

PAPER-II ENVIRONMENTAL SCIENCE

Signature and Name of Invigilator

1. (Signature) _____

(Name) _____

2. (Signature) _____

(Name) _____

D 8912

Time : 1 ¹/₄ hours]

OMR Sheet No. :

(To be filled by the Candidate)

Roll No.

| | | | | | | | |
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(In figures as per admission card)

Roll No. _____

(In words)

[Maximum Marks : 100]

Number of Pages in this Booklet : 8

Number of Questions in this Booklet : 50

Instructions for the Candidates

- Write your roll number in the space provided on the top of this page.
- This paper consists of fifty multiple-choice type of questions.
- 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 :
 - 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.
 - 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.**
 - After this verification is over, the OMR Sheet Number should be entered on this Test Booklet.
- Each item has four alternative responses marked (A), (B), (C) and (D). You have to darken the circle as indicated below on the correct response against each item.
Example :

| | | | |
|-----|-----|-----|-----|
| (A) | (B) | (C) | (D) |
|-----|-----|-----|-----|

where (C) is the correct response.
- Your responses to the items are to be indicated in the **OMR Sheet given inside the Paper I Booklet only**. If you mark at any place other than in the circle in the OMR Sheet, it will not be evaluated.
- Read instructions given inside carefully.
- Rough Work is to be done in the end of this booklet.
- 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, you will render yourself liable to disqualification.
- You have to return the test question booklet and 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 duplicate copy of OMR Sheet on conclusion of examination.
- Use only Blue/Black Ball point pen.
- Use of any calculator or log table etc., is prohibited.
- There is no negative marks for incorrect answers.

परीक्षार्थियों के लिए निर्देश

- पहले पृष्ठ के ऊपर नियत स्थान पर अपना रोल नम्बर लिखिए ।
- इस प्रश्न-पत्र में पचास बहुविकल्पीय प्रश्न हैं ।
- 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 :
 - 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 ।
 - कवर पृष्ठ पर छपे निर्देशानुसार प्रश्न-पुस्तिका के पृष्ठ तथा प्रश्नों की संख्या को अच्छी तरह चेक 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 ।
 - इस जाँच के बाद OMR पत्रक की क्रम संख्या इस प्रश्न-पुस्तिका पर अंकित कर दें ।
- प्रत्येक प्रश्न के लिए चार उत्तर विकल्प (A), (B), (C) तथा (D) दिये गये हैं । आपको सही उत्तर के वृत्त को पेन से भरकर काला करना है जैसा कि नीचे दिखाया गया है ।
उदाहरण :

| | | | |
|-----|-----|-----|-----|
| (A) | (B) | (C) | (D) |
|-----|-----|-----|-----|

जबकि (C) सही उत्तर है ।
- प्रश्नों के उत्तर केवल प्रश्न पत्र I 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 ।
- अन्दर दिये गये निर्देशों को ध्यानपूर्वक पढ़ें ।
- कच्चा काम (Rough Work) इस पुस्तिका के अन्तिम पृष्ठ पर करें ।
- 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, तो परीक्षा के लिये अयोग्य घोषित किये जा सकते हैं ।
- आपको परीक्षा समाप्त होने पर प्रश्न-पुस्तिका एवं 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 OMR पत्रक की डुप्लीकेट प्रति अपने साथ ले जा सकते हैं ।
- केवल नीले/काले बाल प्वाइंट पेन का ही इस्तेमाल करें ।
- किसी भी प्रकार का संगणक (कैलकुलेटर) या लाग टेबल आदि का प्रयोग वर्जित है ।
- गलत उत्तरों के लिए कोई अंक काटे नहीं जाएँगे ।

ENVIRONMENTAL SCIENCE

Paper – II

Note : This paper contains **fifty (50)** objective type questions, each question carrying **two (2)** marks. Attempt **all** the questions.

1. **Assertion (A) :** Biosphere constitutes an excellent life-support system which is sustainable and can fulfil all human needs.

Reason (R) : The size and productivity of the Biosphere is limited by availability of water, nutrients and environmental conditions.

Identify the correct code :

Codes :

- (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.

