community, or country.

(b) The economic cost associated with environmental degradation and resource depletion.

(c) The carbon emissions produced by industrial activities and transportation.

(d) The amount of natural resources available in a given geographical area.

91. A sustainable society:

(a) Returns to a more primitive style of living.

(b) Continues as always and assumes that things will work out for the best.

(c) Meets the needs of the present without compromising those of the future.

(d) Is inconsistent with the goals of environmentalism.

92. Which convention was adopted for the protection of ozone layer?

(a) Vienna Convention   (b) Basel Convention

(c) Rotterdam Convention   (d) Stockholm Convention

93. Calculating the value of GDP of two countries using the Purchasing Power Parity (PPP) method involves:

(a) Expressing the value of both the countries' output in same currency.

(b) Finding out what can be bought in each country with a unit of the local currency.

(c) Comparing the inflation rates in each country.

(d) Taking into account the exchange rate of each country's currency.

94. Consider the following statements with reference to indirect and direct taxes in India:

1. In the case of indirect taxes, the incidence and impact of the tax are on the same person.

2. Direct taxes are progressive in nature.

3. While Income Tax is a type of direct tax, corporate tax is a type of indirect tax.

Which of the statements given above is/are correct?

(a) 2 only   (b) 2 and 3 only

(c) 1 and 2 only   (d) 1, 2 and 3

95. The term secular was added to the Preamble by which amendment of the Indian Constitution?

(a) 42nd (b) 44th

(c) 46th (d) 51st

96. The Tropic of Cancer traverses through which of the following combination of countries?

(a) India, Philippines, China, Saudi Arabia, Egypt

(b) India, Egypt, China, Sri Lanka, Afghanistan

(c) India, China, Saudi Arabia, Egypt, Libya

(d) India, Egypt, China, Myanmar, Afghanistan

97. Match List I with List II and select answer from the codes given below.

	List I		List II
A.	Warren Hastings	I.	Prohibition of Sati
B.	Lord Wellesley	II.	Treaty of Amritsar with Ranjit Singh
C.	Lord Minto	III.	Subsidiary Alliance
D.	Lord William Bentick	IV.	Regulating Act of 1773

(a) A-III, B-IV, C-II, D-I   (b) A-I, B-IV, C-III, D-II

(c) A-IV, B-III, C-II, D-I   (d) A-IV, B-II, C-III, D-I

98. The Komagata Maru Affair merged with the programme of the:

(a) Congress Party   (b) Muslim League

(c) Ghadar Party   (d) Revolutionaries

99. South Asian Association for Regional Cooperation (SAARC) has been in news recently. Which of the following countries is *not* a part of SAARC?

(a) Afghanistan   (b) Maldives

(c) Sri Lanka   (d) Myanmar

100. The following phenomena appears in news frequently. Which of these has/have a bearing on Indian monsoon?

(a) El Nino and Southern Oscillation (ENSO)

(b) Indian Ocean Dipole (IOD)

(c) Both (a) and (b)

(d) Neither (a) nor (b)

Directions (101 to 105) : Study the following information to answer the given questions:

   (1)   In a class of boys and girls, Aman's rank is 12th and Manisha's rank is 8th.

   (2)   Aman's rank among the boys is 6th and Manisha's rank among girls is 3rd.

   (3)   In the class Manisha's rank is 52th from the other end.

   (4)   From the other end, Aman's rank among the boys is 26th.

101. How many boys are there in the class?
  (a)   28   (b)   29
  (c)   31   (d)   Can't be determined

102. Which of the following is Manisha's rank among the girls from the other end?
  (a) 26th (b) 23rd
  (c) 28th (d)   Can't be determined

103. How many boys are there before Manisha?
  (a)   4   (b)   3
  (c)   5   (d)   Can't be determined

104. How many boys are there between Aman and Manisha?
  (a)   One   (b)   Two
  (c)   Three   (d)   None of these

105. How many girls are there before Aman?
  (a)   6   (b)   5
  (c)   7   (d)   Can't be determined

106. N, M, O and P can do a piece of work in 80 days. N and M can together do the piece of work in 120 days, whereas O can do the piece of work in 360 days. In how many days P can finish the work?
  (a)   660   (b)   360   (c)   240   (d)   720

107. If the selling price of an article is 8 % more than its cost price and the discount offered is 10 % on the marked price of the article, then what is the ratio of the cost price to the marked price?
  (a)   5 : 6   (b)   8 : 9   (c)   4 : 5   (d)   3 : 4

108. The monthly incomes of two persons are in the ratio of 4:5 and their monthly expenditures are in the ratio of 7: 9. If each save ₹ 50 a month what are their monthly incomes:
  (a) ₹ 100, ₹ 125   (b) ₹ 200, ₹ 250   (c) ₹ 300, ₹ 375   (d) ₹ 400, ₹ 500

109. Rohit starts from his house in his car and travels 10 km towards the North, then 8 km towards East then 12 km towards his right, 6 km towards his left, 10 km toward north and finely 2 km towards his right. In which direction is he now with reference to the starting point?
  (a)   North   (b)   South   (c)   North-east   (d)   South-west

110. What is the ***incorrect*** number in the sequence: 25, 34, 49, 68, 91, 118, 149 ?
  (a)   34   (b)   25   (c)   91   (d)   118

111. 'ਆਪਣੇ ਨੈਣ ਮੈਨੂੰ ਦੇ ਦੇ ਤੂੰ ਮਟਕਾਉਂਦੀ ਫਿਰ' ਅਖਾਣ ਦਾ ਕੀ ਅਰਥ ਹੈ?

    (a)   ਦੂਸਰੇ ਦੀ ਲੋੜ ਤੋਂ ਬੇਪਰਵਾਹ ਹੋ ਕੇ ਲੋੜੀਂਦੀ ਚੀਜ਼ ਮੰਗਣੀ।

    (b)   ਦੂਸਰੇ ਦੀ ਲੋੜ ਤੋਂ ਬੇਪਰਵਾਹ ਹੋ ਕੇ ਆਪਣੀ ਚੀਜ਼ ਦੇਣੀ।

    (c)   ਦੂਸਰੇ ਦੀ ਲੋੜ ਤੋਂ ਬੇਪਰਵਾਹ ਹੋ ਕੇ ਕੋਈ ਸਿੱਖਿਆ ਲੈਣੀ।

    (d)   ਦੂਸਰੇ ਦੀ ਲੋੜ ਤੋਂ ਬੇਪਰਵਾਹ ਹੋ ਕੇ ਕਿਸੇ ਨੂੰ ਸਿੱਖਿਆ ਦੇਣੀ।

112. 'ਬਿਨਾਂ ਯਤਨ ਕੀਤੇ ਇੱਛਾ ਪੂਰੀ ਹੋਣਾ' ਮੁਹਾਵਰੇ ਦੇ ਅਰਥ ਦੇ ਆਧਾਰ 'ਤੇ ਸਹੀ ਚੋਣ ਕਰੋ।

    (a)   ਭਿੱਜੀ ਬਿੱਲੀ ਬਣ ਜਾਣਾ   (b)   ਬਿੱਲੀ ਲਈ ਛਿੱਕਾ ਟੁੱਟ ਪੈਣਾ

    (c)   ਭੁੰਨੇ ਤਿੱਤਰ ਉਡਾਉਣਾ   (d)   ਭੂਤ ਸਵਾਰ ਹੋਣਾ

113. 'ਨਹੁੰ ਅੜ ਜਾਣਾ' ਮੁਹਾਵਰੇ ਤੋਂ ਕੀ ਭਾਵ ਹੈ?

    (a)   ਕੁਝ ਸਹਾਰਾ ਮਿਲ ਜਾਣਾ   (b)   ਨਹੁੰ-ਮਾਸ ਦਾ ਰਿਸ਼ਤਾ ਹੋਣਾ

    (c)   ਮੁਸੀਬਤ ਪੈਦਾ ਹੋ ਜਾਣੀ   (d)   ਰੰਗ ਵਿਚ ਭੰਗ ਪੈ ਜਾਣੀ

114. 'ਬੁੱਕਲ ਵਿਚ ਰੋੜੀ ਭੰਨਣੀ' ਮੁਹਾਵਰੇ ਤੋਂ ਕੀ ਭਾਵ ਹੈ?

    (a)   ਮੌਜ ਕਰਨੀ

    (b)   ਸਫਲ ਹੋ ਜਾਣਾ

    (c)   ਗੁਪਤ ਯਤਨ ਕਰਨਾ

    (d)   ਮਿਹਨਤ ਕਰਨੀ

115. ਸ਼ੁੱਧ ਪੰਜਾਬੀ ਰੂਪ ਕਿਹੜਾ ਹੈ?

    (a)   ਵੰਹੁਟੀ   (b)   ਵੋਹਟੀ

    (c)   ਵਹੁਟੀ   (d)   ਵੇਹੁਟੀ

116. "I Eat Bread" ਵਾਕ ਦਾ ਪੰਜਾਬੀ ਵਿਚ ਸ਼ੁੱਧ ਅਨੁਵਾਦ ਕਿਹੜਾ ਹੈ?

    (a)   ਮੈਂ ਰੋਟੀ ਖਾ ਰਿਹਾ ਹਾਂ।   (b)   ਮੈਂ ਰੋਟੀ ਖਾ ਗਿਆ ਹਾਂ।

    (c)   ਮੈਂ ਰੋਟੀ ਖਾਂਦਾ ਹਾਂ।   (d)   ਮੈਂ ਰੋਟੀ ਖਾ ਲਈ ਹੈ।

117. ਪੰਜਾਬ ਵਿਚ 'ਰੌਸ਼ਨੀਆਂ ਦਾ ਮੇਲਾ' ਕਿੱਥੇ ਲੱਗਦਾ ਹੈ?

    (a)   ਛਪਾਰ   (b)   ਜਗਰਾਓਂ

    (c)   ਜਰਗ   (d)   ਬਠਿੰਡਾ

ਹੇਠ ਲਿਖੇ ਪੈਰੇ ਵਿੱਚੋਂ 118 ਤੋਂ 120 ਤੱਕ ਪ੍ਰਸ਼ਨ ਹੱਲ ਕਰੋ।

ਇਸ ਕਥਨ ਵਿੱਚ ਸੌ ਫੀਸਦੀ ਸਚਾਈ ਹੈ ਕਿ ਅਸਲ ਸੋਹਣਾ ਉਹ ਹੁੰਦਾ ਹੈ, ਜੋ ਸੋਹਣਾ ਕੰਮ ਕਰਦਾ ਹੈ। ਅਸਲ ਸੋਹਣਾ ਉਹ ਨਹੀਂ ਹੁੰਦਾ ਜਿਸ ਦੀ ਸ਼ਕਲ ਸੋਹਣੀ ਹੋਵੇ, ਸਗੋਂ ਉਹ ਹੁੰਦਾ ਹੈ, ਜਿਹੜਾ ਆਤਮਿਕ ਤੇ ਮਾਨਸਿਕ ਤੌਰ ਤੇ ਸੋਹਣਾ ਹੋਵੇ, ਅਸਲ ਸੋਹਣਾ ਬਣਨ ਲਈ ਮਨੁੱਖ ਨੂੰ ਆਪਣੇ ਅੰਦਰ ਕੁੱਝ ਆਤਮਿਕ ਤੇ ਮਾਨਸਿਕ ਗੁਣ ਪੈਦਾ ਕਰਨੇ ਚਾਹੀਦੇ ਹਨ, ਸਰੀਰਕ ਸੁੰਦਰਤਾ ਥੁੜ-ਚਿਰੀ ਹੁੰਦੀ ਹੈ। ਇਹ ਸਮੇਂ ਨਾਲ ਨਾਸ ਹੋ ਜਾਂਦੀ ਹੈ। ਸੁੰਦਰ ਚਿਹਰਾ ਮਰਦ ਜਾਂ ਤੀਵੀਂ ਦੀ ਪੱਕੀ ਜਾਇਦਾਦ ਨਹੀਂ। ਇਹ ਕਿਸੇ ਦੀ ਬਿਮਾਰੀ ਜਾਂ ਦੁਰਘਟਨਾ ਨਾਲ ਉਸ ਪਾਸੋਂ ਖੁੱਸ ਸਕਦੀ ਹੈ। ਪਰੰਤੂ ਸੁੰਦਰ ਆਤਮਾ ਤੇ ਮਨ ਵਿੱਚੋਂ ਉਪਜੇ ਕਾਰਜ ਅਤੇ ਕਿਰਤਾਂ ਬੰਦੇ ਦੇ ਮਰਨ ਪਿੱਛੋਂ ਜਿਉਂਦੀਆਂ ਰਹਿੰਦੀਆਂ ਹਨ ਤੇ ਲੋਕਾਂ ਨੂੰ ਉਹਨਾਂ ਵਿੱਚ ਸੁੰਦਰਤਾ ਦੀ ਸਦੀਵੀ ਝਲਕ ਦਿਖਾਈ ਦਿੰਦੀ ਹੈ। ਉੱਚ ਨੈਤਿਕ ਗੁਣਾਂ ਤੇ ਆਦਰਸ਼ਾਂ ਵਾਲਾ ਬੰਦਾ ਭਾਵੇਂ ਸ਼ਕਲੋਂ ਕੋਝਾ ਵੀ ਹੋਵੇ, ਉਹ ਸਹੀ ਅਰਥਾਂ ਵਿੱਚ ਸੁੰਦਰ ਹੁੰਦਾ ਹੈ। ਉਸ ਦੇ ਹਰ ਕਾਰਜ ਵਿੱਚੋਂ ਚੰਗਿਆਈ ਦੀ ਮਹਿਕ ਖਿੱਲਰਦੀ ਹੈ। ਉਸ ਦੇ ਮੂੰਹੋਂ ਨਿਕਲਿਆ ਇੱਕ-ਇੱਕ ਸ਼ਬਦ ਦੁਖੀ ਲੋਕਾਂ ਦੇ ਮਨ ਨੂੰ ਠੰਢ ਪਾਉਂਦਾ ਹੈ। ਦੁਨੀਆਵੀ ਲੋਕ ਚੰਮ ਦੀ ਸੁੰਦਰਤਾ ਉੱਪਰ ਮੋਹਿਤ ਹੁੰਦੇ ਹਨ। ਇਹ ਉਹਨਾਂ ਨੂੰ ਵਕਤੀ ਖ਼ੁਸ਼ੀ ਜ਼ਰੂਰ ਦਿੰਦੀ ਹੈ, ਪਰ ਕੁੱਝ ਸਮੇਂ ਪਿੱਛੋਂ ਨਾ ਉਹ ਸੁੰਦਰਤਾ ਰਹਿੰਦੀ ਹੈ ਤੇ ਨਾ ਉਸ ਤੋਂ ਪ੍ਰਾਪਤ ਹੋਣ ਵਾਲੀ ਖੁਸ਼ੀ। ਮਨੁੱਖ ਦੇ ਸੁਹਣੇ ਤੇ ਨੇਕੀ ਭਰੇ ਕੰਮ ਆਲੇ-ਦੁਆਲੇ ਵਿੱਚ ਖੁਸ਼ੀ ਤੇ ਪ੍ਰੇਮ-ਪਿਆਰ ਦਾ ਪਸਾਰ ਕਰਦੇ ਹਨ। ਕੁੱਛ ਵਿੱਚ ਛੁਰੀ ਤੇ ਮੂੰਹੋਂ ਰਾਮ ਰਾਮ ਕਰਨ ਵਾਲਾ ਬੰਦਾ ਸਭ ਤੋਂ ਵੱਧ ਖਤਰਨਾਕ ਹੁੰਦਾ ਹੈ। ਇਸ ਲਈ ਸੋਹਣਾ ਬੰਦਾ ਉਹ ਹੀ ਹੁੰਦਾ ਹੈ, ਜਿਸ ਦੇ ਕੰਮ ਸੋਹਣੇ ਹੁੰਦੇ ਹਨ। ਕੇਵਲ ਸ਼ਕਲ ਦੀ ਸੁੰਦਰਤਾ ਦੇ ਮਾਲਕ ਨੂੰ ਅਸਲ ਸੋਹਣਾ ਨਹੀਂ ਕਿਹਾ ਜਾ ਸਕਦਾ।

118. ਉਪਰੋਕਤ ਪੈਰੇ ਅਨੁਸਾਰ ਕਿਹੋ ਜਿਹੀ ਪਰਵਿਰਤੀ ਵਾਲਾ ਬੰਦਾ ਸਭ ਤੋਂ ਵਧੇਰੇ ਖਤਰਨਾਕ ਹੁੰਦਾ ਹੈ?

   (a)   ਜਿਹੜਾ ਸਾਰਿਆਂ ਨਾਲ ਨਫ਼ਰਤ ਕਰੇ।

   (b)   ਜਿਹੜਾ ਹਰ ਇੱਕ ਨੂੰ ਗੁੱਸੇ ਵਿੱਚ ਬੋਲੇ।

   (c)   ਜਿਹੜਾ ਅੰਦਰੋਂ ਹੋਰ ਤੇ ਬਾਹਰੋਂ ਹੋਰ ਹੋਵੇ।

   (d)   ਜਿਹੜਾ ਅਨੈਤਿਕ ਗੁਣਾਂ ਨਾਲ ਭਰਪੂਰ ਹੋਵੇ।

119. ਪੈਰੇ ਮੁਤਾਬਿਕ ਸਦੀਵੀ ਸੁੰਦਰਤਾ ਕਿਵੇਂ ਆਉਂਦੀ ਹੈ?

   (a)   ਸੁੰਦਰ ਆਤਮਾ ਅਤੇ ਮਨ ਨਾਲ ਕੀਤੇ ਕਾਰਜਾਂ ਕਾਰਣ

   (b)   ਚੰਮ ਦੀ ਸੁੰਦਰਤਾ ਨੂੰ ਦਰ ਕਿਨਾਰ ਕਰਕੇ

   (c)   ਮੂੰਹ ਤੋਂ ਰਾਮ ਰਾਮ ਬੋਲ ਕੇ

   (d)   ਦੁਨਿਆਵੀ ਲੋਕਾਂ ਨਾਲ ਮੋਹ ਘਟਾ ਕੇ

120. ਉਪਰੋਕਤ ਪੈਰੇ ਦਾ ਸਿਰਲੇਖ ਕੀ ਹੈ?

   (a)   ਸੂਰਤ ਦੀ ਮਹੱਤਤਾ।

   (b)   ਸੀਰਤ ਦੀ ਮਹੱਤਤਾ।

   (c)   ਪਿਆਰ ਦੀ ਮਹੱਤਤਾ।

   (d)   ਨੈਤਿਕ ਗੁਣਾਂ ਦੀ ਮਹੱਤਤਾ।

SPACE FOR ROUGH WORK

SPACE FOR ROUGH WORK

Booklet Sr. No.

Question Booklet Set

B

Candidate's Name _____

Father's Name _____

Date of Birth : ☐☐ ☐☐ ☐☐☐☐
          D D   M M   Y Y Y Y

OMR Response Sheet No. _____ **Roll No.** _____

Candidate's Signature :

(Please sign in the box)

[Total Questions : **120**]

[Time Allowed : **2** Hours]

INSTRUCTIONS

1. The candidate shall NOT open this booklet till the time they are told to do so by the Invigilation Staff. However, in the meantime, the candidate can read these instructions carefully and subsequently fill the appropriate columns given above in CAPITAL letters. The candidate may also fill the relevant boxes 1 to 9 of the Optical Mark Reader (OMR) response sheet, supplied separately.

2. Use only blue or black **ball point pen** to fill the relevant columns on this page as well as in OMR sheet. Use of Ink pen or any other pen is not allowed.

3. Other than filling credentials/information in specific space allotted above, do not write anything else on the Test Booklet. Space for rough work is provided at the end. The candidate shall be liable for any adverse effect if the information given above is wrong or illegible or incomplete.

4. Each candidate is required to attempt 120 questions in 120 minutes, except for orthopedically/visually impaired candidates, who would be given 40 extra minutes, for marking correct responses on the OMR sheet.

5. The question paper booklet has **24** pages.

6. The candidates, when allowed to open the question paper booklet, must first check the entire booklet to confirm that the booklet has complete number of pages, the pages are printed correctly and there are no blank or torn pages. In case there is any such error in the question paper booklet then the candidate should IMMEDIATELY bring this fact to the notice of the Invigilation Staff and obtain a new booklet of the same series as given earlier.

7. The serial number of the new Question booklet, if issued for some reason, should be entered in the relevant column of the OMR. The Invigilation Staff must make necessary corrections in their record regarding the change in the serial no. of Question booklet.

8. The paper consists of total 480 Marks. Each question shall carry 4 marks. There are four options for each question and the candidate has to mark the MOST APPROPRIATE answer on the OMR response sheet.

