

PAPER-II

ENVIRONMENTAL SCIENCE

Signature and Name of Invigilator

1. (Signature) _____

(Name) _____

2. (Signature) _____

(Name) _____

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)

D 8 9 1 1

Time : 1 ¼ hours]

[Maximum Marks : 100

Number of Pages in this Booklet : 8

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 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)	(C)	(D)
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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, Roll Number, Phone Number or put any mark on any part of the Answer 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.
9. You have to return the test question booklet and OMR Answer sheet 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 marks for incorrect answers.

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 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 ।**
 - (iii) इस जाँच के बाद 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)	(C)	(D)
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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 चिह्नानंकित 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 उत्तर-पुस्तिका पर नियत स्थान के अलावा अपना नाम, रोल नम्बर, फोन नम्बर या कोई भी ऐसा चिह्न जिससे आपको 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 ।
9. आपको परीक्षा समाप्त होने पर प्रश्न-पुस्तिका एवं OMR उत्तर-पत्रक निरीक्षक महोदय को लौटाना आवश्यक है और परीक्षा समाप्ति के बाद उसे अपने साथ परीक्षा भवन से बाहर न लेकर जायें ।
10. केवल नीले/काले बाल प्वाइंट पेन का ही इस्तेमाल करें ।
11. किसी भी प्रकार का संगणक (कैलकुलेटर) या लाग टेबल आदि का प्रयोग वर्जित है ।
12. 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.

- What are the steps necessary for sustainable management of renewable resources ?
 - Avoiding over-exploitation and pollution of biotic systems.
 - Strengthening the resource base and augmenting regenerability of biotic systems.
 - Use of alternative resources.
 - All of these.
- Fluxes of heat, water vapour and momentum are constant in
 - upper atmosphere
 - middle atmosphere
 - Ekman layer
 - surface boundary layer
- Inversions occur when atmosphere is
 - unstable
 - neutral
 - slightly stable
 - most stable
- When one species limits access of another species to a resource regardless of whether the resource is abundant or scarce, it is called
 - interspecific competition
 - intraspecific competition
 - interference competition
 - exploitative competition
- Nanda Devi and Sunderbans are examples of Indian
 - National Parks
 - Sanctuaries
 - International heritage areas
 - Biosphere reserves
- Match the List – I and II and select the correct answer from the codes given below the lists :

List – I (Analytical techniques)	List – II (Measured items)
(a) XRF	1. Functional groups
(b) Nephelometry	2. Elements
(c) IR spectroscopy	3. Turbidity
(d) UV-visible spectroscopy	4. Aromatics

Codes :

(a)	(b)	(c)	(d)
(A) 4	2	3	1
(B) 1	3	4	2
(C) 3	2	4	1
(D) 2	3	1	4
- The pH of a 0.001 M solution of HCl is
 - 2
 - 3
 - 4
 - 1
- The primitive atmosphere of earth consisted of
 - CO₂, NO₂, NH₃, SO₂
 - H₂, NH₃, CH₄, H₂O
 - CO, N₂O₃, SO₃, H₃N
 - He, Ne, Ar, Kr

9. Which of the following is the major source of mercury pollution in India ?
 (A) Coal based thermal power plants
 (B) Pesticides
 (C) Dental amalgam fillings
 (D) Electrical and electronic gadgets
10. Nitrite causes methaemoglobinemia by
 (A) oxidizing membrane proteins
 (B) reacting with calcium of bones
 (C) oxidizing haemoglobin
 (D) oxidizing membrane lipids
11. Solubility (S) of a sparingly soluble salt of the type AB is related to the solubility product (K_{SP}) by the relation
 (A) $S = K_{SP}^2$ (B) $S = 2 K_{SP}$
 (C) $S = \sqrt{K_{SP}}$ (D) $S = K_{SP}$
12. The amount of biomass which can be sustained under steady state condition of an ecosystem is termed as
 (A) Primary productivity
 (B) System homeostasis
 (C) Sustainable yield
 (D) Carrying capacity
13. Which of the following regions generally possess large diversity in their species composition ?
 (A) Arctic regions
 (B) Antarctic regions
 (C) Snow-clad mountains
 (D) Subtropical regions

