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PAPER - II

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

Number of Pages in this Booklet : 8	Number of Questions in this Booklet : 50

Instructions for the Candidates	**परीक्षार्थियों के लिए निर्देश**

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 on the OMR Sheet and the OMR Sheet Number should be entered on this Test Booklet.
4. Each item has four alternative responses marked (1), (2), (3) and (4). You have to darken the circle as indicated below on the correct response against each item.
   Example : ① ② ● ④ where (3) is the correct response.
5. Your responses to the items are to be indicated in the **OMR Sheet given inside the Booklet only.** If you mark your response at any place other than in the circle in the OMR 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, Roll Number, Phone Number or put any mark on any part of the OMR Sheet, except for the space allotted for the relevant entries, which may disclose your identity, or use abusive language or employ any other unfair means, such as change of response by scratching or using white fluid, you will render yourself liable to disqualification.
9. You have to return the original OMR Sheet to the invigilators at the end of the examination compulsorily and must not carry it with you outside the Examination Hall. You are however, allowed to carry original question booklet and duplicate copy of OMR Sheet on conclusion of examination.
10. **Use only Blue/Black Ball point pen.**
11. **Use of any calculator or log table etc., is prohibited.**
12. **There are no negative marks for incorrect answers.**

परीक्षार्थियों के लिए निर्देश

1. इस 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 पुस्तिका 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 अर्थात् 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 का नंबर OMR पत्रक पर अंकित करें और OMR पत्रक का नंबर इस प्रश्न-पुस्तिका पर अंकित कर दें।
4. प्रत्येक प्रश्न के लिए चार उत्तर विकल्प (1), (2), (3) तथा (4) दिये गये हैं। आपको सही उत्तर के वृत्त को पेन से भरकर काला करना है जैसा कि नीचे दिखाया गया है।
   उदाहरण : ① ② ● ④ जबकि (3) सही उत्तर है।
5. प्रश्नों के उत्तर **केवल प्रश्न पुस्तिका के अन्दर दिये गये OMR पत्रक पर ही** अंकित करने हैं। यदि आप OMR पत्रक पर दिये गये वृत्त के अलावा किसी अन्य स्थान पर उत्तर चिह्नांकित करते हैं, 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 OMR पत्रक पर नियत स्थान के अलावा अपना नाम, रोल नम्बर, फोन नम्बर या कोई भी ऐसा चिह्न जिससे आपकी पहचान हो सके, अंकित करते हैं अथवा अभद्र भाषा का प्रयोग करते हैं, या कोई अन्य अनुचित साधन का प्रयोग करते हैं, जैसे कि अंकित किये गये उत्तर को मिटाना या सफेद स्याही से बदलना तो परीक्षा के लिये अयोग्य घोषित किये जा सकते हैं।
9. आपको परीक्षा समाप्त होने पर मूल OMR पत्रक निरीक्षक महोदय को लौटाना आवश्यक है और परीक्षा समाप्ति के बाद उसे अपने साथ परीक्षा भवन से बाहर न लेकर जायें। हालांकि आप परीक्षा समाप्ति पर मूल प्रश्न-पुस्तिका तथा OMR पत्रक की डुप्लीकेट प्रति अपने साथ ले जा सकते हैं।
10. **केवल नीले/काले बाल प्वाईंट पेन का ही प्रयोग करें।**
11. **किसी भी प्रकार का संगणक (कैलकुलेटर) या लाग टेबल आदि का प्रयोग वर्जित है।**
12. **गलत उत्तरों के लिए कोई नकारात्मक अंक नहीं हैं।**

ENVIRONMENTAL SCIENCES
PAPER - II

Note : This paper contains **fifty (50)** objective type questions of **two (2)** marks each. **All** questions are **compulsory**.