9. There is **negative marking** (1 mark for each question) for questions wrongly answered by the candidate.

10. If a candidate gives more than one answer, it will be treated as a wrong answer even if one of the given answers is correct. There will be same penalty, as above, to that question.

11. If Question is left blank, i.e. question remains unattempted, there will be no penalty for that question.

12. Use of Electronic/Manual Calculator is prohibited.

13. The candidate **MUST READ INSTRUCTIONS BEHIND THE OMR SHEET** before answering the questions and check that two carbon copies attached to the OMR sheet are intact.

1. The maximum velocity in circular section is developed when the proportionate depth is:

   (a) 0.91   (b) 0.81   (c) 0.71   (d) 0.61

2. If the mean precipitation over a region is calculated as 200 mm, and there are 5 stations with recorded precipitation values of 180 mm, 220 mm, 190 mm, and 210 mm, what is the value of the missing fifth station?

   (a) 200 mm   (b) 210 mm   (c) 220 mm   (d) 230 mm

3. Using the normal-ratio method, estimate the missing rainfall (P4) for a station given the following data: Station 1 ($P1 = 80$ mm, $N1 = 90$), Station 2 ($P2 = 120$ mm, $N2 = 110$), Station 3 ($P3 = 100$ mm, $N3 = 105$), and the normal annual rainfall of the missing station ($N4 = 100$).

   (a) 98 mm   (b) 100 mm   (c) 102 mm   (d) 105 mm

4. Given a unit hydrograph with a peak flow of 100 m^3/s for a rainfall excess of 2 mm, what is the peak flow for a rainfall excess of 5 mm?

   (a) 100 m^3/s   (b) 150 m^3/s   (c) 200 m^3/s   (d) 250 m^3/s

5. Using the S-curve method, a 6-hour unit hydrograph has a peak flow of 80 m^3/s. What is the peak flow for a 12-hour unit hydrograph derived from this 6-hour unit hydrograph?

   (a) 40 m^3/s   (b) 80 m^3/s   (c) 120 m^3/s   (d) 160 m^3/s

6. Consider the following statements:

   1. A unit hydrograph is helpful in estimating the runoff from a basin.

   2. The time between the peak rainfall and the peak discharge in a hydrograph is referred to as recession limb.

   3. An instantaneous unit hydrograph (IUH) represents the peak discharge of a river.

   4. The primary factor that differentiates a unit hydrograph from an instantaneous unit hydrograph (IUH) is the duration of effective rainfall.

   Which of the above statements are correct?

   (a) 1 and 4 only

   (b) 2 and 3 only

   (c) 1, 3 and 4 only

   (d) 1, 2 and 4 only

7. Consider the following statements:

1. Darcy's law governs the flow of groundwater through porous media.
2. According to Darcy's Law, the flow rate (Q) through a porous medium is proportional to the hydraulic conductivity (K) of the medium and the hydraulic gradient (i).
3. According to Darcy's law the discharge is inversely proportional to the length of path.

Which of the above statements are correct?

(a) 1 and 2 only

(b) 2 and 3 only

(c) 1 and 3 only

(d) 1, 2 and 3

8. Consider the following statements:

1. The settling velocity of a spherical particle in still water is given by Stoke's law.
2. The self-purification of streams can be modelled using Streeter Phelps model.

Which of the above statements is/are ***incorrect***?

(a) 1 only

(b) 2 only

(c) Both 1 and 2 are incorrect

(d) Neither 1 nor 2 is incorrect

9. Which of the following is an infiltration index?

(a) Evaporation index

(b) Phi index

(c) Runoff coefficient

(d) Manning's coefficient

10. Which of the following best describes the initial abstraction (Ia) in the SCS-CN method?

(a) The total runoff

(b) The initial loss of rainfall due to interception, infiltration, and surface storage

(c) The evaporation loss

(d) The peak discharge

11. Consider the following statements:

    1.   Erosion from the watershed is the primary cause of sedimentation in reservoirs.

    2.   Spillway capacity is the term for the maximum amount of water that can be supplied by a reservoir without failure over a specified period.

    Which of the above statements is/are correct?

    (a)   1 only

    (b)   2 only

    (c)   Both 1 and 2

    (d)   Neither 1 nor 2

12. The initial rate of infiltration of a watershed is estimated as 2.1 in/h, the final capacity is 0.2 in/h, and the time constant, k, is 0.4 h-1. What is the infiltration capacity at t = 2h ? (Use Horton's Infiltration Equation)

    (a)   1.95 in/h

    (b)   1.55 in/h

    (c)   1.75 in/h

    (d)   1.05 in/h

13. Consider the following statements in context of aquifers and aquifer parameters:

    1.   A confined aquifer is a type of aquifer which is directly recharged by surface water.

    2.   The term "specific yield" refers to the volume of water that can be drained by gravity.

    3.   When designing tube wells for water extraction from a confined aquifer, the most crucial parameter for determining the optimal spacing between wells to avoid excessive drawdown is the transmissivity of the aquifer.

    Which of the above statements are correct?

    (a)   1 and 2 only

    (b)   2 and 3 only

    (c)   1 and 3 only

    (d)   1, 2 and 3

14. If a rain gauge records 50 mm of rain in a day, how much water is collected in litres per square meter?

    (a)   5 L/m^2 (b)   50 L/m^2

    (c)   500 L/m^2 (d)   5000 L/m^2

15. A catchment of area 120 ha has a time of concentration of 30 min and runoff coefficient of 0.4. If a storm of duration 45 min results in 3.0 cm of rain over the catchment, estimate the resultant peak flow rate.

(a) $5.33 \text{ m}^3/\text{s}$ (b) $5.01 \text{ m}^3/\text{s}$ (c) $6.02 \text{ m}^3/\text{s}$ (d) $6.22 \text{ m}^3/\text{s}$

16. If a tube well is constructed to a depth of 50 m and it draws water from an aquifer with a saturated thickness of 30 m, what is the effective depth of the well?

(a) 20 m (b) 30 m (c) 50 m (d) 80 m

17. A small catchment of area 300 ha received a rainfall of 12.5 cm in 3 hours. At the outlet of the catchment the measured runoff lasted for 10 hours with an average discharge value of $3.125 \text{ m}^3/\text{s}$. The stream was dry before and after the runoff event. What is the runoff coefficient?

(a) 0.1 (b) 0.2 (c) 0.3 (d) 0.6

18. Which parameter significantly influences the initial steepness of the infiltration capacity curve in a soil infiltration model?

(a) The soil's porosity

(b) The antecedent moisture content of the soil

(c) The surface roughness of the land

(d) The depth of the groundwater table

19. A region has recorded annual maximum rainfall data for 30 years. Using the Gumbel distribution, the mean annual maximum rainfall is found to be 150 mm, and the standard deviation is 20 mm. Calculate the 100-year return period rainfall.

(Gumbel distribution formula $X_T = \mu + K_T \cdot \sigma$, where $K_T = -ln(-ln(1-1/T))$, μ is the mean, σ is the standard deviation, and T is the return period.)

(a) 175 mm   (b) 190 mm
(c) 210 mm   (d) 230 mm

20. A catchment area of 200 square kilometers experiences a rainfall event with an intensity of 40 mm/hr lasting for 3 hours. Assuming a runoff coefficient of 0.7 and using the Rational Method, calculate the peak discharge in cubic meters per second.

(a) $1,555 \text{ m}^3/\text{s}$

(b) $2,800 \text{ m}^3/\text{s}$

(c) $3,111 \text{ m}^3/\text{s}$

(d) $4,444 \text{ m}^3/\text{s}$

21. For a given watershed, the curve number (CN) is calculated based on land use, soil type, and antecedent moisture condition (AMC). If the AMC changes from dry to wet, what is the expected effect on the curve number?

    (a) The curve number decreases

    (b) The curve number remains unchanged

    (c) The curve number increases

    (d) The curve number first decreases, then increases

22. In a watershed with varying land uses, which method of runoff estimation is the most sensitive to changes in land cover, particularly with respect to impervious surfaces?

    (a) Rational method   (b) SCS Curve Number method

    (c) Green-Ampt infiltration model   (d) Unit hydrograph method

23. Which method is most appropriate for determining the yield of a reservoir where inflow exhibits significant seasonal variability?

    (a) Mass curve analysis

    (b) Sequent Peak Algorithm

    (c) Frequency analysis of inflows

    (d) Sediment rating curve analysis

24. Which technique/method is used to measure dissolved oxygen in water?

    (a) Winkler method   (b) Turbidity method

    (c) Streeter method   (d) LaGrange method

25. Which of the following is *not* an example of a natural buffer system?

    (a) Carbonic acid-bicarbonate buffer system

    (b) Phosphate buffer system

    (c) Ammonia buffer system

    (d) Potassium bicarbonate buffer system

26. Which of the following statements is true about MSW treatment techniques?

    1. Composting of MSW is most commonly aerobic

    2. Bio methanation of MSW is most commonly aerobic

    Choose the correct option:

    (a) 1 only   (b) 2 only

    (c) Both 1 and 2   (d) Neither 1 nor 2

27. Which of the following statements is correct regarding solid waste management rules framed by the Government of India?

   (a) Municipal Solid Wastes (Management & Handling) Rules were first notified in 2010

   (b) Disposing construction and demolition waste is a part Solid waste Management rules 2017

   (c) Solid Waste management rules notified in 2016 mandated source segregation of waste

   (d) India doesn't have any Solid waste management rules

28. Which of the following statements is **not** true?

   (a) CNG is stored in high-pressure cylinders.

   (b) CNG has less energy density compared to LNG.

   (c) PNG is commonly used for long-distance transportation of natural gas across oceans.

   (d) CNG infrastructure is less expensive and more widely available compared to LNG infrastructure.

29. In the context of water resource management, what does the term "aquifer overdraft" refer to?

   (a) The enhancement of aquifer recharge rates through artificial methods

   (b) The excessive withdrawal of groundwater leading to long-term depletion

   (c) The increase in groundwater storage due to reduced extraction

   (d) The balance between groundwater recharge and discharge

30. Which of the following orders correctly represents the environment-related acts in India based on their first enactment date, from the earliest to the latest?

   (a) Water (Prevention and Control of Pollution) Act, Air (Prevention and Control of Pollution) Act, Environment (Protection) Act, Biological Diversity Act.

   (b) Water (Prevention and Control of Pollution) Act, Biological Diversity Act, Air (Prevention and Control of Pollution) Act, Environment (Protection) Act.

   (c) Water (Prevention and Control of Pollution) Act, Environment (Protection) Act, Air (Prevention and Control of Pollution) Act, Biological Diversity Act.

   (d) Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Environment (Protection) Act, Biological Diversity Act.

31. Which of the following statements is ***not*** true about nuclear waste management?

(a) High-level radioactive waste requires isolation for thousands of years to prevent radiation exposure to humans and the environment.

(b) Deep geological repositories are considered one of the safest methods for the long-term storage of high-level nuclear waste.

(c) Low-level radioactive waste can be safely disposed of in near-surface disposal facilities without any further treatment.

(d) Nuclear waste reprocessing can reduce the volume of high-level waste but does not eliminate the need for long-term storage solutions.

32. Which soil characteristic is most likely to increase ammonia volatilization following fertilizer application?

(a) Low soil moisture content

(b) High soil organic matter

(c) High cation exchange capacity

(d) High soil pH

33. Which of the following statements about ecosystems is ***not*** true?

(a) Liebig's law states that growth only occurs at the rate permitted by the most non-limiting factor.

(b) The Ramsar Convention was signed in 1971 and became effective in 1975.

(c) The carrying capacity of a population is determined by its limiting resources and represents the maximum number of individuals that an ecosystem can support based on available resources under specific conditions.

(d) A Red Data Book is a document that keeps a record of all the endangered species of animals, plants, and fungi in a country or a state.

34. Which of the following factors is least likely to affect the efficiency of a rooftop water heater?

(a) Sunlight exposure   (b) Tilt and orientation

(c) Water quality   (d) Type of roofing material used

35. Which of the following statements is ***not*** true?

(a) The Environment (Protection) Act made Environmental Impact Assessment statutory.

(b) Screening is a step to identify and prioritize the key environmental issues and impacts to be addressed in the Environmental Impact Assessment.

(c) Pollution Control Boards may also participate in EIA of a project.

(d) The Environmental Impact Assessment 2006 divides the projects into three categories.

36. Which of the following statements is **not** true?

(a) The Convention on Long-range Transboundary Air Pollution (CLRTAP) is an international treaty that specifically addresses CO_2 across national boundaries.

(b) 1985 Helsinki Protocol, 1994 Oslo Protocol and 1999 Gothenburg Protocol fall under the Convention on Long-range Transboundary Air Pollution (CLRTAP).

(c) One of the principles in Rio Declaration states that environmental issues are best handled with the participation of all concerned citizens, at the relevant level.

(d) Acid rains can damage leaves and bark, making trees more susceptible to disease and pests.

37. Based on the information from the graph below:
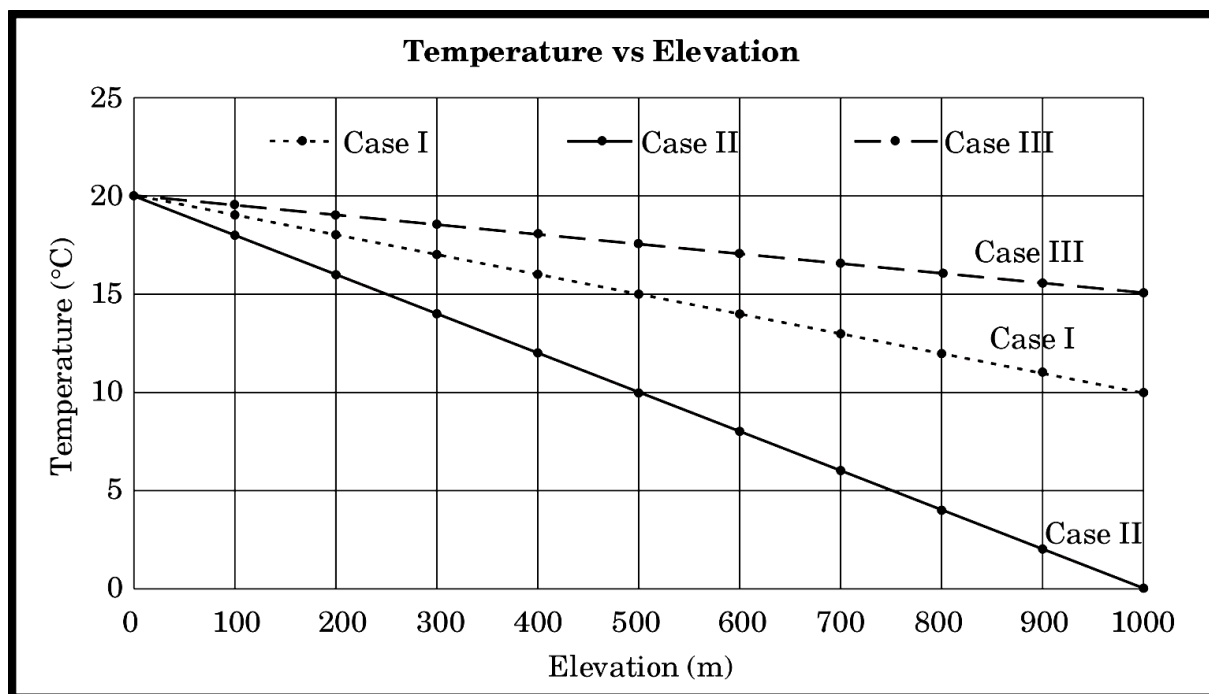
Choose the correct statement:

(a) Case 1 closely represents neutral conditions

(b) Case 2 closely represents neutral conditions

(c) Case 3 closely represents neutral conditions

(d) Both cases 1 and 2 closely represent neutral conditions

38. Consider the following statements:

1. Gravimetric method is used to measure Respirable Particulate Matter.

2. Chemiluminescence is the method used to measure Ozone.

Which of the above statements is/are **incorrect**?

(a) 1 only   (b) 2 only

(c) Both 1 and 2   (d) Neither 1 nor 2

39. Consider the following statements about Catalytic converters:

1. Catalytic converters primary target Carbon monoxide, nitrogen dioxides and hydrocarbons in vehicle exhaust systems.

2. A catalytic convertor helps in reducing nitrogen oxides (NOx) in vehicle emissions by converting NOx into nitrogen and oxygen through a reduction reaction.

3. Aluminum and copper are typically used as catalysts in catalytic converters to facilitate the conversion of harmful gases.

Which of the above statements is/are correct?

(a) 1 only

(b) 1 and 2 only

(c) 3 only

(d) 1 and 3 only

40. How does the air-fuel ratio in spark ignition engines influence the emission of pollutants?

(a) A lean air-fuel mixture (excess air) typically reduces carbon monoxide and hydrocarbon emissions but may increase nitrogen oxides emissions.

(b) A rich air-fuel mixture (excess fuel) reduces all emissions due to complete combustion.

(c) A stoichiometric air-fuel ratio (ideal balance) maximizes particulate matter emissions.

(d) The air-fuel ratio has no impact on emissions as long as the engine is properly tuned.

41. In the context of VOC emission control, consider the following statements:

1. Installation of carbon capture and storage systems is often implemented to limit VOC emissions from automotive refueling operations.

2. The primary purpose of using an activated carbon adsorption system is to capture and concentrate VOCs for subsequent disposal or recovery.

Which of the above statements is/are correct?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

42. A factory emits a pollutant continuously from a stack at a rate of 200 g/s. The wind speed at the stack of 40 m height is 5 m/s. Assuming that plume rise is negligible, the plume spread parameters at a downwind distance of 500 m in the horizontal (y) and vertical (z) directions are 100 m and 50 m, respectively. The ground-level concentration of the pollutant along the centerline at that distance is _____.

(a)   1.85 mg/m^3

(b)   2.3 mg/m^3

(c)   1.85 µg/m^3

(d)   2.3 µg/m^3

43. A factory emits a pollutant continuously from a stack of 40 m height. The wind speed at the stack is 5 m/s. Assuming that plume rise is negligible, the plume spread parameters at a downwind distance of 500 m in the horizontal (y) and vertical (z) directions are 80 m and 35 m, respectively. If the ground-level concentration of the pollutant along the centerline at that distance is 0.0355 g/m³, the factory emits a pollutant continuously from a stack at a rate of _____.

(a)   200 g/s

(b)   2 kg/s

(c)   300 g/s

(d)   3 kg/s

44. Which of the following statements is **not** true according to the National Ambient Air Quality Standards (Central Pollution Control Board, Government of India, notification 2009)?

(a)   Annual standard for Sulphur dioxide is greater than its corresponding daily standard.

(b)   The hourly averaged standard for Carbon Monoxide is 4 mg/m^3.

(c)   The annual averaged standard for $PM_{2.5}$ is 40 µg/m^3.

(d)   Mercury is not a part of National Ambient Air Quality Standards.

45. The most important precursors for Ozone formation in ambient air are:

(a)   NOx and VOCs

(b) CO_2 and VOCs

(c) CO_2 and NOx

(d) H_2 and NOx

46. Which class of micro-organisms are most active in anaerobic digestion of sludge?

(a)   Mesophiles and psychrophiles

(b)   Thermophiles and psychrophiles

(c)   Thermophiles and mesophiles

(d)   Halophiles and mesophiles

47. Algae can be very beneficial, but they cause a problem when they remove:

(a)   Iron

(b)   Nitrates

(c)   Ammonium

(d)   Phosphorous

48. The time of contact for chlorination should be at least:

(a) 5 minutes
(b) 20 minutes

(c) 1 hour
(d) 2 hours

49. In the context of water treatment, odour and taste are controlled by:

(a) Disinfection
(b) Aeration

(c) Coagulation
(d) Soda-lime process

50. Which of the following treatment reduce salinity of water?

1. Flash mixing and sedimentation

2. Electrodialysis

3. Reverse Osmosis

4. Freezing

5. Filtration

(a) 1, 2, 3, 4 and 5
(b) 2, 3 and 4 only

(c) 1, 4 and 5 only
(d) 1, 2 and 4 only

51. The rate limiting step for the production of biogas from an anaerobic digestion of sludge is:

(a) Acidification
(b) Alkalisation

(c) Acetogenesis
(d) Methanogenesis

52. Which one of the following relations holds true for the specific growth rate (μ) of a microorganism in the stationary phase?

