Signature and Name of Invigilator

1. (Signature) _____

   (Name) _____

2. (Signature) _____

   (Name) _____

J−8908	**PAPER−II**

Time : 1¼ hours] ENVIRONMENTAL SCIENCE [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 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 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 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. **Assertion (A) :** Sustainable development is necessary for the survival of human race.

   Reason (R) : Rapid economic growth without environmental concerns cannot be sustained.

   (A) **(A)** is true and **(R)** is false
   (B) **(A)** is false and **(R)** is true
   (C) Both **(A)** and **(R)** true but **(R)** is not the correct explanation
   (D) Both **(A)** and **(R)** true and **(R)** is the correct explanation

2. The spatial scale of meso scale meteorological phenomena is approximately :
   (A) 2 - 3 km to 5 - 6 km
   (B) few km to 100 km
   (C) few 100 m to few km
   (D) 10 mm to 1 km

3. The mass of the earth's mantle is approximately :
   (A) 2×10^{25} gm
   (B) 8.1×10^{17} gm
   (C) 4.05×10^{27} gm
   (D) 3.1×10^{22} gm

4. When the environmental lapse rate is less than the adiabatic lapse rate, the atmosphere is :
   (A) Stable
   (B) Moderately unstable
   (C) Highly unstable
   (D) Neutral

5. The standard hydrogen electrode, the pressure of hydrogen and hydrogen ion concentration respectively are :
   (A) 1 atm ; 10 m
   (B) 10 atm ; 1m
   (C) 1 atm ; 1 m
   (D) 1 atm ; m/10

6. Consider the following statements :
   (i) Entropy in a spontaneous reaction increases
   (ii) Free energy in a spontaneous reaction increases
   (iii) Free energy remains constant when reaction is in equilibrium
   (iv) Free energy increases in a reverse reaction
   Which of these are *correct* :
   (A) (i) and (ii)
   (B) (ii) and (iii)
   (C) (i), (iii) and (iv)
   (D) none of the above

7. **Assertion (A) :** Increased level of Arsenic in water is a health hazard.

    Reason (R) :   Arsenic has antagonistic behaviour with other metals, its dietary requirement is in trace amount and shows speciation.

    (A) Both **(A)** and **(R)** true
    (B) Both **(A)** and **(R)** 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

8. One liter of water contains :
    (A) $55.5 \times 6.02 \times 10^{23}$ H_2O molecules
    (B) $25.5 \times 6.02 \times 10^{23}$ H_2O molecules
    (C) $1.0 \times 6.02 \times 10^{23}$ H_2O molecules
    (D) $1000 \times 6.02 \times 10^{23}$ H_2O molecules

9. When terrestrial plant communities progress with time from successional to climax stage :
    (i)   Standing crop biomass increases
    (ii) Net ecosystem productivity increases
    (iii) Gross productivity per unit of standing crop biomass decreases
    (iv) Biomass supported per unit of energy flow decreases.
    Which of the following combination is *correct* :
    (A) (i) and (ii)   (B) (i) and (iii)   (C) (i)) and (iv)   (D) (ii) and (iii)

10. **Assertion (A) :** 'Hot spots' are the region showing richness of endemic species.

    Reason (R) :   The distribution of endemic species are confined to a specific region.
    (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 the correct explanation
    (C) **(A)** is true but **(R)** is false
    (D) **(A)** is false but **(R)** is true

11. Trophic structure may be shown graphically by ecological pyramids; which of the following ecological pyramid will always have a true upright pyramid shape :
    (A) Pyramid of numbers   (B) Pyramid of biomass
    (C) Pyramid of energy   (D) All of the above

12. Species diversity is generally higher in ecosystem experiencing :
    (A) No disturbance   (B) Moderate disturbance
    (C) High disturbance   (D) Drastic disturbance

13. Those Planktons which have dimensions in the range of 2 - 20μm are known as :
    (A) Micro plankton   (B) Nano plankton
    (C) Peri plankton   (D) Pico plankton

14. **Assertion (A) :** Plants are not auxotrophs.
    Reason (R) : Plants can synthesize all the growth factors they need.
    (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 false and **(R)** is true
    (D) **(A)** is true and **(R)** is false