2. Geostrophic wind occurs when pressure gradient force balances

- (A) Coriolis force
(B) Frictional force
(C) Centripetal force
(D) Coriolis and frictional force together

3. Scales of Meteorology are in the following order starting from the least

- (A) Macro–, Micro–, Meso–
(B) Macro–, Meso–, Micro–
(C) Meso–, Macro–, Micro–
(D) Micro–, Meso–, Macro –

4. When the full potential of physical, chemical and biological factors, a species can use if there is no competition, it is called

- (A) Fundamental niche
(B) Ecological niche
(C) Realized niche
(D) Competitive exclusion

5. The uppermost zone of atmosphere of earth, where shortwave ultraviolet radiations are absorbed, is

- (A) Troposphere
(B) Stratosphere
(C) Mesosphere
(D) Thermosphere

6. Which of the following oxides of nitrogen is the major air pollutant released from automobile exhausts ?

- (A) NO (B) N₂O
(C) NO₂ (D) N₂O₃

7. Match List – I with List – II which contains pollutant gases and their threshold (safe limit) values as per WHO standards :

| List – I (Pollutant gas) | List – II (Thresholds) |
|-----------------------------|---------------------------|
| a. CO | i. 2 ppm |
| b. SO ₂ | ii. 50 ppm |
| c. NO | iii. 0.08 ppm |
| d. PAN | iv. 25 ppm |

Identify the correct code :

Codes :

| | a | b | c | d |
|-----|-----|-----|----|-----|
| (A) | ii | iii | i | iv |
| (B) | iv | ii | i | iii |
| (C) | ii | i | iv | iii |
| (D) | iii | iv | ii | i |

8. The band labelled as UV-C which is lethal to micro-organisms is
 (A) 0.29 – 0.32 μm
 (B) 0.2 – 0.29 μm
 (C) 0.17 – 0.2 μm
 (D) 0.07 – 0.21 μm
9. Which of the following species in the atmosphere is called atmospheric detergent ?
 (A) Chlorine radical
 (B) Hydroxyl radical
 (C) Methyl radical
 (D) Ozone radical
10. The POH of a 0.001 M solution of HCl is
 (A) 12 (B) 10
 (C) 11 (D) 13
11. Identify the pair (element-health effect) which is correctly matched :
 (A) Lead – Methaemoglobinemia
 (B) Arsenic – Kidney damage
 (C) Mercury – Nervous disorder
 (D) PAN – Hypoxemia
12. Which of the following organisms can act as primary consumer, secondary consumer, tertiary consumer or scavenger in different types of food chains ?
 (A) Raven
 (B) Tiger
 (C) Snake
 (D) Phytoplanktones
13. The tendency of biological systems to resist change and to remain in a state of equilibrium is called
 (A) Homeostatis
 (B) Feedback mechanism
 (C) Ecological efficiency
 (D) Carrying capacity
14. If different categories of threatened species are written in a sequence, what is the correct order ?
 (A) Extinct → Vulnerable → Rare → Endangered
 (B) Vulnerable → Rare → Endangered → Extinct
 (C) Vulnerable → Rare → Extinct → Endangered
 (D) Rare → Vulnerable → Endangered → Extinct
15. Which of the following is not a type of ex situ conservation method ?
 (A) Botanical garden
 (B) Zoological park
 (C) Wildlife sanctuaries
 (D) Gene banks
16. As a consequence of succession the P/B ratio (Gross production / Standing crop biomass) is changed. It is
 (A) high during developmental stages and low at mature stage.
 (B) low during developmental stages and high at mature stage.
 (C) > 1 or < 1 at developmental stages and approximately 1 at mature stage.
 (D) remaining unchanged at all stages.
17. Preparation of hazard-zoning map in case of landslide prone regions involves comprehensive investigation of
 (A) details of structural and lithological settings.
 (B) geomorphic features relating to instability of slopes.
 (C) seismicity pattern of the region.
 (D) all of the above.

18. If a_p = specified value of peak acceleration, N = mean rate of occurrence of earthquake per year, t_{ep} = time interval of consideration (exposure period) and F_{ap} = probability that an observed acceleration is less than or equal to a_p , then the cumulative probability distribution of peak acceleration for epoch – dependent seismic hazard map is given by which formula ?