(a) $\mu = 0$
(b) $\mu = \mu_{max}$

(c) $\mu < 0$
(d) $0 < \mu < \mu_{max}$

53. Coagulation-flocculation with alum is performed:

(a) Immediately before chlorination
(b) Immediately after chlorination

(c) After rapid sand filtration
(d) Before rapid sand filtration

54. The settlement of a particle in the sedimentation tank is **not** affected by:

(a) Velocity of flow
(b) Viscosity of water

(c) Size and shape of solid
(d) Depth of the tank

55. Flocculated particles do **not** change their:

(a) Size
(b) Shape

(c) Weight
(d) Density

56. Which of the following is **not** a biological process for destroying organic compounds?

(a) Composting   (b) Trickling Filters

(c) Calcination   (d) Activated sludge

57. Bacteria that can survive with or without free oxygen, are known as:

(a) Aerobic bacteria   (b) Anaerobic bacteria

(c) Facultative bacteria   (d) None of the above

58. Total rainfall in a catchment area of 1200 km^2 during a 6 hour storm is 16 cm while surface runoff due to the storm is 1.2×10^8 m^3. The Φ index is:

(a) 0.1 cm/h

(b) 1.0 cm/h

(c) 0.2 cm/h

(d) Cannot be estimated with the given data

59. Water level in confined well:

(a) Increases with increase in the atmospheric pressure

(b) Decreases with increase in the atmospheric pressure

(c) Does not undergo any change with change in atmospheric pressure

(d) All of these

60. The temperature inside the earth rises by 1°C for the descend of every:

(a) 10 m   (b) 20-25 m

(c) 35-40 m   (d) 50-70 m

61. The assumption in the Thiem formula for discharge from an unconfined aquifer is:

(a) That the flow lines are radial and horizontal

(b) That the flow is turbulent

(c) That the soil is isotropic

(d) That the flow is unsteady

62. Interception Loss is:

(a) More towards the end of a storm

(b) More at the beginning of a storm

(c) Uniform throughout the storm

(d) Low in the beginning of the storm and gradually increases

63. Which of the following is a non-recording rain gauge:

(a) Tipping bucket type rain gauge

(b) Simon's rain gauge

(c) Steven's weighing type rain gauge

(d) Floating type rain gauge

64. Specific yield of an aquifer is:

(a) Proportional to soil porosity

(b) Volume of the water which drains freely

(c) Depends on the soil condition

(d) None of these

65. Consider the following statements:

1. The term "drawdown" refers to the volume of water withdrawn from the aquifer.

2. Discharge per unit of drawdown of a well is called its specific capacity.

3. Specific capacity of a well decreases with time from the start of pumping.

Which of the above statements are correct?

(a) 1 and 2 only   (b) 2 and 3 only

(c) 1 and 3 only   (d) 1, 2 and 3

66. The Air Quality Index (AQI) of a city is 190. It falls under which category?

(a) Very poor   (b) Poor

(c) Moderate   (d) Good

67. The following device works based on the inertial force of the particle:

(a) Fabric filter

(b) Electrostatic precipitator

(c) Cyclone separator

(d) Gravitational settling chamber

68. Concentration of ozone in clean air is _____ppm.

(a) 0.5   (b) 0.1

(c) 0.001   (d) 0.01

69. The aerobic method of composting as practiced in India is called as:

(a) Bangalore method   (b) Mangalore method

(c) Indore method   (d) Nagpur method

70. The volume of voids in a soil mass expressed as percentage of total volume of soil is known as:

(a) porosity   (b) voids ratio

(c) permeability   (d) specific yield

71. Consider the following statements:

1. Isohyets are the imaginary lines joining the points of equal rainfall.

2. Tensiometer is used to measure capillary potential.

Which of the above statements is/are correct?

(a) 1 only   (b) 2 only

(c) Both 1 and 2   (d) Neither 1 nor 2

72. In denitrification _____ is converted to _____.

(a) Ammonia is converted to Nitrate

(b) Ammonia is converted Nitrite

(c) Nitrate is converted to Nitrogen

(d) Nitrite is converted to Nitrate

73. Which of the following is *incorrect* about Gaussian Dispersion Model for air pollution?

(a) Ambient temperature is not directly used in the Gaussian Dispersion Model.

(b) It assumes uniform wind speed and direction over the dispersion area.

(c) Greater stability leads to a wider and more dispersed plume.

(d) It is used for prediction of concentration of air pollutants from point sources.

74. Global warming potential of Carbon dioxide is:

(a) 1   (b) 2

(c) Infinite   (d) 0

75. What does the term "biogeochemical cycle" refer to?

(a) The movement of biotic factors across different biomes.

(b) The cycling of nutrients and elements through the biotic and abiotic components of the Earth.

(c) The process by which genetic material is exchanged between species.

(d) The migration patterns of species across continents.

76. Which of these closely explains the relationship between the size of an ecosystem and its species diversity?

(a) Competitive Exclusion Principle

(b) Theory of Evolution by Natural Selection

(c) Island Biogeography Theory

(d) Keystone Species Concept

77. In which sphere does the process of weathering primarily occur, and how does it affect the other spheres?
   (a) The biosphere; it enriches the soil with organic matter.
   (b) The atmosphere; it influences the climate and weather patterns.
   (c) The hydrosphere; it contributes to soil erosion and sediment transport.
   (d) The lithosphere; it breaks down rocks into soil that supports plant life in the biosphere.

78. What does the term "ecological footprint" specifically measure?
   (a) The total land area required to produce the resources consumed and absorb the waste generated by an individual, community, or country.
   (b) The economic cost associated with environmental degradation and resource depletion.
   (c) The carbon emissions produced by industrial activities and transportation.
   (d) The amount of natural resources available in a given geographical area.

79. A sustainable society:
   (a) Returns to a more primitive style of living.
   (b) Continues as always and assumes that things will work out for the best.
   (c) Meets the needs of the present without compromising those of the future.
   (d) Is inconsistent with the goals of environmentalism.

80. Which convention was adopted for the protection of ozone layer?
   (a) Vienna Convention   (b) Basel Convention
   (c) Rotterdam Convention   (d) Stockholm Convention

81. Calculating the value of GDP of two countries using the Purchasing Power Parity (PPP) method involves:
   (a) Expressing the value of both the countries' output in same currency.
   (b) Finding out what can be bought in each country with a unit of the local currency.
   (c) Comparing the inflation rates in each country.
   (d) Taking into account the exchange rate of each country's currency.

82. Consider the following statements with reference to indirect and direct taxes in India:
   1. In the case of indirect taxes, the incidence and impact of the tax are on the same person.
   2. Direct taxes are progressive in nature.
   3. While Income Tax is a type of direct tax, corporate tax is a type of indirect tax.
   Which of the statements given above is/are correct?
   (a) 2 only   (b) 2 and 3 only
   (c) 1 and 2 only   (d) 1, 2 and 3

83. The term secular was added to the Preamble by which amendment of the Indian Constitution?

(a) 42nd (b) 44th

(c) 46th (d) 51st

84. The Tropic of Cancer traverses through which of the following combination of countries?

(a) India, Philippines, China, Saudi Arabia, Egypt

(b) India, Egypt, China, Sri Lanka, Afghanistan

(c) India, China, Saudi Arabia, Egypt, Libya

(d) India, Egypt, China, Myanmar, Afghanistan

85. Match List I with List II and select answer from the codes given below.

	List I		List II
A.	Warren Hastings	I.	Prohibition of Sati
B.	Lord Wellesley	II.	Treaty of Amritsar with Ranjit Singh
C.	Lord Minto	III.	Subsidiary Alliance
D.	Lord William Bentick	IV.	Regulating Act of 1773

(a) A-III, B-IV, C-II, D-I   (b) A-I, B-IV, C-III, D-II

(c) A-IV, B-III, C-II, D-I   (d) A-IV, B-II, C-III, D-I

86. The Komagata Maru Affair merged with the programme of the:

(a) Congress Party   (b) Muslim League

(c) Ghadar Party   (d) Revolutionaries

87. South Asian Association for Regional Cooperation (SAARC) has been in news recently. Which of the following countries is ***not*** a part of SAARC?

(a) Afghanistan   (b) Maldives

(c) Sri Lanka   (d) Myanmar

88. The following phenomena appears in news frequently. Which of these has/have a bearing on Indian monsoon?

(a) El Nino and Southern Oscillation (ENSO)

(b) Indian Ocean Dipole (IOD)

(c) Both (a) and (b)

(d) Neither (a) nor (b)

Directions (89 to 93) : Study the following information to answer the given questions:

(1) In a class of boys and girls, Aman's rank is 12th and Manisha's rank is 8th.

(2) Aman's rank among the boys is 6th and Manisha's rank among girls is 3rd.

(3) In the class Manisha's rank is 52th from the other end.

(4) From the other end, Aman's rank among the boys is 26th.

89. How many boys are there in the class?
   - (a) 28
   - (b) 29
   - (c) 31
   - (d) Can't be determined

90. Which of the following is Manisha's rank among the girls from the other end?
   - (a) 26th
   - (b) 23rd
   - (c) 28th
   - (d) Can't be determined

91. How many boys are there before Manisha?
   - (a) 4
   - (b) 3
   - (c) 5
   - (d) Can't be determined

92. How many boys are there between Aman and Manisha?
   - (a) One
   - (b) Two
   - (c) Three
   - (d) None of these

93. How many girls are there before Aman?
   - (a) 6
   - (b) 5
   - (c) 7
   - (d) Can't be determined

94. N, M, O and P can do a piece of work in 80 days. N and M can together do the piece of work in 120 days, whereas O can do the piece of work in 360 days. In how many days P can finish the work?
   - (a) 660
   - (b) 360
   - (c) 240
   - (d) 720

95. If the selling price of an article is 8 % more than its cost price and the discount offered is 10 % on the marked price of the article, then what is the ratio of the cost price to the marked price?
   - (a) 5 : 6
   - (b) 8 : 9
   - (c) 4 : 5
   - (d) 3 : 4

96. The monthly incomes of two persons are in the ratio of 4:5 and their monthly expenditures are in the ratio of 7: 9. If each save ₹ 50 a month what are their monthly incomes:
   - (a) ₹ 100, ₹ 125
   - (b) ₹ 200, ₹ 250
   - (c) ₹ 300, ₹ 375
   - (d) ₹ 400, ₹ 500

97. Rohit starts from his house in his car and travels 10 km towards the North, then 8 km towards East then 12 km towards his right, 6 km towards his left, 10 km toward north and finely 2 km towards his right. In which direction is he now with reference to the starting point?
   - (a) North
   - (b) South
   - (c) North-east
   - (d) South-west

98. What is the *incorrect* number in the sequence: 25, 34, 49, 68, 91, 118, 149 ?
   - (a) 34
   - (b) 25
   - (c) 91
   - (d) 118

99. 'ਆਪਣੇ ਨੈਣ ਮੈਨੂੰ ਦੇ ਦੇ ਤੂੰ ਮਟਕਾਉਂਦੀ ਫਿਰ' ਅਖਾਣ ਦਾ ਕੀ ਅਰਥ ਹੈ?

(a) ਦੂਸਰੇ ਦੀ ਲੋੜ ਤੋਂ ਬੇਪਰਵਾਹ ਹੋ ਕੇ ਲੋੜੀਂਦੀ ਚੀਜ਼ ਮੰਗਣੀ।

(b) ਦੂਸਰੇ ਦੀ ਲੋੜ ਤੋਂ ਬੇਪਰਵਾਹ ਹੋ ਕੇ ਆਪਣੀ ਚੀਜ਼ ਦੇਣੀ।

(c) ਦੂਸਰੇ ਦੀ ਲੋੜ ਤੋਂ ਬੇਪਰਵਾਹ ਹੋ ਕੇ ਕੋਈ ਸਿੱਖਿਆ ਲੈਣੀ।

(d) ਦੂਸਰੇ ਦੀ ਲੋੜ ਤੋਂ ਬੇਪਰਵਾਹ ਹੋ ਕੇ ਕਿਸੇ ਨੂੰ ਸਿੱਖਿਆ ਦੇਣੀ।

100. 'ਬਿਨਾਂ ਯਤਨ ਕੀਤੇ ਇੱਛਾ ਪੂਰੀ ਹੋਣਾ' ਮੁਹਾਵਰੇ ਦੇ ਅਰਥ ਦੇ ਆਧਾਰ 'ਤੇ ਸਹੀ ਚੋਣ ਕਰੋ।

(a) ਭਿੱਜੀ ਬਿੱਲੀ ਬਣ ਜਾਣਾ   (b) ਬਿੱਲੀ ਲਈ ਛਿੱਕਾ ਟੁੱਟ ਪੈਣਾ

(c) ਭੁੰਨੇ ਤਿੱਤਰ ਉਡਾਉਣਾ   (d) ਭੂਤ ਸਵਾਰ ਹੋਣਾ

101. 'ਨਹੁੰ ਅੜ ਜਾਣਾ' ਮੁਹਾਵਰੇ ਤੋਂ ਕੀ ਭਾਵ ਹੈ?

(a) ਕੁਝ ਸਹਾਰਾ ਮਿਲ ਜਾਣਾ   (b) ਨਹੁੰ-ਮਾਸ ਦਾ ਰਿਸ਼ਤਾ ਹੋਣਾ

(c) ਮੁਸੀਬਤ ਪੈਦਾ ਹੋ ਜਾਣੀ   (d) ਰੰਗ ਵਿਚ ਭੰਗ ਪੈ ਜਾਣੀ

102. 'ਬੁੱਕਲ ਵਿਚ ਰੋੜੀ ਭੰਨਣੀ' ਮੁਹਾਵਰੇ ਤੋਂ ਕੀ ਭਾਵ ਹੈ?

(a) ਮੌਜ ਕਰਨੀ

(b) ਸਫਲ ਹੋ ਜਾਣਾ

(c) ਗੁਪਤ ਯਤਨ ਕਰਨਾ

(d) ਮਿਹਨਤ ਕਰਨੀ

103. ਸ਼ੁੱਧ ਪੰਜਾਬੀ ਰੂਪ ਕਿਹੜਾ ਹੈ?

(a) ਵੌਹੁਟੀ   (b) ਵੋਹਟੀ

(c) ਵਹੁਟੀ   (d) ਵੇਹੁਟੀ

104. "I Eat Bread" ਵਾਕ ਦਾ ਪੰਜਾਬੀ ਵਿਚ ਸ਼ੁੱਧ ਅਨੁਵਾਦ ਕਿਹੜਾ ਹੈ?

(a) ਮੈਂ ਰੋਟੀ ਖਾ ਰਿਹਾ ਹਾਂ।   (b) ਮੈਂ ਰੋਟੀ ਖਾ ਗਿਆ ਹਾਂ।

(c) ਮੈਂ ਰੋਟੀ ਖਾਂਦਾ ਹਾਂ।   (d) ਮੈਂ ਰੋਟੀ ਖਾ ਲਈ ਹੈ।

105. ਪੰਜਾਬ ਵਿਚ 'ਰੌਸ਼ਨੀਆਂ ਦਾ ਮੇਲਾ' ਕਿੱਥੇ ਲੱਗਦਾ ਹੈ?

(a) ਛਪਾਰ   (b) ਜਗਰਾਓਂ

(c) ਜਰਗ   (d) ਬਠਿੰਡਾ

ਹੇਠ ਲਿਖੇ ਪੈਰੇ ਵਿੱਚੋਂ **106** ਤੋਂ **108** ਤੱਕ ਪ੍ਰਸ਼ਨ ਹੱਲ ਕਰੋ।

ਇਸ ਕਥਨ ਵਿੱਚ ਸੌ ਫੀਸਦੀ ਸਚਾਈ ਹੈ ਕਿ ਅਸਲ ਸੋਹਣਾ ਉਹ ਹੁੰਦਾ ਹੈ, ਜੋ ਸੋਹਣਾ ਕੰਮ ਕਰਦਾ ਹੈ। ਅਸਲ ਸੋਹਣਾ ਉਹ ਨਹੀਂ ਹੁੰਦਾ ਜਿਸ ਦੀ ਸ਼ਕਲ ਸੋਹਣੀ ਹੋਵੇ, ਸਗੋਂ ਉਹ ਹੁੰਦਾ ਹੈ, ਜਿਹੜਾ ਆਤਮਿਕ ਤੇ ਮਾਨਸਿਕ ਤੌਰ ਤੇ ਸੋਹਣਾ ਹੋਵੇ, ਅਸਲ ਸੋਹਣਾ ਬਣਨ ਲਈ ਮਨੁੱਖ ਨੂੰ ਆਪਣੇ ਅੰਦਰ ਕੁੱਝ ਆਤਮਿਕ ਤੇ ਮਾਨਸਿਕ ਗੁਣ ਪੈਦਾ ਕਰਨੇ ਚਾਹੀਦੇ ਹਨ, ਸਰੀਰਕ ਸੁੰਦਰਤਾ ਥੁੜ-ਚਿਰੀ ਹੁੰਦੀ ਹੈ। ਇਹ ਸਮੇਂ ਨਾਲ ਨਾਸ ਹੋ ਜਾਂਦੀ ਹੈ। ਸੁੰਦਰ ਚਿਹਰਾ ਮਰਦ ਜਾਂ ਤੀਵੀਂ ਦੀ ਪੱਕੀ ਜਾਇਦਾਦ ਨਹੀਂ। ਇਹ ਕਿਸੇ ਦੀ ਬਿਮਾਰੀ ਜਾਂ ਦੁਰਘਟਨਾ ਨਾਲ ਉਸ ਪਾਸੋਂ ਖੁੱਸ ਸਕਦੀ ਹੈ। ਪਰੰਤੂ ਸੁੰਦਰ ਆਤਮਾ ਤੇ ਮਨ ਵਿੱਚੋਂ ਉਪਜੇ ਕਾਰਜ ਅਤੇ ਕਿਰਤਾਂ ਬੰਦੇ ਦੇ ਮਰਨ ਪਿੱਛੋਂ ਜਿਉਂਦੀਆਂ ਰਹਿੰਦੀਆਂ ਹਨ ਤੇ ਲੋਕਾਂ ਨੂੰ ਉਹਨਾਂ ਵਿੱਚ ਸੁੰਦਰਤਾ ਦੀ ਸਦੀਵੀ ਝਲਕ ਦਿਖਾਈ ਦਿੰਦੀ ਹੈ। ਉੱਚ ਨੈਤਿਕ ਗੁਣਾਂ ਤੇ ਆਦਰਸ਼ਾਂ ਵਾਲਾ ਬੰਦਾ ਭਾਵੇਂ ਸ਼ਕਲੋਂ ਕੋਝਾ ਵੀ ਹੋਵੇ, ਉਹ ਸਹੀ ਅਰਥਾਂ ਵਿੱਚ ਸੁੰਦਰ ਹੁੰਦਾ ਹੈ। ਉਸ ਦੇ ਹਰ ਕਾਰਜ ਵਿੱਚੋਂ ਚੰਗਿਆਈ ਦੀ ਮਹਿਕ ਖਿੱਲਰਦੀ ਹੈ। ਉਸ ਦੇ ਮੂੰਹੋਂ ਨਿਕਲਿਆ ਇੱਕ-ਇੱਕ ਸ਼ਬਦ ਦੁਖੀ ਲੋਕਾਂ ਦੇ ਮਨ ਨੂੰ ਠੰਡ ਪਾਉਂਦਾ ਹੈ। ਦੁਨੀਆਵੀ ਲੋਕ ਚੰਮ ਦੀ ਸੁੰਦਰਤਾ ਉੱਪਰ ਮੋਹਿਤ ਹੁੰਦੇ ਹਨ। ਇਹ ਉਹਨਾਂ ਨੂੰ ਵਕਤੀ ਖੁਸ਼ੀ ਜ਼ਰੂਰ ਦਿੰਦੀ ਹੈ, ਪਰ ਕੁੱਝ ਸਮੇਂ ਪਿੱਛੋਂ ਨਾ ਉਹ ਸੁੰਦਰਤਾ ਰਹਿੰਦੀ ਹੈ ਤੇ ਨਾ ਉਸ ਤੋਂ ਪ੍ਰਾਪਤ ਹੋਣ ਵਾਲੀ ਖੁਸ਼ੀ। ਮਨੁੱਖ ਦੇ ਸੁਹੱਣੇ ਤੇ ਨੇਕੀ ਭਰੇ ਕੰਮ ਆਲੇ-ਦੁਆਲੇ ਵਿੱਚ ਖੁਸ਼ੀ ਤੇ ਪ੍ਰੇਮ-ਪਿਆਰ ਦਾ ਪਸਾਰ ਕਰਦੇ ਹਨ। ਕੱਛ ਵਿੱਚ ਛੁਰੀ ਤੇ ਮੂੰਹੋਂ ਰਾਮ ਰਾਮ ਕਰਨ ਵਾਲਾ ਬੰਦਾ ਸਭ ਤੋਂ ਵੱਧ ਖਤਰਨਾਕ ਹੁੰਦਾ ਹੈ। ਇਸ ਲਈ ਸੋਹਣਾ ਬੰਦਾ ਉਹ ਹੀ ਹੁੰਦਾ ਹੈ, ਜਿਸ ਦੇ ਕੰਮ ਸੋਹਣੇ ਹੁੰਦੇ ਹਨ। ਕੇਵਲ ਸ਼ਕਲ ਦੀ ਸੁੰਦਰਤਾ ਦੇ ਮਾਲਕ ਨੂੰ ਅਸਲ ਸੋਹਣਾ ਨਹੀਂ ਕਿਹਾ ਜਾ ਸਕਦਾ।

106. ਉਪਰੋਕਤ ਪੈਰੇ ਅਨੁਸਾਰ ਕਿਹੋ ਜਿਹੀ ਪਰਵਿਰਤੀ ਵਾਲਾ ਬੰਦਾ ਸਭ ਤੋਂ ਵਧੇਰੇ ਖਤਰਨਾਕ ਹੁੰਦਾ ਹੈ?