14. Match the items under List – I and List – II and select the correct answer using codes given below :

List – I	List – II
(a) Tissue culture technique	(i). Green revolution
(b) Vermiculture technique	(ii). Storage of propagules
(c) Breeding technique	(iii). Micro-propagation
(d) Cryo preservation technique	(iv). Organic farming

Codes :

- (a) (b) (c) (d)
 (A) (ii) (iv) (iii) (i)
 (B) (iii) (iv) (i) (ii)
 (C) (i) (ii) (iv) (iii)
 (D) (iv) (i) (ii) (iii)
15. Successive increase in concentration of some chemicals through different food level organisms is called
 (A) Biogeochemical cycle
 (B) Biological magnification
 (C) Chemical production
 (D) Biodegradation
16. Which of the following is a correct sequence found in a grassland ecosystem ?
 (A) Grasses → Diatoms → deer → dog
 (B) Grasses → rabbit → wolves → tiger
 (C) Trees → birds → hawks → wolves
 (D) Grasses → snakes → deer → dog

17. Reservoir triggered seismicity in case of hydropower projects with large pondage is most likely to occur when
- thrust fault passes through the reservoir
 - strike-slip fault passes through the reservoir
 - Large flood strikes the project
 - Final reservoir level drops
18. Where the amplitude of Tsunami waves would be maximum ?
- At Deep Ocean
 - Near the Coast
 - On Flood Plains
 - At Mid Oceanic Ridges
19. Given below are scales of four topographic maps. Maps of which scale will have more clarity ?
- 1 : 50,000
 - 1 : 25,000
 - 1 : 250,000
 - 1 : 1,000,000
20. Soil surveys involve which of the following ?
- Soil series mapping
 - Soil depth mapping
 - Soil horizons mapping
 - All of these
21. As we go down the discontinuous Bowen's reaction series (Olivine – Pyroxene – Amphibole – Biotite) the $(Na+K) / Al$ ratio increases from
- 0 to 1
 - 0 to 2
 - 0 to 3
 - 0 to 4
22. The maximum value of power coefficient for a wind turbine can be
- 0.59
 - 0.49
 - 0.92
 - 0.72
23. Average value of solar insolation $\left(\frac{w}{m^2}\right)$ at the earth's surface is
- 250
 - 350
 - 450
 - 550
24. Fuel cells are devices that generate electricity by converting the energy released by
- electrochemical reactions without going through combustion process.
 - biochemical reactions without going through combustion process.
 - electrochemical reactions involving combustion process
 - biochemical reactions involving combustion process
25. Chemically coal is composed of
- Carbon
 - Hydrogen
 - Oxygen
 - Sulphur and / or Nitrogen
- All of above
 - Only (i) and (ii)
 - Only (i), (ii) and (iii)
 - Only (i), (ii) and (iv)
26. Which of the following gases has the maximum global warming potential (GWP) ?
- Carbon-di-oxide
 - Methane
 - Nitrous oxide
 - Water vapour

27. Acid rain has pH
 (A) < 7.6 (B) > 7
 (C) ≤ 5.6 (D) < 1.6
28. Which of the following gases facilitates formation of tropospheric ozone ?
 (A) NO_2 (B) SO_2
 (C) CO (D) NH_3
29. The sound power from a voice shouting is 0.001 Watt. The sound level in dB is
 (A) 90 dB (B) 60 dB
 (C) 30 dB (D) 120 dB
30. According to WHO maximum permissible level of iron in drinking water is
 (A) 1 mg/L
 (B) 5 mg/L
 (C) 10 mg/L
 (D) 50 mg/L
31. The particle sizes associated with ambient aerosols in the atmosphere have the range
 (A) $< 100 \mu\text{m}$
 (B) $5 - 10 \mu\text{m}$
 (C) $1 - 5 \mu\text{m}$
 (D) $< 1 \mu\text{m}$
32. An aquatic system is essentially a single phase system while terrestrial system is a
 (A) two phase system
 (B) three phase system
 (C) four phase system
 (D) multiple phase system higher than having four phases
33. For efficient crop productivity, the level (kg/ha) of N, P, K in soils should, respectively, be
 (A) $> 300, > 80$ and > 360
 (B) $< 50, < 15$ and < 120
 (C) $< 100, < 30$ and < 180
 (D) 150, 50 and 240
34. Identify the correct sequence of stages of obtaining Environmental clearance for new projects
 (A) Appraisal, Screening, Scoping, Public Consultation
 (B) Screening, Public Consultation, Scoping, Appraisal
 (C) Screening, Appraisal, Scoping, Public Consultation
 (D) Screening, Scoping, Public Consultation, Appraisal
35. **Assertion (A) :** Cost benefit analysis converts the benefits from the development, damages and control measures into monetary values.
Reason (R) : Cost benefit analysis compares the cost of damage caused by developmental activity with the cost of control measures adopted and provides the optimum solution for a given environmental quality.
- Which one of the following codes is correct ?
- 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.