- (A) $F_{\max} t_{ep} = \exp \{-Nt(1 - F_{ap})\}$
 (B) $F_{\max} = \exp \{-Nt(1 - F_{ap})\} \cdot t_{ep}$
 (C) $F_{\max} t_{ep} = \exp \{-t(1 - F_{ap})^N\}$
 (D) All of the above

19. **Assertion (A) :** In oceans, Na has the longest residence time, within an order of magnitude of the age of the oceans.

Reason (R) : The long residence time of Na reflects a lack of reactivity of sodium in the marine environment by not being readily incorporated in the common sedimentary minerals, nor being removed by biological reactions.

Identify the correct code :

Codes :

- (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.

20. According to Goldieh the decreasing order of stability of following minerals of igneous rocks towards weathering is

- (A) Muscovite > Quartz > Potash feldspar > Biotite
 (B) Biotite > Potash feldspar > Muscovite > Quartz
 (C) Quartz > Muscovite > Potash feldspar > Biotite
 (D) Potash feldspar > Quartz > Muscovite > Biotite

21. In universal polar stereographic coordinate system the eastings and northings are computed using which projection method ?

- (A) Polar aspect stereographic projection
 (B) Non-polar aspect stereographic projection
 (C) Polar aspect mercator projection
 (D) Non-polar aspect mercator projection

22. Pitchblende is an ore of

- (A) Nickel
 (B) Chromium
 (C) Molybdenum
 (D) Uranium

23. Copper (Cu) is classified according to its geochemical affinity as

- (A) Siderophile element
 (B) Chalcophile element
 (C) Lithophile element
 (D) Atmosphile element

24. If 'a' is the fractional wind speed decrease at the wind turbine, the maximum extraction of power from the wind occurs when 'a' is equal to
 (A) $\frac{1}{2}$ (B) $\frac{1}{3}$
 (C) 1 (D) $\frac{3}{5}$
25. In the following fusion energy reaction
 $D + T = {}_0n^1 + X$
 identify X
 (A) Li (B) H_2
 (C) He^3 (D) He^4
26. **Assertion (A) :** Natural gas is a very attractive ecofriendly fuel.
Reason (R) : It produces few pollutants and less carbon dioxide per unit energy than any other fossil fuel on combustion.
 Identify the correct answer :
Codes :
 (A) Both (A) and (R) are true and (R) is the correct explanation of (A).
 (B) Both (A) and (R) are true and (R) is not the correct explanation of (A).
 (C) (A) is true but (R) is false.
 (D) (A) is false but (R) is true.
27. **Assertion (A) :** Solar photovoltaic cells are expensive.
Reason (R) : Solar photovoltaic cells are fabricated from crystalline silicon and operate only at 10-12% efficiency.
 Identify the correct answer :
Codes :
 (A) Both (A) and (R) are true and (R) is the correct explanation of (A).
 (B) Both (A) and (R) are true and (R) is not the correct explanation of (A).
 (C) (A) is true but (R) is false.
 (D) (A) is false but (R) is true.
28. Human activities add 7-9 gigatons of CO_2 per annum into the atmosphere. Major contributor to this CO_2 is
 (A) Burning of fossil fuels
 (B) Clearing of forests for agriculture
 (C) Fermentation industries
 (D) Cement industries
29. According to WHO, maximum permissible level of chlorides in drinking water is
 (A) 100 mg/L (B) 200 mg/L
 (C) 600 mg/L (D) 800 mg/L
30. Wilting coefficient of a loam represents
 (A) the minimum water content of the soil at which plants can no longer obtain water
 (B) water holding capacity
 (C) capillary water
 (D) field capacity
31. Which one of the following techniques can be used for determining the level of cadmium in soil ?
 (A) UV – Visible spectrophotometer
 (B) Atomic Absorption Spectrophotometer
 (C) XRD
 (D) IR spectrometer
32. For noise control in automobiles, the exhaust muffler attenuates sound by
 (A) Absorption
 (B) Destructive interference
 (C) Reducing velocity of hot gases
 (D) Absorption and destructive interference

33. Five particles ($< 2-3 \mu\text{m}$) can be effectively collected from industrial stacks by
- Fabric filters
 - Cyclone separators
 - Venturi scrubbers
 - Settling chambers