    (a)   ਜਿਹੜਾ ਸਾਰਿਆਂ ਨਾਲ ਨਫ਼ਰਤ ਕਰੇ।

    (b)   ਜਿਹੜਾ ਹਰ ਇੱਕ ਨੂੰ ਗੁੱਸੇ ਵਿੱਚ ਬੋਲੇ।

    (c)   ਜਿਹੜਾ ਅੰਦਰੋਂ ਹੋਰ ਤੇ ਬਾਹਰੋਂ ਹੋਰ ਹੋਵੇ।

    (d)   ਜਿਹੜਾ ਅਨੈਤਿਕ ਗੁਣਾਂ ਨਾਲ ਭਰਪੂਰ ਹੋਵੇ।

107. ਪੈਰੇ ਮੁਤਾਬਿਕ ਸਦੀਵੀ ਸੁੰਦਰਤਾ ਕਿਵੇਂ ਆਉਂਦੀ ਹੈ?

    (a)   ਸੁੰਦਰ ਆਤਮਾ ਅਤੇ ਮਨ ਨਾਲ ਕੀਤੇ ਕਾਰਜਾਂ ਕਾਰਣ

    (b)   ਚੰਮ ਦੀ ਸੁੰਦਰਤਾ ਨੂੰ ਦਰ ਕਿਨਾਰ ਕਰਕੇ

    (c)   ਮੂੰਹ ਤੋਂ ਰਾਮ ਰਾਮ ਬੋਲ ਕੇ

    (d)   ਦੁਨਿਆਵੀ ਲੋਕਾਂ ਨਾਲ ਮੋਹ ਘਟਾ ਕੇ

108. ਉਪਰੋਕਤ ਪੈਰੇ ਦਾ ਸਿਰਲੇਖ ਕੀ ਹੈ?

    (a)   ਸੂਰਤ ਦੀ ਮਹੱਤਤਾ।

    (b)   ਸੀਰਤ ਦੀ ਮਹੱਤਤਾ।

    (c)   ਪਿਆਰ ਦੀ ਮਹੱਤਤਾ।

    (d)   ਨੈਤਿਕ ਗੁਣਾਂ ਦੀ ਮਹੱਤਤਾ।

109. The hydraulic loading in the high-rate trickling filters should be in the range of $(m^3/d/m^2)$:

(a) 150 – 180

(b) 100 – 130

(c) 50 – 80

(d) 10 – 30

110. Consider the following statements:

1. The Trickling filter is used for the biological treatment of both domestic sewage and industrial waste.
2. Reciprocating screens are used for removal of oversized materials from municipal solid waste.

Which of the above statements is/are correct?

(a) 1 only   (b) 2 only   (c) Both 1 and 2   (d) Neither 1 nor 2

111. Which of the following statements is/are *incorrect* regarding landfills?

1. Trench landfilling, area landfilling, slope landfilling are different types of landfills.
2. Leachate is a coloured liquid that comes out of sanitary landfills.
3. High concentration of ammonia is produced in facultative decomposition stage.

Choose the correct option:

(a) 1 and 2 only

(b) 2 and 3 only

(c) 3 only

(d) None is incorrect

112. The C/N ratio for composting should be in the range of:

(a) 50:1   (b) 25:1   (c) 75:1   (d) 100:1

113. Which is *not* a composting method?

(a) Windrow method

(b) Static Pile method

(c) In-vessel method

(d) In-circular method

114. The BOD5 in the leachate is seen in the range as (mg/lt):

(a) 2,000 – 30,000

(b) 31,000 – 40,000

(c) 40,000 – 50,000

(d) more than 50,000

115. The physical tests of water include the following:

(a) Temperature, Colour and Turbidity

(b) Specific gravity, Colour and Turbidity

(c) pH, Specific gravity and Temperature

(d) Hardness, pH, and Temperature

116. The chlorides should be in the range for water supply (domestic):

(a) up to 250 ppm

(b) up to 500 ppm

(c) up to 750 ppm

(d) up to 1000 ppm

117. The detention time in sedimentation tank can be obtained by:

(a) Perimeter of the tank / Rate of flow of water

(b) Rate of flow of water / Perimeter of the tank

(c) Capacity of the tank / Rate of flow of water

(d) Rate of flow of water / Capacity of the tank

118. The main variables of the activated sludge process are:

(a) loading rate, mixing regime and flow scheme

(b) output, biological regime and pH

(c) biological regime, pH, density

(d) pH, density, hardness

119. Consider the following statements regarding Rotating Biological Contactor:

1. Rotating biological contactor treatment technology of wastewater is based on the attached growth process.

2. Rotating biological contactor (RBC) is sensitive to temperature.

3. It has low capital cost.

Which of the above statements is/are correct?

(a) 1 only

(b) 1 and 2 only

(c) 3 only

(d) 1, 2 and 3

120. Consider the following statements:

1. Peak factor for the sewer design is the ratio of maximum flows to average flows.

2. The minimum size of public sewer in plains should not be less than 150 mm.

Which of the above statements is/are correct?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

SPACE FOR ROUGH WORK

Booklet Sr. No.

Question Booklet Set

C

Candidate's Name _____

Father's Name _____

Date of Birth : ☐☐ ☐☐ ☐☐☐☐
      D D   M M   Y Y Y Y

OMR Response Sheet No. _____ **Roll No.** _____

Candidate's Signature :
(Please sign in the box)

[Total Questions : **120**]
[Time Allowed : **2** Hours]

INSTRUCTIONS

1. The candidate shall NOT open this booklet till the time they are told to do so by the Invigilation Staff. However, in the meantime, the candidate can read these instructions carefully and subsequently fill the appropriate columns given above in CAPITAL letters. The candidate may also fill the relevant boxes 1 to 9 of the Optical Mark Reader (OMR) response sheet, supplied separately.

2. Use only blue or black **ball point pen** to fill the relevant columns on this page as well as in OMR sheet. Use of Ink pen or any other pen is not allowed.

3. Other than filling credentials/information in specific space allotted above, do not write anything else on the Test Booklet. Space for rough work is provided at the end. The candidate shall be liable for any adverse effect if the information given above is wrong or illegible or incomplete.

4. Each candidate is required to attempt 120 questions in 120 minutes, except for orthopedically/visually impaired candidates, who would be given 40 extra minutes, for marking correct responses on the OMR sheet.

5. The question paper booklet has **24** pages.

6. The candidates, when allowed to open the question paper booklet, must first check the entire booklet to confirm that the booklet has complete number of pages, the pages are printed correctly and there are no blank or torn pages. In case there is any such error in the question paper booklet then the candidate should IMMEDIATELY bring this fact to the notice of the Invigilation Staff and obtain a new booklet of the same series as given earlier.

7. The serial number of the new Question booklet, if issued for some reason, should be entered in the relevant column of the OMR. The Invigilation Staff must make necessary corrections in their record regarding the change in the serial no. of Question booklet.

8. The paper consists of total 480 Marks. Each question shall carry 4 marks. There are four options for each question and the candidate has to mark the MOST APPROPRIATE answer on the OMR response sheet.

9. There is **negative marking** (1 mark for each question) for questions wrongly answered by the candidate.

10. If a candidate gives more than one answer, it will be treated as a wrong answer even if one of the given answers is correct. There will be same penalty, as above, to that question.

11. If Question is left blank, i.e. question remains unattempted, there will be no penalty for that question.

12. Use of Electronic/Manual Calculator is prohibited.

13. The candidate **MUST READ INSTRUCTIONS BEHIND THE OMR SHEET** before answering the questions and check that two carbon copies attached to the OMR sheet are intact.

1. Which of the following is a non-recording rain gauge:
   (a) Tipping bucket type rain gauge
   (b) Simon's rain gauge
   (c) Steven's weighing type rain gauge
   (d) Floating type rain gauge

2. Specific yield of an aquifer is:
   (a) Proportional to soil porosity
   (b) Volume of the water which drains freely
   (c) Depends on the soil condition
   (d) None of these

3. Consider the following statements:
   1. The term "drawdown" refers to the volume of water withdrawn from the aquifer.
   2. Discharge per unit of drawdown of a well is called its specific capacity.
   3. Specific capacity of a well decreases with time from the start of pumping.
   Which of the above statements are correct?
   (a) 1 and 2 only   (b) 2 and 3 only
   (c) 1 and 3 only   (d) 1, 2 and 3

4. The Air Quality Index (AQI) of a city is 190. It falls under which category?
   (a) Very poor   (b) Poor
   (c) Moderate   (d) Good

5. The following device works based on the inertial force of the particle:
   (a) Fabric filter
   (b) Electrostatic precipitator
   (c) Cyclone separator
   (d) Gravitational settling chamber

6. Concentration of ozone in clean air is _____ppm.
   (a) 0.5   (b) 0.1
   (c) 0.001   (d) 0.01

7. The aerobic method of composting as practiced in India is called as:
   (a) Bangalore method   (b) Mangalore method
   (c) Indore method   (d) Nagpur method

8. The volume of voids in a soil mass expressed as percentage of total volume of soil is known as:

   (a)   porosity   (b)   voids ratio

   (c)   permeability   (d)   specific yield

9. Consider the following statements:

   1.   Isohyets are the imaginary lines joining the points of equal rainfall.

   2.   Tensiometer is used to measure capillary potential.

   Which of the above statements is/are correct?

   (a)   1 only   (b)   2 only

   (c)   Both 1 and 2   (d)   Neither 1 nor 2

10. In denitrification _____ is converted to _____.

   (a)   Ammonia is converted to Nitrate

   (b)   Ammonia is converted Nitrite

   (c)   Nitrate is converted to Nitrogen

   (d)   Nitrite is converted to Nitrate

11. Which of the following is *incorrect* about Gaussian Dispersion Model for air pollution?

   (a)   Ambient temperature is not directly used in the Gaussian Dispersion Model.

   (b)   It assumes uniform wind speed and direction over the dispersion area.

   (c)   Greater stability leads to a wider and more dispersed plume.

   (d)   It is used for prediction of concentration of air pollutants from point sources.

12. Global warming potential of Carbon dioxide is:

   (a)   1   (b)   2

   (c)   Infinite   (d)   0

13. What does the term "biogeochemical cycle" refer to?

   (a)   The movement of biotic factors across different biomes.

   (b)   The cycling of nutrients and elements through the biotic and abiotic components of the Earth.

   (c)   The process by which genetic material is exchanged between species.

   (d)   The migration patterns of species across continents.

14. Which of these closely explains the relationship between the size of an ecosystem and its species diversity?

   (a)   Competitive Exclusion Principle

   (b)   Theory of Evolution by Natural Selection

   (c)   Island Biogeography Theory

   (d)   Keystone Species Concept

15. In which sphere does the process of weathering primarily occur, and how does it affect the other spheres?

    (a) The biosphere; it enriches the soil with organic matter.

    (b) The atmosphere; it influences the climate and weather patterns.

    (c) The hydrosphere; it contributes to soil erosion and sediment transport.

    (d) The lithosphere; it breaks down rocks into soil that supports plant life in the biosphere.

16. What does the term "ecological footprint" specifically measure?

    (a) The total land area required to produce the resources consumed and absorb the waste generated by an individual, community, or country.

    (b) The economic cost associated with environmental degradation and resource depletion.

    (c) The carbon emissions produced by industrial activities and transportation.

    (d) The amount of natural resources available in a given geographical area.

17. A sustainable society:

    (a) Returns to a more primitive style of living.

    (b) Continues as always and assumes that things will work out for the best.

    (c) Meets the needs of the present without compromising those of the future.

    (d) Is inconsistent with the goals of environmentalism.

18. Which convention was adopted for the protection of ozone layer?

    (a) Vienna Convention   (b) Basel Convention

    (c) Rotterdam Convention   (d) Stockholm Convention

19. Calculating the value of GDP of two countries using the Purchasing Power Parity (PPP) method involves:

    (a) Expressing the value of both the countries' output in same currency.

    (b) Finding out what can be bought in each country with a unit of the local currency.

    (c) Comparing the inflation rates in each country.

    (d) Taking into account the exchange rate of each country's currency.

20. Consider the following statements with reference to indirect and direct taxes in India:

    1. In the case of indirect taxes, the incidence and impact of the tax are on the same person.

    2. Direct taxes are progressive in nature.

    3. While Income Tax is a type of direct tax, corporate tax is a type of indirect tax.

    Which of the statements given above is/are correct?

    (a) 2 only   (b) 2 and 3 only

    (c) 1 and 2 only   (d) 1, 2 and 3

21. The term secular was added to the Preamble by which amendment of the Indian Constitution?

(a) 42nd

(b) 44th

(c) 46th

(d) 51st

22. The Tropic of Cancer traverses through which of the following combination of countries?

(a) India, Philippines, China, Saudi Arabia, Egypt

(b) India, Egypt, China, Sri Lanka, Afghanistan

(c) India, China, Saudi Arabia, Egypt, Libya

(d) India, Egypt, China, Myanmar, Afghanistan

23. Match List I with List II and select answer from the codes given below.

	List I		*List II*
A.	Warren Hastings	I.	Prohibition of Sati
B.	Lord Wellesley	II.	Treaty of Amritsar with Ranjit Singh
C.	Lord Minto	III.	Subsidiary Alliance
D.	Lord William Bentick	IV.	Regulating Act of 1773

(a) A-III, B-IV, C-II, D-I

(b) A-I, B-IV, C-III, D-II

(c) A-IV, B-III, C-II, D-I

(d) A-IV, B-II, C-III, D-I

24. The Komagata Maru Affair merged with the programme of the:

(a) Congress Party

(b) Muslim League

(c) Ghadar Party

(d) Revolutionaries

25. South Asian Association for Regional Cooperation (SAARC) has been in news recently. Which of the following countries is ***not*** a part of SAARC?

(a) Afghanistan

(b) Maldives

(c) Sri Lanka

(d) Myanmar

26. The following phenomena appears in news frequently. Which of these has/have a bearing on Indian monsoon?

(a) El Nino and Southern Oscillation (ENSO)

(b) Indian Ocean Dipole (IOD)

(c) Both (a) and (b)

(d) Neither (a) nor (b)

Directions (27 to 31) : Study the following information to answer the given questions:

(1) In a class of boys and girls, Aman's rank is 12th and Manisha's rank is 8th.

(2) Aman's rank among the boys is 6th and Manisha's rank among girls is 3rd.

(3) In the class Manisha's rank is 52th from the other end.

(4) From the other end, Aman's rank among the boys is 26th.

27. How many boys are there in the class?
(a) 28
(b) 29
(c) 31
(d) Can't be determined

28. Which of the following is Manisha's rank among the girls from the other end?
(a) 26th
(b) 23rd
(c) 28th
(d) Can't be determined

29. How many boys are there before Manisha?
(a) 4
(b) 3
(c) 5
(d) Can't be determined

30. How many boys are there between Aman and Manisha?
(a) One
(b) Two
(c) Three
(d) None of these

31. How many girls are there before Aman?
(a) 6
(b) 5
(c) 7
(d) Can't be determined

32. N, M, O and P can do a piece of work in 80 days. N and M can together do the piece of work in 120 days, whereas O can do the piece of work in 360 days. In how many days P can finish the work?
(a) 660
(b) 360
(c) 240
(d) 720

33. If the selling price of an article is 8 % more than its cost price and the discount offered is 10 % on the marked price of the article, then what is the ratio of the cost price to the marked price?
(a) 5 : 6
(b) 8 : 9
(c) 4 : 5
(d) 3 : 4

34. The monthly incomes of two persons are in the ratio of 4:5 and their monthly expenditures are in the ratio of 7: 9. If each save ₹ 50 a month what are their monthly incomes:
(a) ₹ 100, ₹ 125
(b) ₹ 200, ₹ 250
(c) ₹ 300, ₹ 375
(d) ₹ 400, ₹ 500

35. Rohit starts from his house in his car and travels 10 km towards the North, then 8 km towards East then 12 km towards his right, 6 km towards his left, 10 km toward north and finely 2 km towards his right. In which direction is he now with reference to the starting point?
(a) North
(b) South
(c) North-east
(d) South-west

36. What is the *incorrect* number in the sequence: 25, 34, 49, 68, 91, 118, 149 ?
(a) 34
(b) 25
(c) 91
(d) 118

37. 'ਆਪਣੇ ਨੈਣ ਮੈਨੂੰ ਦੇ ਦੇ ਤੂੰ ਮਟਕਾਉਂਦੀ ਫਿਰ' ਅਖਾਣ ਦਾ ਕੀ ਅਰਥ ਹੈ?

(a) ਦੂਸਰੇ ਦੀ ਲੋੜ ਤੋਂ ਬੇਪਰਵਾਹ ਹੋ ਕੇ ਲੋੜੀਂਦੀ ਚੀਜ਼ ਮੰਗਣੀ।

(b) ਦੂਸਰੇ ਦੀ ਲੋੜ ਤੋਂ ਬੇਪਰਵਾਹ ਹੋ ਕੇ ਆਪਣੀ ਚੀਜ਼ ਦੇਣੀ।

(c) ਦੂਸਰੇ ਦੀ ਲੋੜ ਤੋਂ ਬੇਪਰਵਾਹ ਹੋ ਕੇ ਕੋਈ ਸਿੱਖਿਆ ਲੈਣੀ।

(d) ਦੂਸਰੇ ਦੀ ਲੋੜ ਤੋਂ ਬੇਪਰਵਾਹ ਹੋ ਕੇ ਕਿਸੇ ਨੂੰ ਸਿੱਖਿਆ ਦੇਣੀ।

38. 'ਬਿਨਾਂ ਯਤਨ ਕੀਤੇ ਇੱਛਾ ਪੂਰੀ ਹੋਣਾ' ਮੁਹਾਵਰੇ ਦੇ ਅਰਥ ਦੇ ਆਧਾਰ 'ਤੇ ਸਹੀ ਚੋਣ ਕਰੋ।

(a) ਭਿੱਜੀ ਬਿੱਲੀ ਬਣ ਜਾਣਾ   (b) ਬਿੱਲੀ ਲਈ ਛਿੱਕਾ ਟੁੱਟ ਪੈਣਾ

(c) ਭੁੰਨੇ ਤਿੱਤਰ ਉਡਾਉਣਾ   (d) ਭੂਤ ਸਵਾਰ ਹੋਣਾ

39. 'ਨਹੁੰ ਅੜ ਜਾਣਾ' ਮੁਹਾਵਰੇ ਤੋਂ ਕੀ ਭਾਵ ਹੈ?

(a) ਕੁਝ ਸਹਾਰਾ ਮਿਲ ਜਾਣਾ   (b) ਨਹੁੰ-ਮਾਸ ਦਾ ਰਿਸ਼ਤਾ ਹੋਣਾ

(c) ਮੁਸੀਬਤ ਪੈਦਾ ਹੋ ਜਾਣੀ   (d) ਰੰਗ ਵਿਚ ਭੰਗ ਪੈ ਜਾਣੀ

40. 'ਬੁੱਕਲ ਵਿਚ ਰੋੜੀ ਭੰਨਣੀ' ਮੁਹਾਵਰੇ ਤੋਂ ਕੀ ਭਾਵ ਹੈ?

(a) ਮੌਜ ਕਰਨੀ

(b) ਸਫਲ ਹੋ ਜਾਣਾ

(c) ਗੁਪਤ ਯਤਨ ਕਰਨਾ

(d) ਮਿਹਨਤ ਕਰਨੀ

41. ਸ਼ੁੱਧ ਪੰਜਾਬੀ ਰੂਪ ਕਿਹੜਾ ਹੈ?

(a) ਵੌਂਹੁਟੀ   (b) ਵੋਹਟੀ

(c) ਵਹੁਟੀ   (d) ਵੇਹੁਟੀ

42. "I Eat Bread" ਵਾਕ ਦਾ ਪੰਜਾਬੀ ਵਿਚ ਸ਼ੁੱਧ ਅਨੁਵਾਦ ਕਿਹੜਾ ਹੈ?

