Signature and Name of Invigilator

1. (Signature) _____

   (Name) _____

2. (Signature) _____

   (Name) _____

OMR Sheet No. : .....

(To be filled by the Candidate)

Roll No. | | | | | | | |

(In figures as per admission card)

Roll No. _____

(In words)

Test Booklet No.

D–8908

PAPER–II

Time : 1¼ hours] # ENVIRONMENTAL SCIENCE **[Maximum Marks : 100**

Number of Pages in this Booklet : **16** Number of Questions in this Booklet : **50**

Instructions for the Candidates

1. Write your roll number in the space provided on the top of this page.
2. This paper consists of fifty multiple-choice type of questions.
3. At the commencement of examination, the question booklet will be given to you. In the first 5 minutes, you are requested to open the booklet and compulsorily examine it as below :
   (i) To have access to the Question Booklet, tear off the paper seal on the edge of this cover page. Do not accept a booklet without sticker-seal and do not accept an open booklet.
   (ii) **Tally the number of pages and number of questions in the booklet with the information printed on the cover page. Faulty booklets due to pages/questions missing or duplicate or not in serial order or any other discrepancy should be got replaced immediately by a correct booklet from the invigilator within the period of 5 minutes. Afterwards, neither the question booklet will be replaced nor any extra time will be given.**
   (iii) After this verification is over, the Test Booklet Number should be entered in the OMR Sheet and the OMR Sheet Number should be entered on this Test Booklet.
4. Each item has four alternative responses marked (A), (B), (C) and (D). You have to darken the oval as indicated below on the correct response against each item.

   Example : (A) (B) ● (D)

   where (C) is the correct response.
5. Your responses to the items are to be indicated in the Answer Sheet given **inside the Paper I booklet only**. If you mark at any place other than in the ovals in the Answer Sheet, it will not be evaluated.
6. Read instructions given inside carefully.
7. Rough Work is to be done in the end of this booklet.
8. If you write your name or put any mark on any part of the test booklet, except for the space allotted for the relevant entries, which may disclose your identity, you will render yourself liable to disqualification.
9. You have to return the test question booklet to the invigilators at the end of the examination compulsorily and must not carry it with you outside the Examination Hall.
10. **Use only Blue/Black Ball point pen.**
11. **Use of any calculator or log table etc., is prohibited.**
12. **There is NO negative marking.**

परीक्षार्थियों के लिए निर्देश

1. पहले पृष्ठ के ऊपर नियत स्थान पर अपना रोल नम्बर लिखिए।
2. इस प्रश्न-पत्र में पचास बहुविकल्पीय प्रश्न हैं।
3. परीक्षा प्रारम्भ होने पर, प्रश्न-पुस्तिका आपको दे दी जायेगी। पहले पाँच मिनट आपको प्रश्न-पुस्तिका खोलने तथा उसकी निम्नलिखित जाँच के लिए दिये जायेंगे जिसकी जाँच आपको अवश्य करनी है :
   (i) प्रश्न-पुस्तिका खोलने के लिए उसके कवर पेज पर लगी कागज की सील को फाड़ लें। खुली हुई या बिना स्टीकर-सील की पुस्तिका स्वीकार न करें।
   (ii) **कवर पृष्ठ पर छपे निर्देशानुसार प्रश्न-पुस्तिका के पृष्ठ तथा प्रश्नों की संख्या को अच्छी तरह चैक कर लें कि ये पूरे हैं। दोषपूर्ण पुस्तिका जिनमें पृष्ठ/प्रश्न कम हों या दुबारा आ गये हों या सीरियल में न हों अर्थात किसी भी प्रकार की त्रुटिपूर्ण पुस्तिका स्वीकार न करें तथा उसी समय उसे लौटाकर उसके स्थान पर दूसरी सही प्रश्न-पुस्तिका ले लें। इसके लिए आपको पाँच मिनट दिये जायेंगे। उसके बाद न तो आपकी प्रश्न-पुस्तिका वापस ली जायेगी और न ही आपको अतिरिक्त समय दिया जायेगा।**
   (iii) इस जाँच के बाद प्रश्न-पुस्तिका की क्रम संख्या OMR पत्रक पर अंकित करें और OMR पत्रक की क्रम संख्या इस प्रश्न-पुस्तिका पर अंकित कर दें।
4. प्रत्येक प्रश्न के लिए चार उत्तर विकल्प (A), (B), (C) तथा (D) दिये गये हैं। आपको सही उत्तर के दीर्घवृत्त को पेन से भरकर काला करना है जैसा कि नीचे दिखाया गया है।

   उदाहरण : (A) (B) ● (D)