1. The innermost layer of the earth is made up of :
   (1) Silicon and alumina   (2) Silicon and magnesium
   (3) Silicon and nickel   (4) Nickel and iron

2. The heat is distributed through a vertical mixing process called :
   (1) Advection   (2) Diffusion
   (3) Convection   (4) Turbulance

3. Which of the following statement(s) is/are **true** for an isothermal process ?
   (a) There is no change in enthalpy
   (b) There is no change in internal energy
   (c) There is change in temperature
   Choose the **correct** code :
   (1) (a) only   (2) (b) and (c) only
   (3) (a) and (b) only   (4) (a), (b) and (c)

4. Match the **List-I** and **List-II.** Identify the **correct** answer from the code given below :

List-I (Aerosol)	List-II (Source)
(a) Primary natural aerosol	(i) Organic matter from biogenic gases
(b) Secondary natural aerosol	(ii) Soot from biomass burning
(c) Primary anthropogenic aerosol	(iii) Sulphate aerosol from powerplant SO_2 emissions
(d) Secondary anthropogenic aerosol	(iv) Soil dust

   Code :

	(a)	(b)	(c)	(d)
(1)	(i)	(ii)	(iii)	(iv)
(2)	(ii)	(iii)	(iv)	(i)
(3)	(iii)	(iv)	(i)	(ii)
(4)	(iv)	(i)	(ii)	(iii)

5. Which of the following is **not** a heavy metal ?
   (1) Lead   (2) Mercury   (3) Bismuth   (4) Aluminum

6. The dominant dissolved carbon dioxide species in sea water is :
   (1) Bicarbonate ion   (2) Carbonate ion
   (3) Carbonic acid   (4) Aquated carbon dioxide

7. A solution of chemical 'A' having its 0.14 mol L^{-1} concentration has an absorbance of 0.42. Another solution of 'A' under the same conditions has an absorbance of 0.36. What is the concentration of this solution of 'A' ?
   (1) 0.108 mol L^{-1} (2) 0.35 mol L^{-1} (3) 0.12 mol L^{-1} (4) 0.10 mol L^{-1}

8. Which one of the following is **not** a soil micronutrient ?
   (1) Sulphur (2) Boron (3) Iron (4) Zinc

9. If life of NO_2 be 0.693 day, its residence time is :
   (1) 1.44 days (2) 1.0 day (3) 0.693 day (4) 0.48 day

10. The general molecular formula of PAN type compound is :
    (1) $C_X H_Y OONO_2$ (2) $C_X H_Y OO_2 NO_2$ (3) $C_x H_x OO_2 NO_2$ (4) $C_x H_Y ONO_2$

11. In an ecosystem, which one of the following is a micro-consumer ?
    (1) Herbivores (2) Omnivores (3) Carnivores (4) Saprotrophs

12. A structure with hundreds of species non-linearly interlinked for their livelyhood is called :
    (1) Guild (2) Food chain (3) Food web (4) Pyramid

13. The process of examination of change in species diversity between ecosystems is a measure of :
    (1) Alpha diversity (2) Beta diversity
    (3) Gamma diversity (4) Genetic diversity

14. Red tide is caused by :
    (1) Diatoms (2) Dianoflagillates (3) Navicula (4) Desmids

15. The unidirectional series of changes from an uninhabited water body to a water body inhabited by a stable aquatic community are called :
    (1) Eutrophication (2) Succession (3) Regeneration (4) Reclamation

16. Under the clear Sunny day, the maximum depth of the ocean at which photosynthesis can occur is :
    (1) 10 m (2) 250 m (3) 80 m (4) 600 m

17. The organism likely to be most similar to the first life form that evolved on the earth is :
    (1) Blue - green algae (2) Methane producing bacteria
    (3) Protozoan (4) Red algae

18. A landform that results from free fall of rocks is called :
    (1) Alluvial fan (2) Debris flow (3) Talus slope (4) Valley fills

19. In India lignite is mined in :
    (1) Neyveli (2) Jharia (3) Singrauli (4) Singareni

20. Tree height can be measured using remote sensing data from :
(1) Resourcesat (2) Landsat (3) Cartosat (4) RISAT

21. Ecosystem restoration deals with restoring :
(1) Ecosystem integrity (2) Biodiversity
(3) Physical environment (4) Ecosystem resistance