15. **Assertion (A) :** Decomposition of hydrocarbons is favoured in neutral soil.
    Reason (R) : Neutral pH favours the greatest populations of micro organisms.
    (A) Both **(A)** and **(R)** are true and **(R)** is not the correct explanation of **(A)**
    (B) Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**
    (C) **(A)** is false **(R)** is true
    (D) **(A)** is true **(R)** is false

16. A majority of the antibiotics are derived from actinomycetes come from members of the genus :
    (A) *Nocardia*   (B) *Streptomyces*
    (C) *Micromonospora*   (D) *Actinomyces*

17. Germany's poison gas in World War I was developed by :
    (A) Knowels   (B) Haber   (C) Hitlor   (D) Stevenson

18. Which of the following nitrogen fixers is found in philosophers :
    (A) *Azotobacter*   (B) *Clostridium*
    (C) *Klebsiella*   (D) *Rhodospirillum*

19. Thiobacillus and Beggiatoa play an important role in the :
    (A) water cycle on Earth   (B) Phosphorus cycle
    (C) Sulfur cycle in the soil   (D) Breakdown of sewage

20. One of the purpose of secondary treatment of industrial waste water and sewage is to :
    (A) increase the chlorine content   (B) reduce the BOD
    (C) encourage the formation of PCBs (D) discourage ammonification

21. AGENDA 21 specifically advocates to devise strategies to :
    (A) Promote economic growth to support increasing human population with adequate environment care
    (B) Control human population explosion, resource over use and deteriorating environmental quality
    (C) Halt and reverse the effects of environmental degradation to promote sustainable and environmentally sound development
    (D) Promote economic development and environmental with a view to reduce poverty and faster human welfare

22. Eutrophication of water bodies is triggered by :
   (A) Excessive growth of phytoplanktons
   (B) Excessive growth of fishes
   (C) Excessive inflow of nutrients
   (D) Bright sunlight

23. Under montreal protocol, developing countries are required to phase out the HCFCs by the year :
   (A) 2030   (B) 2010   (C) 2020   (D) 2040

24. Identify the correct sequence of gases in the increasing order of their global warming potential :
   (A) $CH_4 < N_2O < CFC < SF_6$ (B) $CO_2 < N_2O < CH_4 < CFC$
   (C) $CO_2 < CH_4 < SF_6 < CFC$ (D) $N_2O < CH_4 < CO_2 < CFC$

25. In a simple regression consisting of dependent variable Y, independent variable X and random error term ϵ, $Y = \alpha + \beta X + \epsilon$, the expectation value $<\epsilon>$ is :
   (A) 0   (B) α/β (C) β/α (D) $(\beta - \alpha)$

26. If p and q are the probabilities of success and failure, respectively in a trial and N is the total number of trials, the variance is :
   (A) $\sqrt{npq}$ (B) npq (C) $n\dfrac{p}{q}$ (D) $n\dfrac{q}{p}$

27. If $S = 4$ is the standard deviation of sample size 20 drawn from a normal distribution with standard deviation $\sigma = 2$, the value of Ψ^2 (chi-square) statistic is :
   (A) 40   (B) 10   (C) 20   (D) 80

28. Under unstable atmospheric conditions, the plum rise (Δh) above the stack varies with wind speed (u) at stack height as :
   (A) $\Delta h \propto u$ (B) $\Delta h \propto 1/u$ (C) $\Delta h \propto u^{1/3}$ (D) $\Delta h \propto u^{-1/3}$

29. The geometric mean of the data 2, 4, 27 is :
   (A) 6   (B) $6\sqrt{6}$ (C) 16.5   (D) $\sqrt{33}$

30. Bulking of sewage sludge is frequently associated with :
   (A) High C : N ratio   (B) High C : P ratio
   (C) High dissolved oxygen   (D) All of the above

31. Which of the following is removed from waste water by :
   (A) Phosphates   (B) Organic Compounds
   (C) Ammonia   (D) Sulphates