   जबकि (C) सही उत्तर है।
5. प्रश्नों के उत्तर **केवल प्रश्न पत्र I के अन्दर दिये गये** उत्तर-पत्रक पर ही अंकित करने हैं। यदि आप उत्तर पत्रक पर दिये गये दीर्घवृत्त के अलावा किसी अन्य स्थान पर उत्तर चिन्हांकित करते है, तो उसका मूल्यांकन नहीं होगा।
6. अन्दर दिये गये निर्देशों को ध्यानपूर्वक पढ़ें।
7. कच्चा काम (Rough Work) इस पुस्तिका के अन्तिम पृष्ठ पर करें।
8. यदि आप उत्तर-पुस्तिका पर अपना नाम या ऐसा कोई भी निशान जिससे आपकी पहचान हो सके, किसी भी भाग पर दर्शाते या अंकित करते हैं तो परीक्षा के लिये अयोग्य घोषित कर दिये जायेंगे।
9. आपको परीक्षा समाप्त होने पर उत्तर-पुस्तिका निरीक्षक महोदय को लौटाना आवश्यक है और परीक्षा समाप्ति के बाद अपने साथ परीक्षा भवन से बाहर न लेकर जायें।
10. **केवल नीले/काले बाल प्वाईंट पैन का ही इस्तेमाल करें।**
11. **किसी भी प्रकार का संगणक (कैलकुलेटर) या लाग टेबल आदि का प्रयोग वर्जित है।**
12. **गलत उत्तर के लिए अंक नहीं काटे जायेंगे।**

ENVIRONMENTAL SCIENCE

PAPER – II

Note : This paper contains **fifty** (50) multiple-choice questions, each question carrying **two** (2) marks. Attempt **all** of them.

1. Plants suitable for biomonitoring of SO_2 pollution are :

(A) White pine, moss and lichens

(B) Tobacco, grapes and garden bean

(C) Apricot, peach and gladiolas

(D) Tomato and lettuce

2. Which of the following survive by forming spores ?

(A) *Escherichia coli* (B) *Rhizobium*

(C) *Clostridium* (D) *Salmonella*

3. *Deinococcus* and *Deinobacter* are radiation resistant bacteria because :

(A) They have effective repair mechanism for damaged DNA and have high concentration of carotenoids

(B) They do not absorb radiations

(C) They have RNA instead of DNA

(D) They grow in ice

4. The orchid seeds do not germinate under ordinary conditions because :

(A) Orchid seeds are too large for dispersal

(B) Orchid seeds do not have endosperm

(C) Orchid seeds undergo a dormancy period

(D) They germinate under very dry conditions

5. Which of the following is for rhizosphere ?

(A) Region where soil and roots make contact

(B) Apical part of root

(C) Epidermal part of the root

(D) Root hairs

6. Suppose the number of individual prey population is N_1 and their intrinsic rate of population increase N_1, where :

$r_1 = b - m$

b = birth rate per individual

m = mortality rate per individual, then the rate of change of the prey population (dN_1/dt) (without immigration and emigration) is as below :

(A) $\frac{1}{2} r_1 N_1$ (B) $r_1 N_1$

(C) $(r_1 N_1)^2$ (D) $(r_1 N_1)^{1/2}$

7. The photosynthetic zone is limited to the upper layers of water in the soil with a high intensity of productivity per unit volume, yielding an average of about :

(A) 300 mg c m^{-2} hr^{-1} (B) 250 mg c m^{-2} hr^{-1}

(C) 100 mg c m^{-2} hr^{-1} (D) 75 mg c m^{-2} hr^{-1}

8. **Assertion (A) :** Copper - T is used as a contraceptive.

Reason (R) : Copper of Copper - T disrupts production of some reproductive hormone.

(A) Both **(A)** and **(R)** are true and **(R)** is correct explanation of **(A)**

(B) Both **(A)** and **(R)** are true but **(R)** is not correct explanation of **(A)**

(C) **(A)** is true but **(R)** is false

(D) **(A)** is false but **(R)** is true

9. Asbestos use is banned in many countries. It is known to cause :

(A) Cardiac diseases (B) Urinary diseases

(C) Lung cancer (D) Cataract

10. Which of the following is used as a carrier for the *Rhizobium* biofertilization ?

(A) Peat bog (B) Salt (C) Sand (D) Cow dung

11. The flow in natural streams is almost always turbulent and may be assumed to be incompressible, consequently the applicable equations of motion for the fluid are the :

(A) Bed-load equation (B) Reynolds equation

(C) Lane's model (D) Lacey's equation

12. Suspended sediment load is that part of the sediment load which is transported within the main body flow. The primary mechanism of maintaining the sediment particles in suspension is :