34. Soil fulvic acids are strong chelators of
- Iron (II)
 - Iron (III)
 - Both Iron (II) and Iron (III)
 - $\text{Fe}(\text{OH})_3$

35. Natural source of polycyclic aromatic hydrocarbons (PAHs) is
- Root exudates
 - Anaerobic bacteria
 - Aerobic bacteria
 - Grass fires

36. Match the 'phase' with the 'activity' in Environmental Audit. Identify the correct answer from the codes given below the lists :

| List – I (Phase) | List – II (Activity) |
|-----------------------------------|---|
| a. Pre-Audit | i. Human input-output analysis in relation to economy |
| b. On-site Audit | ii. Reviewing audit-check lists |
| c. Post-Audit | iii. Records/Documents Review |

Codes :

- | | | | |
|-----|-----|-----|-----|
| | a | b | c |
| (A) | ii | iii | i |
| (B) | i | iii | ii |
| (C) | i | ii | iii |
| (D) | iii | ii | i |

37. Match the Impact Assessment Methodologies (List – II) with the corresponding environments (List – I). Identify the correct answer from the codes given below the lists.

| List – I | List – II |
|-----------------|----------------------------|
| a. Air | i. Ecosystem models |
| b. Biological | ii. Gaussian models |
| c. Water | iii. Mass balance approach |
| d. Land | iv. G.I.S. |

Codes :

- | | | | | |
|-----|-----|-----|-----|-----|
| | a | b | c | d |
| (A) | ii | i | iii | iv |
| (B) | i | ii | iv | iii |
| (C) | iii | iv | ii | i |
| (D) | iv | iii | i | ii |

38. Public hearing is conducted
- Prior to site selection
 - Prior to approval of Terms of Reference
 - After preparation of EIA
 - After environmental clearance

39. IAIA stands for
- International Association of Impact Assessment
 - Indian Association of Impact Assessment
 - International Assembly of Impact Assessment
 - Indian Assembly of Impact Assessment

40. Municipal Solid Wastes (MSWs) have the heating value typically in the range
- 9,300 to 12,800 kJ/kg
 - 1000 to 2500 kJ/kg
 - 1780 to 2830 kJ/kg
 - 530 to 780 kJ/kg

41. The Motor Vehicles Act 1938 was amended in which year ?

- (A) 1972 (B) 1980
(C) 1988 (D) 1986

42. The following statistical test is used to ascertain whether there is significant difference between the variances of two sets of observations :

- (A) t-test
(B) F-test
(C) Chi square test
(D) Regression

43. The population (N) of an ecosystem obeys the growth equation

$$\frac{dN}{dt} = \alpha N - \beta N^2$$

where α and β are constants. The maximum sustainable yield of this ecosystem will be

- (A) $\alpha - \beta N$ (B) α/β
(C) $\alpha/2\beta$ (D) α^2/β

44. The geometric mean of the following data :

4, 10, 25, 10

is

- (A) 10 (B) 5
(C) 12.25 (D) $\frac{100}{49}$

45. If the mean and variance of a Poisson distribution are μ and σ , then the following relation is correct.

- (A) $\sigma = \mu^2$ (B) $\sigma = \sqrt{\mu}$
(C) $\sigma^2 = \mu$ (D) $\sigma = 2\mu$

46. In the Gaussian Plume Model, the plume rise varies with Buoyancy Flux Parameter F as

- (A) F (B) $F^{\frac{1}{2}}$
(C) $F^{\frac{1}{3}}$ (D) $F^{\frac{1}{4}}$

47. United Nations Conference on Environment, also termed as Earth Summit, was held in 1992 in which city ?

- (A) Rio de Janeiro
(B) Kyoto
(C) Stockholm
(D) Copenhagen

48. In which part of India, the tropical Western Ghats are situated ?

- (A) Punjab (B) Rajasthan
(C) Gujarat (D) Kerala

49. Variety of different species, genetic variability among individuals within each species and variety of ecosystems constitute the so called

- (A) Species diversity
(B) Genetic diversity
(C) Biological diversity
(D) Ecological diversity

50. Baba Amte was the leader of

- (A) Appiko Movement
(B) Chipko Movement
(C) Narmada Bachao Andolan
(D) Tehri Dam Movement

Space For Rough Work