(a) ਮੈਂ ਰੋਟੀ ਖਾ ਰਿਹਾ ਹਾਂ।   (b) ਮੈਂ ਰੋਟੀ ਖਾ ਗਿਆ ਹਾਂ।

(c) ਮੈਂ ਰੋਟੀ ਖਾਂਦਾ ਹਾਂ।   (d) ਮੈਂ ਰੋਟੀ ਖਾ ਲਈ ਹੈ।

43. ਪੰਜਾਬ ਵਿਚ 'ਰੌਸ਼ਨੀਆਂ ਦਾ ਮੇਲਾ' ਕਿੱਥੇ ਲੱਗਦਾ ਹੈ?

(a) ਛਪਾਰ   (b) ਜਗਰਾਓਂ

(c) ਜਰਗ   (d) ਬਠਿੰਡਾ

ਹੇਠ ਲਿਖੇ ਪੈਰੇ ਵਿੱਚੋਂ **44** ਤੋਂ **46** ਤੱਕ ਪ੍ਰਸ਼ਨ ਹੱਲ ਕਰੋ।

ਇਸ ਕਥਨ ਵਿੱਚ ਸੌ ਫੀਸਦੀ ਸਚਾਈ ਹੈ ਕਿ ਅਸਲ ਸੋਹਣਾ ਉਹ ਹੁੰਦਾ ਹੈ, ਜੋ ਸੋਹਣਾ ਕੰਮ ਕਰਦਾ ਹੈ। ਅਸਲ ਸੋਹਣਾ ਉਹ ਨਹੀਂ ਹੁੰਦਾ ਜਿਸ ਦੀ ਸ਼ਕਲ ਸੋਹਣੀ ਹੋਵੇ, ਸਗੋਂ ਉਹ ਹੁੰਦਾ ਹੈ, ਜਿਹੜਾ ਆਤਮਿਕ ਤੇ ਮਾਨਸਿਕ ਤੌਰ ਤੇ ਸੋਹਣਾ ਹੋਵੇ, ਅਸਲ ਸੋਹਣਾ ਬਣਨ ਲਈ ਮਨੁੱਖ ਨੂੰ ਆਪਣੇ ਅੰਦਰ ਕੁੱਝ ਆਤਮਿਕ ਤੇ ਮਾਨਸਿਕ ਗੁਣ ਪੈਦਾ ਕਰਨੇ ਚਾਹੀਦੇ ਹਨ, ਸਰੀਰਕ ਸੁੰਦਰਤਾ ਥੁੜ-ਚਿਰੀ ਹੁੰਦੀ ਹੈ। ਇਹ ਸਮੇਂ ਨਾਲ ਨਾਸ਼ ਹੋ ਜਾਂਦੀ ਹੈ। ਸੁੰਦਰ ਚਿਹਰਾ ਮਰਦ ਜਾਂ ਤੀਵੀਂ ਦੀ ਪੱਕੀ ਜਾਈਦਾਦ ਨਹੀਂ। ਇਹ ਕਿਸੇ ਦੀ ਬਿਮਾਰੀ ਜਾਂ ਦੁਰਘਟਨਾ ਨਾਲ ਉਸ ਪਾਸੋਂ ਖੁੱਸ ਸਕਦੀ ਹੈ। ਪਰੰਤੂ ਸੁੰਦਰ ਆਤਮਾ ਤੇ ਮਨ ਵਿੱਚੋਂ ਉਪਜੇ ਕਾਰਜ ਅਤੇ ਕਿਰਤਾਂ ਬੰਦੇ ਦੇ ਮਰਨ ਪਿੱਛੋਂ ਜਿਉਂਦੀਆਂ ਰਹਿੰਦੀਆਂ ਹਨ ਤੇ ਲੋਕਾਂ ਨੂੰ ਉਹਨਾਂ ਵਿੱਚ ਸੁੰਦਰਤਾ ਦੀ ਸਦੀਵੀ ਝਲਕ ਦਿਖਾਈ ਦਿੰਦੀ ਹੈ। ਉੱਚ ਨੈਤਿਕ ਗੁਣਾਂ ਤੇ ਆਦਰਸ਼ਾਂ ਵਾਲਾ ਬੰਦਾ ਭਾਵੇਂ ਸ਼ਕਲੋਂ ਕੋਝਾ ਵੀ ਹੋਵੇ, ਉਹ ਸਹੀ ਅਰਥਾਂ ਵਿੱਚ ਸੁੰਦਰ ਹੁੰਦਾ ਹੈ। ਉਸ ਦੇ ਹਰ ਕਾਰਜ ਵਿੱਚੋਂ ਚੰਗਿਆਈ ਦੀ ਮਹਿਕ ਖਿਲਰਦੀ ਹੈ। ਉਸ ਦੇ ਮੂੰਹੋਂ ਨਿਕਲਿਆ ਇੱਕ-ਇੱਕ ਸ਼ਬਦ ਦੁਖੀ ਲੋਕਾਂ ਦੇ ਮਨ ਨੂੰ ਠੰਡ ਪਾਉਂਦਾ ਹੈ। ਦੁਨੀਆਵੀ ਲੋਕ ਚੰਮ ਦੀ ਸੁੰਦਰਤਾ ਉੱਪਰ ਮੋਹਿਤ ਹੁੰਦੇ ਹਨ। ਇਹ ਉਹਨਾਂ ਨੂੰ ਵਕਤੀ ਖੁਸ਼ੀ ਜ਼ਰੂਰ ਦਿੰਦੀ ਹੈ, ਪਰ ਕੁੱਝ ਸਮੇਂ ਪਿੱਛੋਂ ਨਾ ਉਹ ਸੁੰਦਰਤਾ ਰਹਿੰਦੀ ਹੈ ਤੇ ਨਾ ਉਸ ਤੋਂ ਪ੍ਰਾਪਤ ਹੋਣ ਵਾਲੀ ਖੁਸ਼ੀ। ਮਨੁੱਖ ਦੇ ਸੁਹਣੇ ਤੇ ਨੇਕੀ ਭਰੇ ਕੰਮ ਆਲੇ-ਦੁਆਲੇ ਵਿੱਚ ਖੁਸ਼ੀ ਤੇ ਪ੍ਰੇਮ-ਪਿਆਰ ਦਾ ਪਸਾਰ ਕਰਦੇ ਹਨ। ਕੱਛ ਵਿੱਚ ਛੁਰੀ ਤੇ ਮੂੰਹੋਂ ਰਾਮ ਰਾਮ ਕਰਨ ਵਾਲਾ ਬੰਦਾ ਸਭ ਤੋਂ ਵੱਧ ਖਤਰਨਾਕ ਹੁੰਦਾ ਹੈ। ਇਸ ਲਈ ਸੋਹਣਾ ਬੰਦਾ ਉਹ ਹੀ ਹੁੰਦਾ ਹੈ, ਜਿਸ ਦੇ ਕੰਮ ਸੋਹਣੇ ਹੁੰਦੇ ਹਨ। ਕੇਵਲ ਸ਼ਕਲ ਦੀ ਸੁੰਦਰਤਾ ਦੇ ਮਾਲਕ ਨੂੰ ਅਸਲ ਸੋਹਣਾ ਨਹੀਂ ਕਿਹਾ ਜਾ ਸਕਦਾ।

44. ਉਪਰੋਕਤ ਪੈਰੇ ਅਨੁਸਾਰ ਕਿਹੋ ਜਿਹੀ ਪਰਵਿਰਤੀ ਵਾਲਾ ਬੰਦਾ ਸਭ ਤੋਂ ਵਧੇਰੇ ਖਤਰਨਾਕ ਹੁੰਦਾ ਹੈ?

   (a)   ਜਿਹੜਾ ਸਾਰਿਆਂ ਨਾਲ ਨਫ਼ਰਤ ਕਰੇ।

   (b)   ਜਿਹੜਾ ਹਰ ਇੱਕ ਨੂੰ ਗੁੱਸੇ ਵਿੱਚ ਬੋਲੇ।

   (c)   ਜਿਹੜਾ ਅੰਦਰੋਂ ਹੋਰ ਤੇ ਬਾਹਰੋਂ ਹੋਰ ਹੋਵੇ।

   (d)   ਜਿਹੜਾ ਅਨੈਤਿਕ ਗੁਣਾਂ ਨਾਲ ਭਰਪੂਰ ਹੋਵੇ।

45. ਪੈਰੇ ਮੁਤਾਬਿਕ ਸਦੀਵੀ ਸੁੰਦਰਤਾ ਕਿਵੇਂ ਆਉਂਦੀ ਹੈ?

   (a)   ਸੁੰਦਰ ਆਤਮਾ ਅਤੇ ਮਨ ਨਾਲ ਕੀਤੇ ਕਾਰਜਾਂ ਕਾਰਣ

   (b)   ਚੰਮ ਦੀ ਸੁੰਦਰਤਾ ਨੂੰ ਦਰ ਕਿਨਾਰ ਕਰਕੇ

   (c)   ਮੂੰਹ ਤੋਂ ਰਾਮ ਰਾਮ ਬੋਲ ਕੇ

   (d)   ਦੁਨਿਆਵੀ ਲੋਕਾਂ ਨਾਲ ਮੋਹ ਘਟਾ ਕੇ

46. ਉਪਰੋਕਤ ਪੈਰੇ ਦਾ ਸਿਰਲੇਖ ਕੀ ਹੈ?

   (a)   ਸੂਰਤ ਦੀ ਮਹੱਤਤਾ।

   (b)   ਸੀਰਤ ਦੀ ਮਹੱਤਤਾ।

   (c)   ਪਿਆਰ ਦੀ ਮਹੱਤਤਾ।

   (d)   ਨੈਤਿਕ ਗੁਣਾਂ ਦੀ ਮਹੱਤਤਾ।

47. The hydraulic loading in the high-rate trickling filters should be in the range of $(m^3/d/m^2)$:

(a) 150 – 180
(b) 100 – 130
(c) 50 – 80
(d) 10 – 30

48. Consider the following statements:
1. The Trickling filter is used for the biological treatment of both domestic sewage and industrial waste.
2. Reciprocating screens are used for removal of oversized materials from municipal solid waste.

Which of the above statements is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

49. Which of the following statements is/are *incorrect* regarding landfills?
1. Trench landfilling, area landfilling, slope landfilling are different types of landfills.
2. Leachate is a coloured liquid that comes out of sanitary landfills.
3. High concentration of ammonia is produced in facultative decomposition stage.

Choose the correct option:

(a) 1 and 2 only
(b) 2 and 3 only
(c) 3 only
(d) None is incorrect

50. The C/N ratio for composting should be in the range of:

(a) 50:1
(b) 25:1
(c) 75:1
(d) 100:1

51. Which is *not* a composting method?

(a) Windrow method
(b) Static Pile method
(c) In-vessel method
(d) In-circular method

52. The BOD5 in the leachate is seen in the range as (mg/lt):

(a) 2,000 – 30,000
(b) 31,000 – 40,000
(c) 40,000 – 50,000
(d) more than 50,000

53. The physical tests of water include the following:

(a) Temperature, Colour and Turbidity
(b) Specific gravity, Colour and Turbidity
(c) pH, Specific gravity and Temperature
(d) Hardness, pH, and Temperature

54. The chlorides should be in the range for water supply (domestic):

(a) up to 250 ppm   (b) up to 500 ppm

(c) up to 750 ppm   (d) up to 1000 ppm

55. The detention time in sedimentation tank can be obtained by:

(a) Perimeter of the tank / Rate of flow of water

(b) Rate of flow of water / Perimeter of the tank

(c) Capacity of the tank / Rate of flow of water

(d) Rate of flow of water / Capacity of the tank

56. The main variables of the activated sludge process are:

(a) loading rate, mixing regime and flow scheme

(b) output, biological regime and pH

(c) biological regime, pH, density

(d) pH, density, hardness

57. Consider the following statements regarding Rotating Biological Contactor:

1. Rotating biological contactor treatment technology of wastewater is based on the attached growth process.

2. Rotating biological contactor (RBC) is sensitive to temperature.

3. It has low capital cost.

Which of the above statements is/are correct?

(a) 1 only

(b) 1 and 2 only

(c) 3 only

(d) 1, 2 and 3

58. Consider the following statements:

1. Peak factor for the sewer design is the ratio of maximum flows to average flows.

2. The minimum size of public sewer in plains should not be less than 150 mm.

Which of the above statements is/are correct?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

59. The maximum velocity in circular section is developed when the proportionate depth is:

(a)   0.91   (b)   0.81   (c)   0.71   (d)   0.61

60. If the mean precipitation over a region is calculated as 200 mm, and there are 5 stations with recorded precipitation values of 180 mm, 220 mm, 190 mm, and 210 mm, what is the value of the missing fifth station?

(a)   200 mm   (b)   210 mm   (c)   220 mm   (d)   230 mm

61. Using the normal-ratio method, estimate the missing rainfall (P4) for a station given the following data: Station 1 (P1 = 80 mm, N1 = 90), Station 2 (P2 = 120 mm, N2 = 110), Station 3 (P3 = 100 mm, N3 = 105), and the normal annual rainfall of the missing station (N4 = 100).

(a)   98 mm   (b)   100 mm   (c)   102 mm   (d)   105 mm

62. Given a unit hydrograph with a peak flow of 100 m^3/s for a rainfall excess of 2 mm, what is the peak flow for a rainfall excess of 5 mm?

(a)   100 m^3/s   (b)   150 m^3/s   (c)   200 m^3/s   (d)   250 m^3/s

63. Using the S-curve method, a 6-hour unit hydrograph has a peak flow of 80 m^3/s. What is the peak flow for a 12-hour unit hydrograph derived from this 6-hour unit hydrograph?

(a)   40 m^3/s   (b)   80 m^3/s   (c)   120 m^3/s   (d)   160 m^3/s

64. Consider the following statements:

1.   A unit hydrograph is helpful in estimating the runoff from a basin.

2.   The time between the peak rainfall and the peak discharge in a hydrograph is referred to as recession limb.

3.   An instantaneous unit hydrograph (IUH) represents the peak discharge of a river.

4.   The primary factor that differentiates a unit hydrograph from an instantaneous unit hydrograph (IUH) is the duration of effective rainfall.

Which of the above statements are correct?

(a)   1 and 4 only

(b)   2 and 3 only

(c)   1, 3 and 4 only

(d)   1, 2 and 4 only

65. Consider the following statements:

1. Darcy's law governs the flow of groundwater through porous media.

2. According to Darcy's Law, the flow rate (Q) through a porous medium is proportional to the hydraulic conductivity (K) of the medium and the hydraulic gradient (i).

3. According to Darcy's law the discharge is inversely proportional to the length of path.

Which of the above statements are correct?

(a)   1 and 2 only

(b)   2 and 3 only

(c)   1 and 3 only

(d)   1, 2 and 3

66. Consider the following statements:

1. The settling velocity of a spherical particle in still water is given by Stoke's law.

2. The self-purification of streams can be modelled using Streeter Phelps model.

Which of the above statements is/are ***incorrect***?

(a)   1 only

(b)   2 only

(c)   Both 1 and 2 are incorrect

(d)   Neither 1 nor 2 is incorrect

67. Which of the following is an infiltration index?

(a)   Evaporation index

(b)   Phi index

(c)   Runoff coefficient

(d)   Manning's coefficient

68. Which of the following best describes the initial abstraction (Ia) in the SCS-CN method?

(a)   The total runoff

(b)   The initial loss of rainfall due to interception, infiltration, and surface storage

(c)   The evaporation loss

(d)   The peak discharge

69. Consider the following statements:

1. Erosion from the watershed is the primary cause of sedimentation in reservoirs.

2. Spillway capacity is the term for the maximum amount of water that can be supplied by a reservoir without failure over a specified period.

Which of the above statements is/are correct?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

70. The initial rate of infiltration of a watershed is estimated as 2.1 in/h, the final capacity is 0.2 in/h, and the time constant, k, is 0.4 h-1. What is the infiltration capacity at t = 2h ? (Use Horton's Infiltration Equation)

(a) 1.95 in/h

(b) 1.55 in/h

(c) 1.75 in/h

(d) 1.05 in/h

71. Consider the following statements in context of aquifers and aquifer parameters:

1. A confined aquifer is a type of aquifer which is directly recharged by surface water.

2. The term "specific yield" refers to the volume of water that can be drained by gravity.

3. When designing tube wells for water extraction from a confined aquifer, the most crucial parameter for determining the optimal spacing between wells to avoid excessive drawdown is the transmissivity of the aquifer.

Which of the above statements are correct?

(a) 1 and 2 only

(b) 2 and 3 only

(c) 1 and 3 only

(d) 1, 2 and 3

72. If a rain gauge records 50 mm of rain in a day, how much water is collected in litres per square meter?

(a) 5 L/m^2

(b) 50 L/m^2

(c) 500 L/m^2

(d) 5000 L/m^2

73. A catchment of area 120 ha has a time of concentration of 30 min and runoff coefficient of 0.4. If a storm of duration 45 min results in 3.0 cm of rain over the catchment, estimate the resultant peak flow rate.

(a) 5.33 m^3/s (b) 5.01 m^3/s (c) 6.02 m^3/s (d) 6.22 m^3/s

74. If a tube well is constructed to a depth of 50 m and it draws water from an aquifer with a saturated thickness of 30 m, what is the effective depth of the well?

(a) 20 m (b) 30 m (c) 50 m (d) 80 m

75. A small catchment of area 300 ha received a rainfall of 12.5 cm in 3 hours. At the outlet of the catchment the measured runoff lasted for 10 hours with an average discharge value of 3.125 m^3/s. The stream was dry before and after the runoff event. What is the runoff coefficient?

(a) 0.1 (b) 0.2 (c) 0.3 (d) 0.6

76. Which parameter significantly influences the initial steepness of the infiltration capacity curve in a soil infiltration model?

(a) The soil's porosity

(b) The antecedent moisture content of the soil

(c) The surface roughness of the land

(d) The depth of the groundwater table

77. A region has recorded annual maximum rainfall data for 30 years. Using the Gumbel distribution, the mean annual maximum rainfall is found to be 150 mm, and the standard deviation is 20 mm. Calculate the 100-year return period rainfall.

(Gumbel distribution formula $X_T = \mu + K_T \cdot \sigma$, where $K_T = - ln(-ln(1-1/T))$, μ is the mean, σ is the standard deviation, and T is the return period.)

(a) 175 mm (b) 190 mm

(c) 210 mm (d) 230 mm

78. A catchment area of 200 square kilometers experiences a rainfall event with an intensity of 40 mm/hr lasting for 3 hours. Assuming a runoff coefficient of 0.7 and using the Rational Method, calculate the peak discharge in cubic meters per second.

(a) 1,555 m^3/s

(b) 2,800 m^3/s

(c) 3,111 m^3/s

(d) 4,444 m^3/s

79. For a given watershed, the curve number (CN) is calculated based on land use, soil type, and antecedent moisture condition (AMC). If the AMC changes from dry to wet, what is the expected effect on the curve number?

    (a) The curve number decreases

    (b) The curve number remains unchanged

    (c) The curve number increases

    (d) The curve number first decreases, then increases

80. In a watershed with varying land uses, which method of runoff estimation is the most sensitive to changes in land cover, particularly with respect to impervious surfaces?

    (a) Rational method   (b) SCS Curve Number method

    (c) Green-Ampt infiltration model   (d) Unit hydrograph method

81. Which method is most appropriate for determining the yield of a reservoir where inflow exhibits significant seasonal variability?

    (a) Mass curve analysis

    (b) Sequent Peak Algorithm

    (c) Frequency analysis of inflows

    (d) Sediment rating curve analysis

82. Which technique/method is used to measure dissolved oxygen in water?

    (a) Winkler method   (b) Turbidity method

    (c) Streeter method   (d) LaGrange method

83. Which of the following is *not* an example of a natural buffer system?

    (a) Carbonic acid-bicarbonate buffer system

    (b) Phosphate buffer system

    (c) Ammonia buffer system

    (d) Potassium bicarbonate buffer system

84. Which of the following statements is true about MSW treatment techniques?

    1. Composting of MSW is most commonly aerobic

    2. Bio methanation of MSW is most commonly aerobic

    Choose the correct option:

    (a) 1 only   (b) 2 only

    (c) Both 1 and 2   (d) Neither 1 nor 2

85. Which of the following statements is correct regarding solid waste management rules framed by the Government of India?

(a) Municipal Solid Wastes (Management & Handling) Rules were first notified in 2010

(b) Disposing construction and demolition waste is a part Solid waste Management rules 2017

(c) Solid Waste management rules notified in 2016 mandated source segregation of waste

(d) India doesn't have any Solid waste management rules

86. Which of the following statements is **not** true?

(a) CNG is stored in high-pressure cylinders.