32. The bacteria responsible for deposition of iron oxide in water pipes :
   (A) *Gallionella*   (B) *Klebsiella*   (C) *Thermococcus*   (D) *Helicobacter*

33. **Assertion (A) :** In electrostatic precipitator corona discharge is used for removing particulate particles from the gas stream.
    Reason (R) : The corona discharge creates an electric field, which makes the particles settle down.
    (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

34. Which of the following affects the ozone concentration in troposphere :
    (A) CO
    (B) N_2
    (C) SO_2
    (D) CO_2

35. **Assertion (A) :** While characterizing the size of an aerosol particle aerodynamic diameter is used.
    Reason (R) : The aerosol particle may be of irregular shape.
    (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 the correct explanation of **(A)**
    (C) **(A)** is true but **(R)** is false
    (D) **(A)** is false but **(R)** is true

36. The noise index Lgo refers to :
    (A) Background noise level
    (B) Peak noise level
    (C) Average noise level
    (D) 90%

37. Fission of 1 gm of ^{235}U liberates energy equivalent to about :
    (A) 5.7 barrels of crude oil
    (B) 13.7 barrels of crude oil
    (C) 18.7 barrels of crude oil
    (D) 22.7 barrels of crude oil

38. To increase the power output from a MHD power plant, which of the following compounds is used :
    (A) ZnO
    (B) Fe_2O_3
    (C) Cs_2O_3
    (D) SiO_2

39. **Assertion (A) :** Geothermal reservoirs with temperatures above 180°C are useful for generating electric power.
    Reason (R) : High temperature steam can be used to drive turbines to generate electricity.
    (A) Both **(A)** and **(R)** are true and **(R)** is the ecorrect 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

40. The optimum range of wind speeds for wind power generation is :
    (A) 2 - 4 m/sec
    (B) 1 - 2 m/sec
    (C) 4 - 12 m/sec
    (D) 15 - 20 m/sec

41. Deep sea ferromanganese nodules are found on :
    (A) Oceanic plateau
    (B) Oceanic ridges
    (C) Oceanic islands
    (D) Oceanic plains

42. In ocean regime carbonate compensation depth (CCD) implies :
(A) Precipitation of carbonate (B) Dissolution of carbonate
(C) Evaporation of carbonate (D) Sublimation of carbonate

43. Which of the following statement is *NOT* correct :
Carcinogenic agents like pesticides are mutagens which may cause.
(A) Change in chromosome
(B) Change in nucleotide sequence in DNA of sperms or eggs, which is inherited
(C) Change in nucleotide sequence in DNA of somatic cells is inherited
(D) Change in DNA sequence may be due to generation of free radicals in the cells

44. According to the Public Liability Insurance Act 1991, what is the upper monetary limit for drawing insurance policies by the owners for handling any hazardous substance :
(A) Rs. 5 Crores (B) Rs. 50 Crores
(C) Rs. 500 Crores (D) Rs. 1000 Crores

45. Hospital waste has to be disposed off by :
(A) handing over to hazardous waste management site
(B) burring 3 meters below the ground
(C) burring 10 meters below the ground
(D) incineration

46. Which of the following industries do not produce hazardous waste :
(A) Electroplating (B) Chemical
(C) Sugar (D) Pharmaceutical

47. Four stages viz Initiation, Inventory analysis, Impact assessment and improvement assessment are associated with :
(A) LCA (B) EIA
(C) Environmental Audit (D) Environmental Impact - Statement

48. When industry with 'Red' category is to be established, it is necessary to have public hearing or inquiry under the procedure called as :
(A) Environmental Health Hazard (EHH)
(B) Environmental Litigation (EL)
(C) Environmental Management System (EMS)
(D) Environmental Impact Assessment (EIA)

49. The National Ambient Air Quality Standard for 1 hour average concentration (mg/m^3) of CO in restricted area is :
(A) 2 (B) 4 (C) 16 (D) 20

50. For aerosol particles of size comparable to wavelengths of either shortwave radiation or infra-red radiation, the following type of scattering takes place :
(A) Rayleigh scattering (B) Mie scattering
(C) Raman scattering (D) Brillouin scattering

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Space For Rough Work