(A) Channel flow (B) Particle size

(C) Turbulent diffusion (D) Dissolved gasses

13. A highly vesicular material derived from acidic lavas and produced in very large quantities is known as :

(A) Scoriae (B) Volcanic bomb

(C) Pumice (D) Tuff

14. Half life (T) of a radioactive sample is given by :

(A) $0.693/\lambda$ (B) $1.693/\lambda$ (C) $0.693/2\lambda$ (D) $1.693/2\lambda$

Where λ is the disintegration constant

15. At the present time volcanoes are confined to certain limited areas of the Earth's surface. This special zone is called :

(A) Trans-Atlantic volcanic zone

(B) Circum-Pacific Ring of fire

(C) Central-Asian inter-continental zone

(D) Indian-Ocean volcanic belt

16. When the cavities between the mineral grains in a rock contains fluid, it is called :

(A) Permeable rock (B) Porous rock

(C) Cavernous rock (D) Fractured rock

17. Temperature in the troposphere :

(A) Decreases with height (B) Rapidly increases with height

(C) Slowly increases with height (D) Remains constant

18. Failure to explain the black body radiation emission spectrum in the ultraviolet region (ultraviolet catastrophe) has occurred in :

(A) Plancks radiation law (B) Rayleigh Jeans law

(C) Wiens Displacement law (D) Stephans Boltzmann law

19. A noise signal can be characterized through its amplitude/energy content in the signal. The signal can be expressed in various forms like root mean square value, given as :

(A) $\left[\frac{1}{T}\int_0^T a^2(t)\,dt\right]^{1/2}$ (B) $\left[\frac{1}{2T}\int_0^T a^2(t)\,dt\right]^{1/2}$

(C) $\left[\frac{1}{T}\int_0^T |a|.dt\right]$ (D) $\left[\frac{1}{2T}\int_0^T |a|.dt\right]$

Where T is the relevant time period over which the averaging takes place and a(t) the instantaneous amplitude.

20. Sound pressure level (dB) can be expressed as :

(A) $20\log_{10}\left(\frac{\text{Measured pressure}}{\text{Reference pressure}}\right)$

(B) $20\log_{10}\left(\frac{\text{Reference pressure}}{\text{Measured pressure}}\right)$

(C) $20\log_{10}\left(\frac{\text{Reference pressure}}{\text{Measured pressure}}\right)^{1/2}$

(D) $20\log_{10}\left(\frac{\text{Measured pressure}}{\text{Reference pressure}}\right)^{1/2}$

21. Relationship regarding wave particle duality ($P = h/\lambda$, P = momentum, h = Plancks constant and λ The wave length), was given by :

(A) Heisenberg (B) De Broglie

(C) Neils Bohr (D) Schroedinger

22. The effect of low level non-ionizing electromagnetic radiation effects on bilogical systems can be classified in the following category :

(A) Instantaneous (B) Delayed

(C) Not at all (D) Prolonged

23. Which of the following is a recalcitrant ?

(A) Sugarcane waste (B) DDT

(C) Lignin (D) Cellulose

24. A small reduction in ozone concentration can lead to a large increase in the amount of harmful ultraviolet radiations reaching the earth in the wavelength region :

(A) 200 – 205 nm (B) 220 – 225 nm

(C) 260 – 265 nm (D) 295 – 300 nm

25. The planet nearest to the Sun is :

(A) Earth (B) Mercury (C) Moon (D) Jupitor

26. Steel units generate which of the following air pollutants :

(A) Particulates, smoke, carbon monoxide, fluoride

(B) SO_2, acid mist

(C) NO_x, SO_2, particulates

(D) SO_2, NO_x, particulates, smoke

27. In a soil profile, O_2 concentration :

(A) Increases vertically from top to bottom

(B) Increases horizontally but not vertically

(C) Decreases vertically from top to bottom

(D) Both vertically and horizontally increases randomly

28. Mobile phone frequencies are in the range of :

(A) 1kHz – 100kHz (B) 100kHz – 100MHz

(C) 100MHz – 700MHz (D) 800MHz – 2200MHz

29. Elements in sea water present in order of increasing residence time :

(A) Na > Cl > Mg > Ca > K > Fe > P

(B) Cl > Na > Mg > Ca > K > P > Fe

(C) Cl > Mg > Ca > Na > K > Fe > P

(D) Mg > Ca > Cl > Na > K > P > Fe

30. **Assertion (A) :** Aerosols heave potential for modifying the climate.

Reason (R) : Aerosols interact with both short wave and infra-red radiation.