(b) CNG has less energy density compared to LNG.

(c) PNG is commonly used for long-distance transportation of natural gas across oceans.

(d) CNG infrastructure is less expensive and more widely available compared to LNG infrastructure.

87. In the context of water resource management, what does the term "aquifer overdraft" refer to?

(a) The enhancement of aquifer recharge rates through artificial methods

(b) The excessive withdrawal of groundwater leading to long-term depletion

(c) The increase in groundwater storage due to reduced extraction

(d) The balance between groundwater recharge and discharge

88. Which of the following orders correctly represents the environment-related acts in India based on their first enactment date, from the earliest to the latest?

(a) Water (Prevention and Control of Pollution) Act, Air (Prevention and Control of Pollution) Act, Environment (Protection) Act, Biological Diversity Act.

(b) Water (Prevention and Control of Pollution) Act, Biological Diversity Act, Air (Prevention and Control of Pollution) Act, Environment (Protection) Act.

(c) Water (Prevention and Control of Pollution) Act, Environment (Protection) Act, Air (Prevention and Control of Pollution) Act, Biological Diversity Act.

(d) Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Environment (Protection) Act, Biological Diversity Act.

89. Which of the following statements is **not** true about nuclear waste management?

(a) High-level radioactive waste requires isolation for thousands of years to prevent radiation exposure to humans and the environment.

(b) Deep geological repositories are considered one of the safest methods for the long-term storage of high-level nuclear waste.

(c) Low-level radioactive waste can be safely disposed of in near-surface disposal facilities without any further treatment.

(d) Nuclear waste reprocessing can reduce the volume of high-level waste but does not eliminate the need for long-term storage solutions.

90. Which soil characteristic is most likely to increase ammonia volatilization following fertilizer application?

(a) Low soil moisture content

(b) High soil organic matter

(c) High cation exchange capacity

(d) High soil pH

91. Which of the following statements about ecosystems is **not** true?

(a) Liebig's law states that growth only occurs at the rate permitted by the most non-limiting factor.

(b) The Ramsar Convention was signed in 1971 and became effective in 1975.

(c) The carrying capacity of a population is determined by its limiting resources and represents the maximum number of individuals that an ecosystem can support based on available resources under specific conditions.

(d) A Red Data Book is a document that keeps a record of all the endangered species of animals, plants, and fungi in a country or a state.

92. Which of the following factors is least likely to affect the efficiency of a rooftop water heater?

(a) Sunlight exposure   (b) Tilt and orientation

(c) Water quality   (d) Type of roofing material used

93. Which of the following statements is **not** true?

(a) The Environment (Protection) Act made Environmental Impact Assessment statutory.

(b) Screening is a step to identify and prioritize the key environmental issues and impacts to be addressed in the Environmental Impact Assessment.

(c) Pollution Control Boards may also participate in EIA of a project.

(d) The Environmental Impact Assessment 2006 divides the projects into three categories.

94. Which of the following statements is *not* true?

(a) The Convention on Long-range Transboundary Air Pollution (CLRTAP) is an international treaty that specifically addresses CO_2 across national boundaries.

(b) 1985 Helsinki Protocol, 1994 Oslo Protocol and 1999 Gothenburg Protocol fall under the Convention on Long-range Transboundary Air Pollution (CLRTAP).

(c) One of the principles in Rio Declaration states that environmental issues are best handled with the participation of all concerned citizens, at the relevant level.

(d) Acid rains can damage leaves and bark, making trees more susceptible to disease and pests.

95. Based on the information from the graph below:
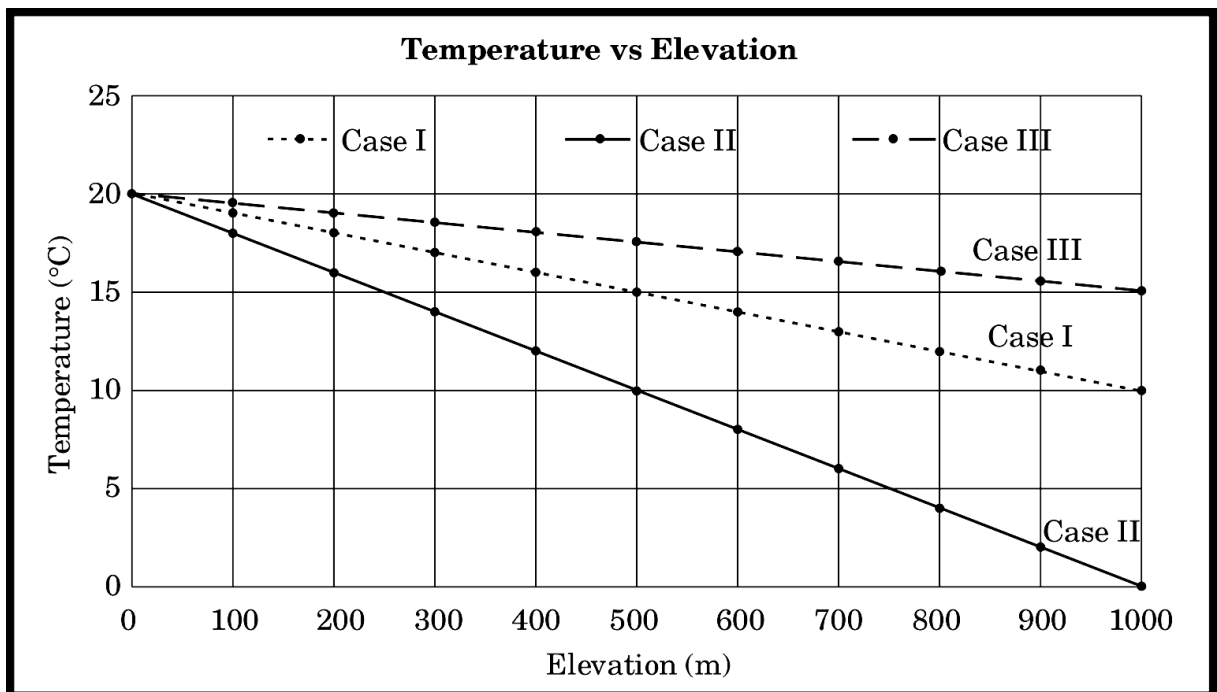
Choose the correct statement:

(a) Case 1 closely represents neutral conditions

(b) Case 2 closely represents neutral conditions

(c) Case 3 closely represents neutral conditions

(d) Both cases 1 and 2 closely represent neutral conditions

96. Consider the following statements:

1. Gravimetric method is used to measure Respirable Particulate Matter.

2. Chemiluminescence is the method used to measure Ozone.

Which of the above statements is/are *incorrect*?

(a) 1 only   (b) 2 only

(c) Both 1 and 2   (d) Neither 1 nor 2

97. Consider the following statements about Catalytic converters:

1. Catalytic converters primary target Carbon monoxide, nitrogen dioxides and hydrocarbons in vehicle exhaust systems.

2. A catalytic convertor helps in reducing nitrogen oxides (NOx) in vehicle emissions by converting NOx into nitrogen and oxygen through a reduction reaction.

3. Aluminum and copper are typically used as catalysts in catalytic converters to facilitate the conversion of harmful gases.

Which of the above statements is/are correct?

(a) 1 only

(b) 1 and 2 only

(c) 3 only

(d) 1 and 3 only

98. How does the air-fuel ratio in spark ignition engines influence the emission of pollutants?

(a) A lean air-fuel mixture (excess air) typically reduces carbon monoxide and hydrocarbon emissions but may increase nitrogen oxides emissions.

(b) A rich air-fuel mixture (excess fuel) reduces all emissions due to complete combustion.

(c) A stoichiometric air-fuel ratio (ideal balance) maximizes particulate matter emissions.

(d) The air-fuel ratio has no impact on emissions as long as the engine is properly tuned.

99. In the context of VOC emission control, consider the following statements:

1. Installation of carbon capture and storage systems is often implemented to limit VOC emissions from automotive refueling operations.

2. The primary purpose of using an activated carbon adsorption system is to capture and concentrate VOCs for subsequent disposal or recovery.

Which of the above statements is/are correct?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

100. A factory emits a pollutant continuously from a stack at a rate of 200 g/s. The wind speed at the stack of 40 m height is 5 m/s. Assuming that plume rise is negligible, the plume spread parameters at a downwind distance of 500 m in the horizontal (y) and vertical (z) directions are 100 m and 50 m, respectively. The ground-level concentration of the pollutant along the centerline at that distance is _____.

(a)   1.85 mg/m^3 (b)   2.3 mg/m^3

(c)   1.85 µg/m^3 (d)   2.3 µg/m^3

101. A factory emits a pollutant continuously from a stack of 40 m height. The wind speed at the stack is 5 m/s. Assuming that plume rise is negligible, the plume spread parameters at a downwind distance of 500 m in the horizontal (y) and vertical (z) directions are 80 m and 35 m, respectively. If the ground-level concentration of the pollutant along the centerline at that distance is 0.0355 g/m³, the factory emits a pollutant continuously from a stack at a rate of _____.

(a)   200 g/s   (b)   2 kg/s

(c)   300 g/s   (d)   3 kg/s

102. Which of the following statements is **not** true according to the National Ambient Air Quality Standards (Central Pollution Control Board, Government of India, notification 2009)?

(a)   Annual standard for Sulphur dioxide is greater than its corresponding daily standard.

(b)   The hourly averaged standard for Carbon Monoxide is 4 mg/m^3.

(c)   The annual averaged standard for $PM_{2.5}$ is 40 µg/m^3.

(d)   Mercury is not a part of National Ambient Air Quality Standards.

103. The most important precursors for Ozone formation in ambient air are:

(a)   NOx and VOCs   (b) CO_2 and VOCs

(c) CO_2 and NOx   (d) H_2 and NOx

104. Which class of micro-organisms are most active in anaerobic digestion of sludge?

(a)   Mesophiles and psychrophiles

(b)   Thermophiles and psychrophiles

(c)   Thermophiles and mesophiles

(d)   Halophiles and mesophiles

105. Algae can be very beneficial, but they cause a problem when they remove:

(a)   Iron   (b)   Nitrates

(c)   Ammonium   (d)   Phosphorous

106. The time of contact for chlorination should be at least:

(a) 5 minutes

(b) 20 minutes

(c) 1 hour

(d) 2 hours

107. In the context of water treatment, odour and taste are controlled by:

(a) Disinfection

(b) Aeration

(c) Coagulation

(d) Soda-lime process

108. Which of the following treatment reduce salinity of water?

1. Flash mixing and sedimentation

2. Electrodialysis

3. Reverse Osmosis

4. Freezing

5. Filtration

(a) 1, 2, 3, 4 and 5

(b) 2, 3 and 4 only

(c) 1, 4 and 5 only

(d) 1, 2 and 4 only

109. The rate limiting step for the production of biogas from an anaerobic digestion of sludge is:

(a) Acidification

(b) Alkalisation

(c) Acetogenesis

(d) Methanogenesis

110. Which one of the following relations holds true for the specific growth rate (μ) of a microorganism in the stationary phase?

(a) $\mu = 0$

(b) $\mu = \mu_{max}$

(c) $\mu < 0$

(d) $0 < \mu < \mu_{max}$

111. Coagulation-flocculation with alum is performed:

(a) Immediately before chlorination

(b) Immediately after chlorination

(c) After rapid sand filtration

(d) Before rapid sand filtration

112. The settlement of a particle in the sedimentation tank is *not* affected by:

(a) Velocity of flow

(b) Viscosity of water

(c) Size and shape of solid

(d) Depth of the tank

113. Flocculated particles do *not* change their:

(a) Size

(b) Shape

(c) Weight

(d) Density

114. Which of the following is **not** a biological process for destroying organic compounds?

(a) Composting   (b) Trickling Filters

(c) Calcination   (d) Activated sludge

115. Bacteria that can survive with or without free oxygen, are known as:

(a) Aerobic bacteria   (b) Anaerobic bacteria

(c) Facultative bacteria   (d) None of the above

116. Total rainfall in a catchment area of 1200 km^2 during a 6 hour storm is 16 cm while surface runoff due to the storm is $1.2 \times 10^8 \ m^3$. The Φ index is:

(a) 0.1 cm/h

(b) 1.0 cm/h

(c) 0.2 cm/h

(d) Cannot be estimated with the given data

117. Water level in confined well:

(a) Increases with increase in the atmospheric pressure

(b) Decreases with increase in the atmospheric pressure

(c) Does not undergo any change with change in atmospheric pressure

(d) All of these

118. The temperature inside the earth rises by 1°C for the descend of every:

(a) 10 m   (b) 20-25 m

(c) 35-40 m   (d) 50-70 m

119. The assumption in the Thiem formula for discharge from an unconfined aquifer is:

(a) That the flow lines are radial and horizontal

(b) That the flow is turbulent

(c) That the soil is isotropic

(d) That the flow is unsteady

120. Interception Loss is:

(a) More towards the end of a storm

(b) More at the beginning of a storm

(c) Uniform throughout the storm

(d) Low in the beginning of the storm and gradually increases

SPACE FOR ROUGH WORK

Booklet Sr. No.

Candidate's Name _____

Father's Name _____

Date of Birth :

D	D	M	M	Y Y	Y Y

D   D   M   M   Y   Y   Y   Y

OMR Response Sheet No. _____ **Roll No.** _____

Candidate's Signature :
(Please sign in the box)

[Total Questions : **120**]

[Time Allowed : **2** Hours]

INSTRUCTIONS

1. The candidate shall NOT open this booklet till the time they are told to do so by the Invigilation Staff. However, in the meantime, the candidate can read these instructions carefully and subsequently fill the appropriate columns given above in CAPITAL letters. The candidate may also fill the relevant boxes 1 to 9 of the Optical Mark Reader (OMR) response sheet, supplied separately.

2. Use only blue or black **ball point pen** to fill the relevant columns on this page as well as in OMR sheet. Use of Ink pen or any other pen is not allowed.

3. Other than filling credentials/information in specific space allotted above, do not write anything else on the Test Booklet. Space for rough work is provided at the end. The candidate shall be liable for any adverse effect if the information given above is wrong or illegible or incomplete.

4. Each candidate is required to attempt 120 questions in 120 minutes, except for orthopedically/visually impaired candidates, who would be given 40 extra minutes, for marking correct responses on the OMR sheet.

5. The question paper booklet has **24** pages.

6. The candidates, <u>when allowed to open</u> the question paper booklet, <u>must first check the entire booklet</u> to confirm that the booklet has complete number of pages, the pages are printed correctly and there are no blank or torn pages. In case there is any such error in the question paper booklet then the candidate should IMMEDIATELY bring this fact to the notice of the Invigilation Staff and obtain a new booklet of the same series as given earlier.

7. The serial number of the new Question booklet, if issued for some reason, should be entered in the relevant column of the OMR. The Invigilation Staff must make necessary corrections in their record regarding the change in the serial no. of Question booklet.

8. The paper consists of total 480 Marks. Each question shall carry 4 marks. There are four options for each question and the candidate has to mark the <u>MOST APPROPRIATE</u> answer on the OMR response sheet.

9. There is **negative marking** (1 mark for each question) for questions wrongly answered by the candidate.

10. If a candidate gives more than one answer, it will be treated as a wrong answer even if one of the given answers is correct. There will be same penalty, as above, to that question.

11. If Question is left blank, i.e. question remains unattempted, there will be no penalty for that question.

12. Use of Electronic/Manual Calculator is prohibited.

13. The candidate **MUST READ INSTRUCTIONS BEHIND THE OMR SHEET** before answering the questions and check that two carbon copies attached to the OMR sheet are intact.

1. ‘ਆਪਣੇ ਨੈਣ ਮੈਨੂੰ ਦੇ ਦੇ ਤੂੰ ਮਟਕਾਉਂਦੀ ਫਿਰ’ ਅਖਾਣ ਦਾ ਕੀ ਅਰਥ ਹੈ?

   (a) ਦੂਸਰੇ ਦੀ ਲੋੜ ਤੋਂ ਬੇਪਰਵਾਹ ਹੋ ਕੇ ਲੋੜੀਂਦੀ ਚੀਜ਼ ਮੰਗਣੀ।

   (b) ਦੂਸਰੇ ਦੀ ਲੋੜ ਤੋਂ ਬੇਪਰਵਾਹ ਹੋ ਕੇ ਆਪਣੀ ਚੀਜ਼ ਦੇਣੀ।

   (c) ਦੂਸਰੇ ਦੀ ਲੋੜ ਤੋਂ ਬੇਪਰਵਾਹ ਹੋ ਕੇ ਕੋਈ ਸਿੱਖਿਆ ਲੈਣੀ।

   (d) ਦੂਸਰੇ ਦੀ ਲੋੜ ਤੋਂ ਬੇਪਰਵਾਹ ਹੋ ਕੇ ਕਿਸੇ ਨੂੰ ਸਿੱਖਿਆ ਦੇਣੀ।

2. ‘ਬਿਨਾਂ ਯਤਨ ਕੀਤੇ ਇੱਛਾ ਪੂਰੀ ਹੋਣਾ’ ਮੁਹਾਵਰੇ ਦੇ ਅਰਥ ਦੇ ਆਧਾਰ ’ਤੇ ਸਹੀ ਚੋਣ ਕਰੋ।

   (a) ਭਿੱਜੀ ਬਿੱਲੀ ਬਣ ਜਾਣਾ   (b) ਬਿੱਲੀ ਲਈ ਛਿੱਕਾ ਟੁੱਟ ਪੈਣਾ

   (c) ਭੁੰਨੇ ਤਿੱਤਰ ਉਡਾਉਣਾ   (d) ਭੂਤ ਸਵਾਰ ਹੋਣਾ

3. ‘ਨਹੁੰ ਅੜ ਜਾਣਾ’ ਮੁਹਾਵਰੇ ਤੋਂ ਕੀ ਭਾਵ ਹੈ?

   (a) ਕੁਝ ਸਹਾਰਾ ਮਿਲ ਜਾਣਾ   (b) ਨਹੁੰ-ਮਾਸ ਦਾ ਰਿਸ਼ਤਾ ਹੋਣਾ

   (c) ਮੁਸੀਬਤ ਪੈਦਾ ਹੋ ਜਾਣੀ   (d) ਰੰਗ ਵਿਚ ਭੰਗ ਪੈ ਜਾਣੀ

4. ‘ਬੁੱਕਲ ਵਿਚ ਰੋੜੀ ਭੰਨਣੀ’ ਮੁਹਾਵਰੇ ਤੋਂ ਕੀ ਭਾਵ ਹੈ?

   (a) ਮੌਜ ਕਰਨੀ

   (b) ਸਫਲ ਹੋ ਜਾਣਾ

   (c) ਗੁਪਤ ਯਤਨ ਕਰਨਾ

   (d) ਮਿਹਨਤ ਕਰਨੀ

5. ਸ਼ੁੱਧ ਪੰਜਾਬੀ ਰੂਪ ਕਿਹੜਾ ਹੈ?

   (a) ਵੈਂਹੁਟੀ   (b) ਵੇਹਟੀ

   (c) ਵਹੁਟੀ   (d) ਵੇਹੁਟੀ

6. "I Eat Bread" ਵਾਕ ਦਾ ਪੰਜਾਬੀ ਵਿਚ ਸ਼ੁੱਧ ਅਨੁਵਾਦ ਕਿਹੜਾ ਹੈ?

   (a) ਮੈਂ ਰੋਟੀ ਖਾ ਰਿਹਾ ਹਾਂ।   (b) ਮੈਂ ਰੋਟੀ ਖਾ ਗਿਆ ਹਾਂ।

   (c) ਮੈਂ ਰੋਟੀ ਖਾਂਦਾ ਹਾਂ।   (d) ਮੈਂ ਰੋਟੀ ਖਾ ਲਈ ਹੈ।

7. ਪੰਜਾਬ ਵਿਚ ‘ਰੌਸ਼ਨੀਆਂ ਦਾ ਮੇਲਾ’ ਕਿੱਥੇ ਲੱਗਦਾ ਹੈ?