36. Match the items in List – I with List – II and select the correct answers using codes given below :

List – I (Developmental project)	List – II (Validity time period for Environmental Impact Assessment Report)
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- | | |
|-------------------------------|---------------------|
| (a) Mining Projects | (i) 10 years |
| (b) River Valley Projects | (ii) 30 years |
| (c) Area Development Projects | (iii) 5 years |
| (d) Other Projects | (iv) Limited period |

Codes :

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

37. Match the List – I and List – II. Identify the correct answer from the codes given below the lists :

List – I (Domain)	List – II (Effects)
(a) Socioeconomics	(i) Barrier to travel corridors
(b) Wildlife	(ii) Employment opportunities
(c) Water quality	(iii) Erosivity & Erodability
(d) Soil environment	(iv) BOD and COD

Codes :

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

38. Hazardous substances have the following attributes :

- (A) Ignitability
 (B) Ignitability, Reactivity and Corrosivity
 (C) Reactivity and Toxicity
 (D) Corrosivity and Toxicity

39. Among bio-medical wastes, human anatomical wastes fall under category

- (A) 4 (B) 2
 (C) 3 (D) 1

40. To test whether there is a significant difference between the means of two sets of observations, one employs the following statistical technique :

- (A) Regression
 (B) χ^2 test (chi square test)
 (C) t-test
 (D) F-test

41. For any finite set of positive numbers, which is the correct relationship involving Harmonic Mean (HM), Geometric Mean (GM) and Arithmetic Mean (AM) ?

- (A) $HM \leq GM \leq AM$
 (B) $AM \leq GM \leq HM$
 (C) $AM \leq HM \leq GM$
 (D) $GM \leq HM \leq AM$

42. The population (N) of an ecosystem follows logistic growth. If K is its carrying capacity, then the environmental resistance is

- (A) $\frac{N}{K}$ (B) $1 - \frac{N}{K}$
 (C) $\frac{N^2}{K}$ (D) NK

43. For the following Poisson distribution

$$P(X) = \frac{2^x e^{-2}}{x!}; X = 0, 1, 2, \dots$$

the value of the mean is

- (A) 2 (B) 4
(C) 1 (D) $\frac{1}{2}$
44. In the Gaussian Plume Model, the plume rise, under neutral or unstable atmospheric conditions, varies with the average wind speed (u m/sec) at stack height as
- (A) u
(B) $\frac{1}{u}$
(C) $\frac{1}{u^2}$
(D) $\frac{1}{u^3}$
45. Which of the following steps can be used to raise the assimilative capacity of natural systems ?
- (A) Turn barren land into eutrophic system.
(B) Avoid concentration of polluting industry at a particular place.
(C) Both (A) and (B).
(D) None of these.
46. Kyoto Protocol on climate change was envisaged in which year ?
- (A) 1992
(B) 1994
(C) 1997
(D) 2002

47. About what percentage of earth's drylands are deserts ?

- (A) 10 – 20%
(B) 23 – 26%
(C) 33 – 36%
(D) 43 – 53%

48. 'Ring of Fire' surrounds which ocean ?

- (A) Indian Ocean
(B) Atlantic Ocean
(C) Arctic Ocean
(D) Pacific Ocean

49. **Assertion (A)** : Available data suggest that the first cells on earth were anaerobic heterotrophs.

Reason (R) : In the beginning, the earth's atmosphere probably lacked free oxygen.

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 and (R) is false.
(D) (A) is false and (R) is true.

50. Chemical formula for CFC-113 is

- (A) CCl_2F_2
(B) CCl_3F_3
(C) $C_2Cl_3F_3$
(D) CCl_2F_3

Space For Rough Work