(A) Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**

(B) Both **(A)** and **(R)** are true but **(R)** is not the correct explanation of **(A)**

(C) **(A)** is true but **(R)** is false

(D) **(A)** is false but **(R)** is true

31. Out of the following which is not a green-house gas :

(A) CH_4 (B) CO_2 (C) N_2O (D) SO_2

32. Ozone "hole" in the stratosphere was discovered over the continent of :

(A) North America (B) Australia

(C) Antarctica (D) Greenland

33. Which of the following layers of Earth have the composition of peridotite ?

(A) Upper Mantle

(B) Inner Core

(C) Outer Core

(D) Continental Crust

34. Sedimentary component which is produced *in-situ* within the pore spaces is called :

(A) Primary

(B) Authigenic

(C) Allogenic

(D) Orogenic

35. Stoke's law of settling velocity simplified as $V \propto \frac{1}{d^n}$ suggest that :

(A) A large particle 100μm in diameter will settle slowly compared to a smaller 10 μm particle

(B) A large particle 100 μm in diameter, will settle faster than a smaller particle 10 μm

(C) Both a large 100 μm particle and a small 10 μm particle will settle in a column of 10 cm. at the same time.

(D) Small particle 10 μm in diameter will settle faster, while coarser particle of 100 μm diameter will remain in suspension.

36. Which of these remote sensing tool is commonly used for groundwater exploration and soil moisture determinations :

(A) Colour composite imageries

(B) Band 5 spectra

(C) Infra Red spectra

(D) Black and white Aerial photos

37. The atmosphere is divided in four layers. The layer in contact with the surface of the Earth is called :

(A) Stratosphere

(B) Troposphere

(C) Mesosphere

(D) Ionosphere

38. A ship (X) moving due North with a velocity (ν) observes that another ship (Y) is moving due west. the actual velocity of (Y) is :

(A) (ν) is due East

(B) ($\sqrt{2}\,\nu$) is towards North West

(C) (ν) is towards South East

(D) ($\sqrt{2}\,\nu$) is towards North East

39. The solubility of Fe in water :

(A) Increases with increasing pH

(B) Decreases with increasing pH

(C) Independent of pH

(D) Dependent only on redox potential and not pH

40. A cube of ice with radius of 100 mm is formed at 3° C. When ice melts, the final volume will be :

(A) 1000 cm^3 (B) 1250 cm^3

(C) 1000 mm^3 (D) 1750 mm^3

41. Which of the following phenomena can be explained by the wave model of light, but not by the particle model ?

(A) Pressure is exerted by a light beam

(B) All of the energy emitted by an atom, as light can later be completely transferred to another atom

(C) A light beam changes direction when passing from one medium to another

(D) Light can reach the geometrical shadow of an obstacle in its path

42. 2 ppm of CO at 25° C and 760 mm of Hg pressure is equivalent to :

(A) 1250 $\mu g/m^3$ (B) 1145 $\mu g/m^3$

(C) 2500 $\mu g/m^3$ (D) 2290 $\mu g/m^3$

43. Which waves carry most energy ?

(A) UV light (B) Infra-red light

(C) Microwaves (D) Millimeter waves

44. If one wishes to measure total As, As^{+3} and As^{+5} in a sample the most suitable analytical tool is :

(A) Atomic Absorption spectrophotometer

(B) Ion chromatograph

(C) Scanning Electron Microscope

(D) Gas chromatograph

45. The acid rains result from chemical transformation and transport of :

(A) Sulfur dioxide and nitrogen oxide

(B) Phosphorus pentaoxide and sulfur compound

(C) Chlorine gas and nitrous oxide

(D) Iron oxide and copper nitrate

46. Any particulate matter, gas, or combination thereof other than water vapour is called :

(A) Air curtain

(B) Air emission

(C) Air monitoring

(D) Air contaminant

47. The chemical system for removal of the ions of salt, is called :

(A) Ion transfer

(B) Ionization

(C) Ion exchange

(D) Ion vaporization

48. At ordinary temperatures, the molecules of a diatomic gas have only translational and rotational kinetic energies. At high temperatures, they may have vibrational energy. As a result of this, compared to lower temperatures, a diatomic gas at higher temperatures will have :

(A) Lower molar heat capacity (B) Higher molar heat capacity

(C) Lower isothermal compressibility (D) Higher isothermal compressibility

49. In the periodic table of elements :

(A) Non-metallic property increases vertically

(B) Metallic property increases from right to left

(C) Non-metallic property increases from right to left

(D) Metallic property increases left to right and from top to bottom

50. Polychlorinated biphenyls (PCBs) which cause environmental exposure risk have these important properties :

(A) Very high volatility in air

(B) Chemically unstable and highly reactive

(C) Heat stable and have no flash or fire point

(D) Highly soluble in water and poorly soluble in oils and organic solvents

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Space For Rough Work