   (a) ਛਪਾਰ   (b) ਜਗਰਾਓਂ

   (c) ਜਰਗ   (d) ਬਠਿੰਡਾ

ਹੇਠ ਲਿਖੇ ਪੈਰੇ ਵਿੱਚੋਂ **8 ਤੋਂ 10 ਤੱਕ** ਪ੍ਰਸ਼ਨ ਹੱਲ ਕਰੋ।

ਇਸ ਕਥਨ ਵਿੱਚ ਸੌ ਫੀਸਦੀ ਸਚਾਈ ਹੈ ਕਿ ਅਸਲ ਸੋਹਣਾ ਉਹ ਹੁੰਦਾ ਹੈ, ਜੋ ਸੋਹਣਾ ਕੰਮ ਕਰਦਾ ਹੈ। ਅਸਲ ਸੋਹਣਾ ਉਹ ਨਹੀਂ ਹੁੰਦਾ ਜਿਸ ਦੀ ਸ਼ਕਲ ਸੋਹਣੀ ਹੋਵੇ, ਸਗੋਂ ਉਹ ਹੁੰਦਾ ਹੈ, ਜਿਹੜਾ ਆਤਮਿਕ ਤੇ ਮਾਨਸਿਕ ਤੌਰ ਤੇ ਸੋਹਣਾ ਹੋਵੇ, ਅਸਲ ਸੋਹਣਾ ਬਣਨ ਲਈ ਮਨੁੱਖ ਨੂੰ ਆਪਣੇ ਅੰਦਰ ਕੁੱਝ ਆਤਮਿਕ ਤੇ ਮਾਨਸਿਕ ਗੁਣ ਪੈਦਾ ਕਰਨੇ ਚਾਹੀਦੇ ਹਨ, ਸਰੀਰਕ ਸੁੰਦਰਤਾ ਥੁੜ-ਚਿਰੀ ਹੁੰਦੀ ਹੈ। ਇਹ ਸਮੇਂ ਨਾਲ ਨਾਸ ਹੋ ਜਾਂਦੀ ਹੈ। ਸੁੰਦਰ ਚਿਹਰਾ ਮਰਦ ਜਾਂ ਤੀਵੀਂ ਦੀ ਪੱਕੀ ਜਾਇਦਾਦ ਨਹੀਂ। ਇਹ ਕਿਸੇ ਦੀ ਬਿਮਾਰੀ ਜਾਂ ਦੁਰਘਟਨਾ ਨਾਲ ਉਸ ਪਾਸੋਂ ਖੁੱਸ ਸਕਦੀ ਹੈ। ਪਰੰਤੂ ਸੁੰਦਰ ਆਤਮਾ ਤੇ ਮਨ ਵਿੱਚੋਂ ਉਪਜੇ ਕਾਰਜ ਅਤੇ ਕਿਰਤਾਂ ਬੰਦੇ ਦੇ ਮਰਨ ਪਿੱਛੋਂ ਜਿਉਂਦੀਆਂ ਰਹਿੰਦੀਆਂ ਹਨ ਤੇ ਲੋਕਾਂ ਨੂੰ ਉਹਨਾਂ ਵਿੱਚ ਸੁੰਦਰਤਾ ਦੀ ਸਦੀਵੀ ਝਲਕ ਦਿਖਾਈ ਦਿੰਦੀ ਹੈ। ਉੱਚ ਨੈਤਿਕ ਗੁਣਾਂ ਤੇ ਆਦਰਸ਼ਾਂ ਵਾਲਾ ਬੰਦਾ ਭਾਵੇਂ ਸ਼ਕਲੋਂ ਕੋਝਾ ਵੀ ਹੋਵੇ, ਉਹ ਸਹੀ ਅਰਥਾਂ ਵਿੱਚ ਸੁੰਦਰ ਹੁੰਦਾ ਹੈ। ਉਸ ਦੇ ਹਰ ਕਾਰਜ ਵਿੱਚੋਂ ਚੰਗਿਆਈ ਦੀ ਮਹਿਕ ਖਿੱਲਰਦੀ ਹੈ। ਉਸ ਦੇ ਮੂੰਹੋਂ ਨਿਕਲਿਆ ਇੱਕ-ਇੱਕ ਸ਼ਬਦ ਦੁਖੀ ਲੋਕਾਂ ਦੇ ਮਨ ਨੂੰ ਠੰਡ ਪਾਉਂਦਾ ਹੈ। ਦੁਨੀਆਵੀ ਲੋਕ ਚੰਮ ਦੀ ਸੁੰਦਰਤਾ ਉੱਪਰ ਮੋਹਿਤ ਹੁੰਦੇ ਹਨ। ਇਹ ਉਹਨਾਂ ਨੂੰ ਵਕਤੀ ਖੁਸ਼ੀ ਜਰੂਰ ਦਿੰਦੀ ਹੈ, ਪਰ ਕੁੱਝ ਸਮੇਂ ਪਿੱਛੋਂ ਨਾ ਉਹ ਸੁੰਦਰਤਾ ਰਹਿੰਦੀ ਹੈ ਤੇ ਨਾ ਉਸ ਤੋਂ ਪ੍ਰਾਪਤ ਹੋਣ ਵਾਲੀ ਖੁਸ਼ੀ। ਮਨੁੱਖ ਦੇ ਸੁਹਣੇ ਤੇ ਨੇਕੀ ਭਰੇ ਕੰਮ ਆਲੇ-ਦੁਆਲੇ ਵਿੱਚ ਖੁਸ਼ੀ ਤੇ ਪ੍ਰੇਮ-ਪਿਆਰ ਦਾ ਪਸਾਰ ਕਰਦੇ ਹਨ। ਕੁੱਛ ਵਿੱਚ ਛੁਰੀ ਤੇ ਮੂੰਹੋਂ ਰਾਮ ਰਾਮ ਕਰਨ ਵਾਲਾ ਬੰਦਾ ਸਭ ਤੋਂ ਵੱਧ ਖਤਰਨਾਕ ਹੁੰਦਾ ਹੈ। ਇਸ ਲਈ ਸੋਹਣਾ ਬੰਦਾ ਉਹ ਹੀ ਹੁੰਦਾ ਹੈ, ਜਿਸ ਦੇ ਕੰਮ ਸੋਹਣੇ ਹੁੰਦੇ ਹਨ। ਕੇਵਲ ਸ਼ਕਲ ਦੀ ਸੁੰਦਰਤਾ ਦੇ ਮਾਲਕ ਨੂੰ ਅਸਲ ਸੋਹਣਾ ਨਹੀਂ ਕਿਹਾ ਜਾ ਸਕਦਾ।

8. ਉਪਰੋਕਤ ਪੈਰੇ ਅਨੁਸਾਰ ਕਿਹੋ ਜਿਹੀ ਪਰਵਿਰਤੀ ਵਾਲਾ ਬੰਦਾ ਸਭ ਤੋਂ ਵਧੇਰੇ ਖਤਰਨਾਕ ਹੁੰਦਾ ਹੈ?

   (a)   ਜਿਹੜਾ ਸਾਰਿਆਂ ਨਾਲ ਨਫ਼ਰਤ ਕਰੇ।

   (b)   ਜਿਹੜਾ ਹਰ ਇੱਕ ਨੂੰ ਗੁੱਸੇ ਵਿੱਚ ਬੋਲੇ।

   (c)   ਜਿਹੜਾ ਅੰਦਰੋਂ ਹੋਰ ਤੇ ਬਾਹਰੋਂ ਹੋਰ ਹੋਵੇ।

   (d)   ਜਿਹੜਾ ਅਨੈਤਿਕ ਗੁਣਾਂ ਨਾਲ ਭਰਪੂਰ ਹੋਵੇ।

9. ਪੈਰੇ ਮੁਤਾਬਿਕ ਸਦੀਵੀ ਸੁੰਦਰਤਾ ਕਿਵੇਂ ਆਉਂਦੀ ਹੈ?

   (a)   ਸੁੰਦਰ ਆਤਮਾ ਅਤੇ ਮਨ ਨਾਲ ਕੀਤੇ ਕਾਰਜਾਂ ਕਾਰਣ

   (b)   ਚੰਮ ਦੀ ਸੁੰਦਰਤਾ ਨੂੰ ਦਰ ਕਿਨਾਰ ਕਰਕੇ

   (c)   ਮੂੰਹ ਤੋਂ ਰਾਮ ਰਾਮ ਬੋਲ ਕੇ

   (d)   ਦੁਨਿਆਵੀ ਲੋਕਾਂ ਨਾਲ ਮੋਹ ਘਟਾ ਕੇ

10. ਉਪਰੋਕਤ ਪੈਰੇ ਦਾ ਸਿਰਲੇਖ ਕੀ ਹੈ?

    (a)   ਸੂਰਤ ਦੀ ਮਹੱਤਤਾ।

    (b)   ਸੀਰਤ ਦੀ ਮਹੱਤਤਾ।

    (c)   ਪਿਆਰ ਦੀ ਮਹੱਤਤਾ।

    (d)   ਨੈਤਿਕ ਗੁਣਾਂ ਦੀ ਮਹੱਤਤਾ।

11. The hydraulic loading in the high-rate trickling filters should be in the range of $(m^3/d/m^2)$:

(a) 150 – 180   (b) 100 – 130

(c) 50 – 80   (d) 10 – 30

12. Consider the following statements:
1. The Trickling filter is used for the biological treatment of both domestic sewage and industrial waste.
2. Reciprocating screens are used for removal of oversized materials from municipal solid waste.

Which of the above statements is/are correct?

(a) 1 only   (b) 2 only   (c) Both 1 and 2   (d) Neither 1 nor 2

13. Which of the following statements is/are ***incorrect*** regarding landfills?
1. Trench landfilling, area landfilling, slope landfilling are different types of landfills.
2. Leachate is a coloured liquid that comes out of sanitary landfills.
3. High concentration of ammonia is produced in facultative decomposition stage.

Choose the correct option:

(a) 1 and 2 only   (b) 2 and 3 only

(c) 3 only   (d) None is incorrect

14. The C/N ratio for composting should be in the range of:

(a) 50:1   (b) 25:1   (c) 75:1   (d) 100:1

15. Which is ***not*** a composting method?

(a) Windrow method   (b) Static Pile method

(c) In-vessel method   (d) In-circular method

16. The BOD5 in the leachate is seen in the range as (mg/lt):

(a) 2,000 – 30,000   (b) 31,000 – 40,000

(c) 40,000 – 50,000   (d) more than 50,000

17. The physical tests of water include the following:

(a) Temperature, Colour and Turbidity

(b) Specific gravity, Colour and Turbidity

(c) pH, Specific gravity and Temperature

(d) Hardness, pH, and Temperature

18. The chlorides should be in the range for water supply (domestic):

    (a)   up to 250 ppm   (b)   up to 500 ppm

    (c)   up to 750 ppm   (d)   up to 1000 ppm

19. The detention time in sedimentation tank can be obtained by:

    (a)   Perimeter of the tank / Rate of flow of water

    (b)   Rate of flow of water / Perimeter of the tank

    (c)   Capacity of the tank / Rate of flow of water

    (d)   Rate of flow of water / Capacity of the tank

20. The main variables of the activated sludge process are:

    (a)   loading rate, mixing regime and flow scheme

    (b)   output, biological regime and pH

    (c)   biological regime, pH, density

    (d)   pH, density, hardness

21. Consider the following statements regarding Rotating Biological Contactor:

    1.   Rotating biological contactor treatment technology of wastewater is based on the attached growth process.

    2.   Rotating biological contactor (RBC) is sensitive to temperature.

    3.   It has low capital cost.

    Which of the above statements is/are correct?

    (a)   1 only

    (b)   1 and 2 only

    (c)   3 only

    (d)   1, 2 and 3

22. Consider the following statements:

    1.   Peak factor for the sewer design is the ratio of maximum flows to average flows.

    2.   The minimum size of public sewer in plains should not be less than 150 mm.

    Which of the above statements is/are correct?

    (a)   1 only

    (b)   2 only

    (c)   Both 1 and 2

    (d)   Neither 1 nor 2

23. The maximum velocity in circular section is developed when the proportionate depth is:

(a)   0.91   (b)   0.81   (c)   0.71   (d)   0.61

24. If the mean precipitation over a region is calculated as 200 mm, and there are 5 stations with recorded precipitation values of 180 mm, 220 mm, 190 mm, and 210 mm, what is the value of the missing fifth station?

(a)   200 mm   (b)   210 mm   (c)   220 mm   (d)   230 mm

25. Using the normal-ratio method, estimate the missing rainfall (P4) for a station given the following data: Station 1 (P1 = 80 mm, N1 = 90), Station 2 (P2 = 120 mm, N2 = 110), Station 3 (P3 = 100 mm, N3 = 105), and the normal annual rainfall of the missing station (N4 = 100).

(a)   98 mm   (b)   100 mm   (c)   102 mm   (d)   105 mm

26. Given a unit hydrograph with a peak flow of 100 m^3/s for a rainfall excess of 2 mm, what is the peak flow for a rainfall excess of 5 mm?

(a)   100 m^3/s   (b)   150 m^3/s   (c)   200 m^3/s   (d)   250 m^3/s

27. Using the S-curve method, a 6-hour unit hydrograph has a peak flow of 80 m^3/s. What is the peak flow for a 12-hour unit hydrograph derived from this 6-hour unit hydrograph?

(a)   40 m^3/s   (b)   80 m^3/s   (c)   120 m^3/s   (d)   160 m^3/s

28. Consider the following statements:

1.   A unit hydrograph is helpful in estimating the runoff from a basin.

2.   The time between the peak rainfall and the peak discharge in a hydrograph is referred to as recession limb.

3.   An instantaneous unit hydrograph (IUH) represents the peak discharge of a river.

4.   The primary factor that differentiates a unit hydrograph from an instantaneous unit hydrograph (IUH) is the duration of effective rainfall.

Which of the above statements are correct?

(a)   1 and 4 only

(b)   2 and 3 only

(c)   1, 3 and 4 only

(d)   1, 2 and 4 only

29. Consider the following statements:

1. Darcy's law governs the flow of groundwater through porous media.

2. According to Darcy's Law, the flow rate (Q) through a porous medium is proportional to the hydraulic conductivity (K) of the medium and the hydraulic gradient (i).

3. According to Darcy's law the discharge is inversely proportional to the length of path.

Which of the above statements are correct?

(a) 1 and 2 only

(b) 2 and 3 only

(c) 1 and 3 only

(d) 1, 2 and 3

30. Consider the following statements:

1. The settling velocity of a spherical particle in still water is given by Stoke's law.

2. The self-purification of streams can be modelled using Streeter Phelps model.

Which of the above statements is/are ***incorrect***?

(a) 1 only

(b) 2 only

(c) Both 1 and 2 are incorrect

(d) Neither 1 nor 2 is incorrect

31. Which of the following is an infiltration index?

(a) Evaporation index

(b) Phi index

(c) Runoff coefficient

(d) Manning's coefficient

32. Which of the following best describes the initial abstraction (Ia) in the SCS-CN method?

(a) The total runoff

(b) The initial loss of rainfall due to interception, infiltration, and surface storage

(c) The evaporation loss

(d) The peak discharge

33. Consider the following statements:

    1. Erosion from the watershed is the primary cause of sedimentation in reservoirs.

    2. Spillway capacity is the term for the maximum amount of water that can be supplied by a reservoir without failure over a specified period.

    Which of the above statements is/are correct?

    (a) 1 only

    (b) 2 only

    (c) Both 1 and 2

    (d) Neither 1 nor 2

34. The initial rate of infiltration of a watershed is estimated as 2.1 in/h, the final capacity is 0.2 in/h, and the time constant, k, is 0.4 h-1. What is the infiltration capacity at t = 2h ? (Use Horton's Infiltration Equation)

    (a) 1.95 in/h

    (b) 1.55 in/h

    (c) 1.75 in/h

    (d) 1.05 in/h

35. Consider the following statements in context of aquifers and aquifer parameters:

    1. A confined aquifer is a type of aquifer which is directly recharged by surface water.

    2. The term "specific yield" refers to the volume of water that can be drained by gravity.

    3. When designing tube wells for water extraction from a confined aquifer, the most crucial parameter for determining the optimal spacing between wells to avoid excessive drawdown is the transmissivity of the aquifer.

    Which of the above statements are correct?

    (a) 1 and 2 only

    (b) 2 and 3 only

    (c) 1 and 3 only

    (d) 1, 2 and 3

36. If a rain gauge records 50 mm of rain in a day, how much water is collected in litres per square meter?

    (a) 5 L/m^2 (b) 50 L/m^2

    (c) 500 L/m^2 (d) 5000 L/m^2

37. A catchment of area 120 ha has a time of concentration of 30 min and runoff coefficient of 0.4. If a storm of duration 45 min results in 3.0 cm of rain over the catchment, estimate the resultant peak flow rate.

   (a)   5.33 m^3/s   (b)   5.01 m^3/s   (c)   6.02 m^3/s   (d)   6.22 m^3/s

38. If a tube well is constructed to a depth of 50 m and it draws water from an aquifer with a saturated thickness of 30 m, what is the effective depth of the well?

   (a)   20 m   (b)   30 m   (c)   50 m   (d)   80 m

39. A small catchment of area 300 ha received a rainfall of 12.5 cm in 3 hours. At the outlet of the catchment the measured runoff lasted for 10 hours with an average discharge value of 3.125 m^3/s. The stream was dry before and after the runoff event. What is the runoff coefficient?

   (a)   0.1   (b)   0.2   (c)   0.3   (d)   0.6

40. Which parameter significantly influences the initial steepness of the infiltration capacity curve in a soil infiltration model?

   (a)   The soil's porosity

   (b)   The antecedent moisture content of the soil

   (c)   The surface roughness of the land

   (d)   The depth of the groundwater table

41. A region has recorded annual maximum rainfall data for 30 years. Using the Gumbel distribution, the mean annual maximum rainfall is found to be 150 mm, and the standard deviation is 20 mm. Calculate the 100-year return period rainfall.

   (Gumbel distribution formula $X_T = \mu + K_T \cdot \sigma$, where $K_T = - ln(-ln(1-1/T))$, μ is the mean, σ is the standard deviation, and T is the return period.)

   (a)   175 mm   (b)   190 mm

   (c)   210 mm   (d)   230 mm

42. A catchment area of 200 square kilometers experiences a rainfall event with an intensity of 40 mm/hr lasting for 3 hours. Assuming a runoff coefficient of 0.7 and using the Rational Method, calculate the peak discharge in cubic meters per second.

   (a)   1,555 m^3/s

   (b)   2,800 m^3/s

   (c)   3,111 m^3/s

   (d)   4,444 m^3/s

43. For a given watershed, the curve number (CN) is calculated based on land use, soil type, and antecedent moisture condition (AMC). If the AMC changes from dry to wet, what is the expected effect on the curve number?

(a) The curve number decreases

(b) The curve number remains unchanged

(c) The curve number increases

(d) The curve number first decreases, then increases

44. In a watershed with varying land uses, which method of runoff estimation is the most sensitive to changes in land cover, particularly with respect to impervious surfaces?

(a) Rational method   (b) SCS Curve Number method

(c) Green-Ampt infiltration model   (d) Unit hydrograph method

45. Which method is most appropriate for determining the yield of a reservoir where inflow exhibits significant seasonal variability?

(a) Mass curve analysis

(b) Sequent Peak Algorithm

(c) Frequency analysis of inflows

(d) Sediment rating curve analysis

46. Which technique/method is used to measure dissolved oxygen in water?

(a) Winkler method   (b) Turbidity method

(c) Streeter method   (d) LaGrange method

47. Which of the following is *not* an example of a natural buffer system?

(a) Carbonic acid-bicarbonate buffer system

(b) Phosphate buffer system

(c) Ammonia buffer system

(d) Potassium bicarbonate buffer system

48. Which of the following statements is true about MSW treatment techniques?

1. Composting of MSW is most commonly aerobic

2. Bio methanation of MSW is most commonly aerobic

Choose the correct option:

(a) 1 only   (b) 2 only

(c) Both 1 and 2   (d) Neither 1 nor 2

49. Which of the following statements is correct regarding solid waste management rules framed by the Government of India?

   (a) Municipal Solid Wastes (Management & Handling) Rules were first notified in 2010

   (b) Disposing construction and demolition waste is a part Solid waste Management rules 2017

   (c) Solid Waste management rules notified in 2016 mandated source segregation of waste

   (d) India doesn't have any Solid waste management rules

50. Which of the following statements is **not** true?

   (a) CNG is stored in high-pressure cylinders.

   (b) CNG has less energy density compared to LNG.

   (c) PNG is commonly used for long-distance transportation of natural gas across oceans.

   (d) CNG infrastructure is less expensive and more widely available compared to LNG infrastructure.

51. In the context of water resource management, what does the term "aquifer overdraft" refer to?

   (a) The enhancement of aquifer recharge rates through artificial methods

   (b) The excessive withdrawal of groundwater leading to long-term depletion

   (c) The increase in groundwater storage due to reduced extraction

   (d) The balance between groundwater recharge and discharge

52. Which of the following orders correctly represents the environment-related acts in India based on their first enactment date, from the earliest to the latest?

   (a) Water (Prevention and Control of Pollution) Act, Air (Prevention and Control of Pollution) Act, Environment (Protection) Act, Biological Diversity Act.