22. A single solar cell (10 cm × 10 cm) produces a voltage of 0.5 V and a current upto 2.5 A. If the solar insolation is 800 W/m², the efficiency of the solar cell is :
(1) ~ 15.6 % (2) ~ 24.6 % (3) ~ 12.3 % (4) ~ 10.2 %

23. Which of the following atoms is **not** fissile ?
(1) $^{238}_{92}U$ (2) $^{235}_{92}U$ (3) $^{233}_{92}U$ (4) $^{239}_{94}U$

24. Which of the following fuels has minimum nitrogen content ?
(1) Crude oil (2) CNG (3) Producer gas (4) LPG

25. Maximum sulfur content is found in which grade of coal ?
(1) Bituminous (2) Sub - bituminous
(3) Lignite (4) Anthracite

26. Which of the following solar cell materials has maximum efficiency ?
(1) Cd Te, thin film (2) Si, polycrystalline
(3) Amorphous Si : Ge : H film (4) Ga As, single crystal

27. Noise level of 70 dB corresponds to sound intensity of :
(1) $10^{-5}\,Wm^{-2}$ (2) $10^{-7}\,Wm^{-2}$ (3) $10^{-4}\,Wm^{-2}$ (4) $10^{-3.5}Wm^{-2}$

28. At 25°C and 1 atm. pressure, 1 ppm concentration of SO_2 is equivalent to :
(1) 1310 μg/m³ (2) 1826 μg/m³ (3) 2620 μg/m³ (4) 5240 μg/m³

29. Given below are two statements. One labelled as **Assertion (A)** and the other labelled as **Reason (R)** :
Assertion (A) : Arsenic (III) is more toxic than arsenic (V).
Reason (R) : Arsenic (V) binds the sulfhydryl group more strongly than arsenic (III).
Choose the **correct** answer :
(1) Both **(A)** and **(R)** are correct and **(R)** is the correct explanation of **(A)**.
(2) Both **(A)** and **(R)** are correct and **(R)** is not the correct explanation of **(A)**.
(3) **(A)** is true, but **(R)** is false.
(4) **(A)** is false and **(R)** is true.

30. The half life period of a radioactive substance is 32 h. How much time it would take for its 75% disintegration ?
(1) 16 h (2) 96 h (3) 128 h (4) 64 h

31. Match the **List-I** and **List-II**. Identify the correct answer from the code given below :

	List-I		List-II
	(Pesticides)		(Target)
(a)	Avicide	(i)	Fish
(b)	Disinfectant	(ii)	Plants
(c)	Herbicide	(iii)	Birds
(d)	Piscicide	(iv)	Micro-organisms

Code :

	(a)	(b)	(c)	(d)
(1)	(i)	(ii)	(iii)	(iv)
(2)	(ii)	(i)	(iii)	(iv)
(3)	(iii)	(iv)	(ii)	(i)
(4)	(iv)	(ii)	(i)	(iii)

32. Nitrogen fixation in nature is **not** accomplished by :
(1) Lightning
(2) Cyanobacteria
(3) Rotifers
(4) Bacteria in root nodules of Leguminous plants

33. Which country has opted out of Paris Agreement on climate change ?
(1) USA
(2) Canada
(3) Australia
(4) Russia

34. Under the EIA notification of 14th September, 2006, preparation of EIA is **not** required for the projects falling in the :
(1) Category 'A' projects
(2) Category 'B' projects
(3) Category B$_1$ projects
(4) Category B$_2$ projects

35. Which type of projects usually require an EIA ?
(1) Community garden development
(2) Mining and mineral development projects
(3) Outdoor recreation
(4) Development of community wells

36. Match the **List-I** and **List-II**. Identify the correct answer from the code given below :

	List-I		List-II
	(Series)		(Environmental labelling)
(a)	ISO 14021	(i)	Principles and procedures
(b)	ISO 14022	(ii)	Self declaration of environmental claims
(c)	ISO 14023	(iii)	Symbols
(d)	ISO 14024	(iv)	Testing and verification methods

Code :