   (b) Water (Prevention and Control of Pollution) Act, Biological Diversity Act, Air (Prevention and Control of Pollution) Act, Environment (Protection) Act.

   (c) Water (Prevention and Control of Pollution) Act, Environment (Protection) Act, Air (Prevention and Control of Pollution) Act, Biological Diversity Act.

   (d) Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Environment (Protection) Act, Biological Diversity Act.

53. Which of the following statements is *not* true about nuclear waste management?

(a) High-level radioactive waste requires isolation for thousands of years to prevent radiation exposure to humans and the environment.

(b) Deep geological repositories are considered one of the safest methods for the long-term storage of high-level nuclear waste.

(c) Low-level radioactive waste can be safely disposed of in near-surface disposal facilities without any further treatment.

(d) Nuclear waste reprocessing can reduce the volume of high-level waste but does not eliminate the need for long-term storage solutions.

54. Which soil characteristic is most likely to increase ammonia volatilization following fertilizer application?

(a) Low soil moisture content

(b) High soil organic matter

(c) High cation exchange capacity

(d) High soil pH

55. Which of the following statements about ecosystems is *not* true?

(a) Liebig's law states that growth only occurs at the rate permitted by the most non-limiting factor.

(b) The Ramsar Convention was signed in 1971 and became effective in 1975.

(c) The carrying capacity of a population is determined by its limiting resources and represents the maximum number of individuals that an ecosystem can support based on available resources under specific conditions.

(d) A Red Data Book is a document that keeps a record of all the endangered species of animals, plants, and fungi in a country or a state.

56. Which of the following factors is least likely to affect the efficiency of a rooftop water heater?

(a) Sunlight exposure

(b) Tilt and orientation

(c) Water quality

(d) Type of roofing material used

57. Which of the following statements is *not* true?

(a) The Environment (Protection) Act made Environmental Impact Assessment statutory.

(b) Screening is a step to identify and prioritize the key environmental issues and impacts to be addressed in the Environmental Impact Assessment.

(c) Pollution Control Boards may also participate in EIA of a project.

(d) The Environmental Impact Assessment 2006 divides the projects into three categories.

58. Which of the following statements is **_not_** true?

(a) The Convention on Long-range Transboundary Air Pollution (CLRTAP) is an international treaty that specifically addresses CO_2 across national boundaries.

(b) 1985 Helsinki Protocol, 1994 Oslo Protocol and 1999 Gothenburg Protocol fall under the Convention on Long-range Transboundary Air Pollution (CLRTAP).

(c) One of the principles in Rio Declaration states that environmental issues are best handled with the participation of all concerned citizens, at the relevant level.

(d) Acid rains can damage leaves and bark, making trees more susceptible to disease and pests.

59. Based on the information from the graph below:
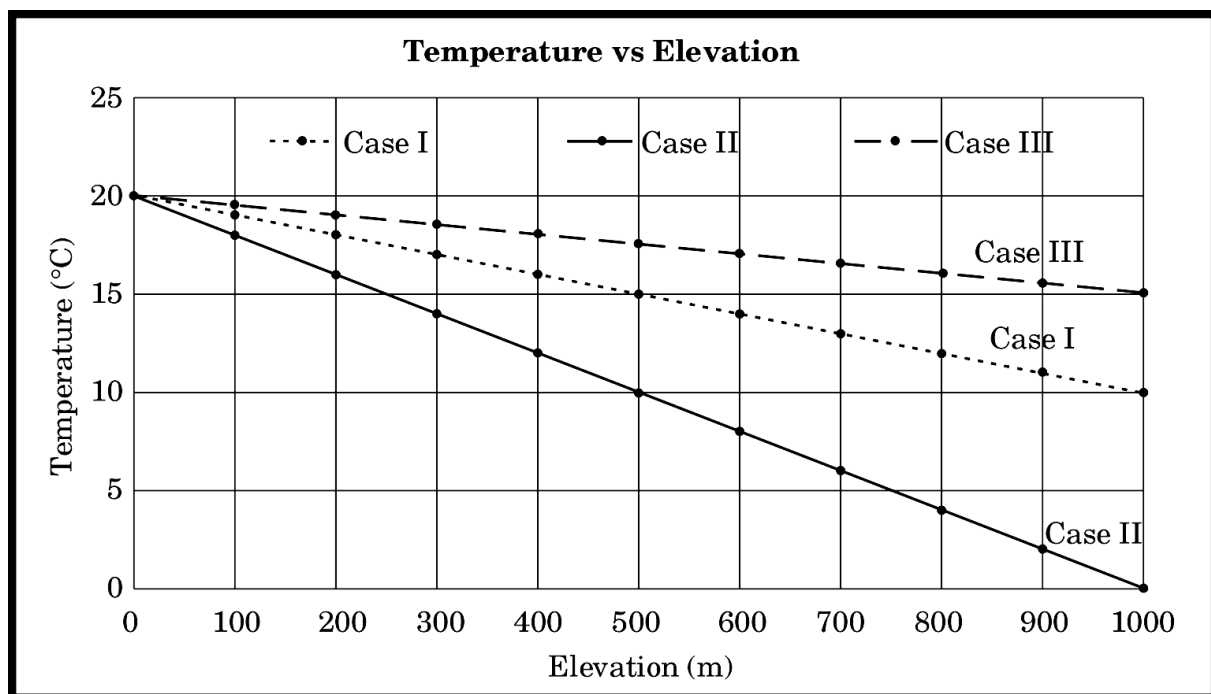
Choose the correct statement:

(a) Case 1 closely represents neutral conditions

(b) Case 2 closely represents neutral conditions

(c) Case 3 closely represents neutral conditions

(d) Both cases 1 and 2 closely represent neutral conditions

60. Consider the following statements:

1. Gravimetric method is used to measure Respirable Particulate Matter.

2. Chemiluminescence is the method used to measure Ozone.

Which of the above statements is/are **_incorrect_**?

(a) 1 only   (b) 2 only

(c) Both 1 and 2   (d) Neither 1 nor 2

61. Consider the following statements about Catalytic converters:

1. Catalytic converters primary target Carbon monoxide, nitrogen dioxides and hydrocarbons in vehicle exhaust systems.

2. A catalytic convertor helps in reducing nitrogen oxides (NOx) in vehicle emissions by converting NOx into nitrogen and oxygen through a reduction reaction.

3. Aluminum and copper are typically used as catalysts in catalytic converters to facilitate the conversion of harmful gases.

Which of the above statements is/are correct?

(a) 1 only

(b) 1 and 2 only

(c) 3 only

(d) 1 and 3 only

62. How does the air-fuel ratio in spark ignition engines influence the emission of pollutants?

(a) A lean air-fuel mixture (excess air) typically reduces carbon monoxide and hydrocarbon emissions but may increase nitrogen oxides emissions.

(b) A rich air-fuel mixture (excess fuel) reduces all emissions due to complete combustion.

(c) A stoichiometric air-fuel ratio (ideal balance) maximizes particulate matter emissions.

(d) The air-fuel ratio has no impact on emissions as long as the engine is properly tuned.

63. In the context of VOC emission control, consider the following statements:

1. Installation of carbon capture and storage systems is often implemented to limit VOC emissions from automotive refueling operations.

2. The primary purpose of using an activated carbon adsorption system is to capture and concentrate VOCs for subsequent disposal or recovery.

Which of the above statements is/are correct?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

64. A factory emits a pollutant continuously from a stack at a rate of 200 g/s. The wind speed at the stack of 40 m height is 5 m/s. Assuming that plume rise is negligible, the plume spread parameters at a downwind distance of 500 m in the horizontal (y) and vertical (z) directions are 100 m and 50 m, respectively. The ground-level concentration of the pollutant along the centerline at that distance is _____.

(a) 1.85 mg/m^3 (b) 2.3 mg/m^3

(c) 1.85 µg/m^3 (d) 2.3 µg/m^3

65. A factory emits a pollutant continuously from a stack of 40 m height. The wind speed at the stack is 5 m/s. Assuming that plume rise is negligible, the plume spread parameters at a downwind distance of 500 m in the horizontal (y) and vertical (z) directions are 80 m and 35 m, respectively. If the ground-level concentration of the pollutant along the centerline at that distance is 0.0355 g/m³, the factory emits a pollutant continuously from a stack at a rate of _____.

(a) 200 g/s (b) 2 kg/s

(c) 300 g/s (d) 3 kg/s

66. Which of the following statements is **not** true according to the National Ambient Air Quality Standards (Central Pollution Control Board, Government of India, notification 2009)?

(a) Annual standard for Sulphur dioxide is greater than its corresponding daily standard.

(b) The hourly averaged standard for Carbon Monoxide is 4 mg/m^3.

(c) The annual averaged standard for $PM_{2.5}$ is 40 µg/m^3.

(d) Mercury is not a part of National Ambient Air Quality Standards.

67. The most important precursors for Ozone formation in ambient air are:

(a) NOx and VOCs (b) CO_2 and VOCs

(c) CO_2 and NOx (d) H_2 and NOx

68. Which class of micro-organisms are most active in anaerobic digestion of sludge?

(a) Mesophiles and psychrophiles

(b) Thermophiles and psychrophiles

(c) Thermophiles and mesophiles

(d) Halophiles and mesophiles

69. Algae can be very beneficial, but they cause a problem when they remove:

(a) Iron (b) Nitrates

(c) Ammonium (d) Phosphorous

70. The time of contact for chlorination should be at least:

(a) 5 minutes   (b) 20 minutes

(c) 1 hour   (d) 2 hours

71. In the context of water treatment, odour and taste are controlled by:

(a) Disinfection   (b) Aeration

(c) Coagulation   (d) Soda-lime process

72. Which of the following treatment reduce salinity of water?

1. Flash mixing and sedimentation

2. Electrodialysis

3. Reverse Osmosis

4. Freezing

5. Filtration

(a) 1, 2, 3, 4 and 5   (b) 2, 3 and 4 only

(c) 1, 4 and 5 only   (d) 1, 2 and 4 only

73. The rate limiting step for the production of biogas from an anaerobic digestion of sludge is:

(a) Acidification   (b) Alkalisation

(c) Acetogenesis   (d) Methanogenesis

74. Which one of the following relations holds true for the specific growth rate (μ) of a microorganism in the stationary phase?

(a) $\mu = 0$ (b) $\mu = \mu_{max}$

(c) $\mu < 0$ (d) $0 < \mu < \mu_{max}$

75. Coagulation-flocculation with alum is performed:

(a) Immediately before chlorination   (b) Immediately after chlorination

(c) After rapid sand filtration   (d) Before rapid sand filtration

76. The settlement of a particle in the sedimentation tank is *not* affected by:

(a) Velocity of flow   (b) Viscosity of water

(c) Size and shape of solid   (d) Depth of the tank

77. Flocculated particles do *not* change their:

(a) Size   (b) Shape

(c) Weight   (d) Density

78. Which of the following is ***not*** a biological process for destroying organic compounds?

(a) Composting (b) Trickling Filters

(c) Calcination (d) Activated sludge

79. Bacteria that can survive with or without free oxygen, are known as:

(a) Aerobic bacteria (b) Anaerobic bacteria

(c) Facultative bacteria (d) None of the above

80. Total rainfall in a catchment area of 1200 km^2 during a 6 hour storm is 16 cm while surface runoff due to the storm is 1.2×10^8 m^3. The Φ index is:

(a) 0.1 cm/h

(b) 1.0 cm/h

(c) 0.2 cm/h

(d) Cannot be estimated with the given data

81. Water level in confined well:

(a) Increases with increase in the atmospheric pressure

(b) Decreases with increase in the atmospheric pressure

(c) Does not undergo any change with change in atmospheric pressure

(d) All of these

82. The temperature inside the earth rises by 1°C for the descend of every:

(a) 10 m (b) 20-25 m

(c) 35-40 m (d) 50-70 m

83. The assumption in the Thiem formula for discharge from an unconfined aquifer is:

(a) That the flow lines are radial and horizontal

(b) That the flow is turbulent

(c) That the soil is isotropic

(d) That the flow is unsteady

84. Interception Loss is:

(a) More towards the end of a storm

(b) More at the beginning of a storm

(c) Uniform throughout the storm

(d) Low in the beginning of the storm and gradually increases

85. Which of the following is a non-recording rain gauge:

(a) Tipping bucket type rain gauge

(b) Simon's rain gauge

(c) Steven's weighing type rain gauge

(d) Floating type rain gauge

86. Specific yield of an aquifer is:

(a) Proportional to soil porosity

(b) Volume of the water which drains freely

(c) Depends on the soil condition

(d) None of these

87. Consider the following statements:

1. The term "drawdown" refers to the volume of water withdrawn from the aquifer.

2. Discharge per unit of drawdown of a well is called its specific capacity.

3. Specific capacity of a well decreases with time from the start of pumping.

Which of the above statements are correct?

(a) 1 and 2 only   (b) 2 and 3 only

(c) 1 and 3 only   (d) 1, 2 and 3

88. The Air Quality Index (AQI) of a city is 190. It falls under which category?

(a) Very poor   (b) Poor

(c) Moderate   (d) Good

89. The following device works based on the inertial force of the particle:

(a) Fabric filter

(b) Electrostatic precipitator

(c) Cyclone separator

(d) Gravitational settling chamber

90. Concentration of ozone in clean air is _____ppm.

(a) 0.5   (b) 0.1

(c) 0.001   (d) 0.01

91. The aerobic method of composting as practiced in India is called as:

(a) Bangalore method   (b) Mangalore method

(c) Indore method   (d) Nagpur method

92. The volume of voids in a soil mass expressed as percentage of total volume of soil is known as:

(a) porosity

(b) voids ratio

(c) permeability

(d) specific yield

93. Consider the following statements:

1. Isohyets are the imaginary lines joining the points of equal rainfall.

2. Tensiometer is used to measure capillary potential.

Which of the above statements is/are correct?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

94. In denitrification _____ is converted to _____.

(a) Ammonia is converted to Nitrate

(b) Ammonia is converted Nitrite

(c) Nitrate is converted to Nitrogen

(d) Nitrite is converted to Nitrate

95. Which of the following is *incorrect* about Gaussian Dispersion Model for air pollution?

(a) Ambient temperature is not directly used in the Gaussian Dispersion Model.

(b) It assumes uniform wind speed and direction over the dispersion area.

(c) Greater stability leads to a wider and more dispersed plume.

(d) It is used for prediction of concentration of air pollutants from point sources.

96. Global warming potential of Carbon dioxide is:

(a) 1

(b) 2

(c) Infinite

(d) 0

97. What does the term "biogeochemical cycle" refer to?

(a) The movement of biotic factors across different biomes.

(b) The cycling of nutrients and elements through the biotic and abiotic components of the Earth.

(c) The process by which genetic material is exchanged between species.

(d) The migration patterns of species across continents.

98. Which of these closely explains the relationship between the size of an ecosystem and its species diversity?

(a) Competitive Exclusion Principle

(b) Theory of Evolution by Natural Selection

(c) Island Biogeography Theory

(d) Keystone Species Concept

99. In which sphere does the process of weathering primarily occur, and how does it affect the other spheres?
   (a) The biosphere; it enriches the soil with organic matter.
   (b) The atmosphere; it influences the climate and weather patterns.
   (c) The hydrosphere; it contributes to soil erosion and sediment transport.
   (d) The lithosphere; it breaks down rocks into soil that supports plant life in the biosphere.

100. What does the term "ecological footprint" specifically measure?
   (a) The total land area required to produce the resources consumed and absorb the waste generated by an individual, community, or country.
   (b) The economic cost associated with environmental degradation and resource depletion.
   (c) The carbon emissions produced by industrial activities and transportation.
   (d) The amount of natural resources available in a given geographical area.

101. A sustainable society:
   (a) Returns to a more primitive style of living.
   (b) Continues as always and assumes that things will work out for the best.
   (c) Meets the needs of the present without compromising those of the future.
   (d) Is inconsistent with the goals of environmentalism.

102. Which convention was adopted for the protection of ozone layer?
   (a) Vienna Convention   (b) Basel Convention
   (c) Rotterdam Convention   (d) Stockholm Convention

103. Calculating the value of GDP of two countries using the Purchasing Power Parity (PPP) method involves:
   (a) Expressing the value of both the countries' output in same currency.
   (b) Finding out what can be bought in each country with a unit of the local currency.
   (c) Comparing the inflation rates in each country.
   (d) Taking into account the exchange rate of each country's currency.

104. Consider the following statements with reference to indirect and direct taxes in India:
   1. In the case of indirect taxes, the incidence and impact of the tax are on the same person.
   2. Direct taxes are progressive in nature.
   3. While Income Tax is a type of direct tax, corporate tax is a type of indirect tax.
   Which of the statements given above is/are correct?
   (a) 2 only   (b) 2 and 3 only
   (c) 1 and 2 only   (d) 1, 2 and 3

105. The term secular was added to the Preamble by which amendment of the Indian Constitution?

(a) 42nd (b) 44th

(c) 46th (d) 51st

106. The Tropic of Cancer traverses through which of the following combination of countries?

(a) India, Philippines, China, Saudi Arabia, Egypt

(b) India, Egypt, China, Sri Lanka, Afghanistan

(c) India, China, Saudi Arabia, Egypt, Libya

(d) India, Egypt, China, Myanmar, Afghanistan

107. Match List I with List II and select answer from the codes given below.

	List I		*List II*
A.	Warren Hastings	I.	Prohibition of Sati
B.	Lord Wellesley	II.	Treaty of Amritsar with Ranjit Singh
C.	Lord Minto	III.	Subsidiary Alliance
D.	Lord William Bentick	IV.	Regulating Act of 1773

(a) A-III, B-IV, C-II, D-I   (b) A-I, B-IV, C-III, D-II

(c) A-IV, B-III, C-II, D-I   (d) A-IV, B-II, C-III, D-I

108. The Komagata Maru Affair merged with the programme of the:

(a) Congress Party   (b) Muslim League

(c) Ghadar Party   (d) Revolutionaries

109. South Asian Association for Regional Cooperation (SAARC) has been in news recently. Which of the following countries is **not** a part of SAARC?

(a) Afghanistan   (b) Maldives

(c) Sri Lanka   (d) Myanmar

110. The following phenomena appears in news frequently. Which of these has/have a bearing on Indian monsoon?

(a) El Nino and Southern Oscillation (ENSO)

(b) Indian Ocean Dipole (IOD)

(c) Both (a) and (b)

(d) Neither (a) nor (b)

Directions (111 to 115) : Study the following information to answer the given questions:

    (1)   In a class of boys and girls, Aman's rank is 12th and Manisha's rank is 8th.

    (2)   Aman's rank among the boys is 6th and Manisha's rank among girls is 3rd.

    (3)   In the class Manisha's rank is 52th from the other end.

    (4)   From the other end, Aman's rank among the boys is 26th.

111. How many boys are there in the class?
- (a) 28
- (b) 29
- (c) 31
- (d) Can't be determined

112. Which of the following is Manisha's rank among the girls from the other end?
- (a) 26th
- (b) 23rd
- (c) 28th
- (d) Can't be determined

113. How many boys are there before Manisha?
- (a) 4
- (b) 3
- (c) 5
- (d) Can't be determined

114. How many boys are there between Aman and Manisha?
- (a) One
- (b) Two
- (c) Three
- (d) None of these

115. How many girls are there before Aman?
- (a) 6
- (b) 5
- (c) 7
- (d) Can't be determined

116. N, M, O and P can do a piece of work in 80 days. N and M can together do the piece of work in 120 days, whereas O can do the piece of work in 360 days. In how many days P can finish the work?
- (a) 660
- (b) 360
- (c) 240
- (d) 720

117. If the selling price of an article is 8 % more than its cost price and the discount offered is 10 % on the marked price of the article, then what is the ratio of the cost price to the marked price?
- (a) 5 : 6
- (b) 8 : 9
- (c) 4 : 5
- (d) 3 : 4

118. The monthly incomes of two persons are in the ratio of 4:5 and their monthly expenditures are in the ratio of 7: 9. If each save ₹ 50 a month what are their monthly incomes:
- (a) ₹ 100, ₹ 125
- (b) ₹ 200, ₹ 250
- (c) ₹ 300, ₹ 375
- (d) ₹ 400, ₹ 500

119. Rohit starts from his house in his car and travels 10 km towards the North, then 8 km towards East then 12 km towards his right, 6 km towards his left, 10 km toward north and finely 2 km towards his right. In which direction is he now with reference to the starting point?
- (a) North
- (b) South
- (c) North-east
- (d) South-west

120. What is the *incorrect* number in the sequence: 25, 34, 49, 68, 91, 118, 149 ?
- (a) 34
- (b) 25
- (c) 91
- (d) 118

SPACE FOR ROUGH WORK

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