	(a)	(b)	(c)	(d)
(1)	(i)	(ii)	(iii)	(iv)
(2)	(ii)	(iii)	(iv)	(i)
(3)	(iii)	(iv)	(i)	(ii)
(4)	(iv)	(i)	(iii)	(ii)

37. Match the **List-I** and **List-II**. Identify the correct answer from the code given below :

	List-I		List-II
	(Acts)		(Year)
(a)	Environmental Protection Act	(i)	1991
(b)	Air (Prevention and Control of Pollution) Act	(ii)	1977
(c)	Water (Prevention and Control of Pollution) Act	(iii)	1981
(d)	Public Liability Insurance Act	(iv)	1986

Code :

	(a)	(b)	(c)	(d)
(1)	(i)	(ii)	(iii)	(iv)
(2)	(ii)	(iii)	(iv)	(i)
(3)	(iii)	(iv)	(i)	(ii)
(4)	(iv)	(iii)	(ii)	(i)

38. Articles 21, 48-A and 51-A(g), which aim to protect and improve the environment and safe guard forests and wildlife, incorporate which of the following principles of environmental law ?
(1) Polluter pays principle
(2) Precautionary principle
(3) Principle of strict liability
(4) Moral duty of the state

39. Which is the **correct** classification of forests under the Indian Forest Act, 1927 ?
(1) Grasslands, tropical forests, wetlands
(2) Protected forest, reserved forest, village forest
(3) Wildlife sanctuary, national parks, biosphere reserve
(4) Private forest, social forest, town forest

40. Hardening of the steel releases the hazardous waste containing :
(1) Brine sludge containing mercury
(2) Cyanide - nitrate containing sludge
(3) Lead bearing residues
(4) Tar containing waste

41. Red coloured containers in the hospitals are used to dump :
(1) Waste from laboratory cultures
(2) House keeping waste
(3) Human anatomical waste
(4) Waste sharps

42. Mercury pollution is considered hazardous to human health because,
(1) Mercury is a pure metal and hard to digest
(2) Mercury accumulates and its concentration increases high up in the food chain
(3) Mercury is highly soluble in water and easily absorbed by human body
(4) Mercury is heavy and is not dispersed by the wind

43. In the context of Gaussian Plume Dispersion model assumptions, consider the following statements :

(a) The pollutants have the same density as the air surrounding them.

(b) The atmosphere is stable.

Choose the **correct** code :

(1) Both (a) and (b) are true   (2) (a) is true, (b) is false

(3) (a) is false, (b) is true   (4) Both (a) and (b) are false

44. Graphically depicting a group of numerical data through their Quartile is :

(1) Histogram   (2) Frequency polygon

(3) Box plot   (4) Pie chart

45. If, out of 50 fish of a pond, 12 had no ectoparasite and remaining had varying numbers of parasites on them, then how many of fish had at least one parasite ?

(1) 4   (2) 24   (3) 38   (4) 16

46. In a One-way ANOVA, explained variance was found to be 8.0 and unexplained variance was 3.67. The F-ratio is :

(1) 0.46   (2) 4.26   (3) 2.0   (4) 2.18

47. In total global emissions of CO_2 , India's contribution is about :

(1) ~ 3%   (2) ~ 6%   (3) ~ 9%   (4) ~ 12%

48. According to IPCC, in order to restrict global mean temperature rise to 2°C by the year 2050, global energy related CO_2 emissions (reference year 2005) need to be cut down by the year 2050 by :

(1) ~ 50%   (2) ~ 90%   (3) ~ 40%   (4) ~ 30%

49. Global average water consumption (L/person/day) is :

(1) ~ 53   (2) ~ 20   (3) ~ 42   (4) ~ 80

50. In a city, half a million cars travel approximately 20 km on a given day. The average HC emission rate is 2.0 g per car km. Assuming that the average molecular weight of all the emitted HCs is equal to that of CH_4 , how much volume of HC is released in the city each day ?

(1) 1.4×10^4 m^3 /day   (2) 2.8×10^4 m^3 /day

(3) 6.1×10^4 m^3 /day   (4) 11.3×10^4 m^3 /day

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Space For Rough Work