

Signature and Name of Invigilator

1. (Signature) _____

(Name) _____

2. (Signature) _____

(Name) _____

D-8907**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**

- 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 Serial No. of the booklet should be entered in the Answer-sheets and the Serial No. of Answer Sheet should be entered on this Booklet.
- 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)

where (C) is the correct response.
- 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.
- Read instructions given inside carefully.
- Rough Work is to be done in the end of this booklet.
- 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.
- 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.
- Use only Blue/Black Ball point pen.**
- Use of any calculator or log table etc., is prohibited.**
- There is NO negative marking.**

Answer Sheet No. :

(To be filled by the Candidate)

Roll No.

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(In figures as per admission card)

Roll No. _____

(In words)

Test Booklet No.**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 प्रश्न-पुस्तिका की क्रम संख्या उत्तर-पत्रक पर अंकित करें और उत्तर-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 दीर्घवृत्त 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** उत्तर-पत्रक पर ही अंकित करने हैं। यदि आप उत्तर पत्रक पर दिये गये दीर्घवृत्त के अलावा किसी अन्य स्थान पर उत्तर चिन्हंकित 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 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।
- 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।
- केवल नीले/ काले बाल प्वाईट पेन का ही इस्तेमाल करें।**
- किसी भी प्रकार का संगणक (कैलकुलेटर) या लाग टेबल आदि का प्रयोग वर्जित है।
- 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. Wind rose of a given location represents :
 - (A) Frequency distribution of wind speeds in the form of a histogram.
 - (B) Frequency distribution of wind speeds in percentage terms in the form of a π chart.
 - (C) Frequency distribution of wind speed associated with a cyclone.
 - (D) Frequency distribution of wind speed and direction in polar coordinates.
2. **Assertion (A) :** Sustainable production of hay or green fodder is essential for uninterrupted supply of animal products.
Reason (R) : Environmental concerns are detrimental for sustainable production of hay or green fodder.
 - (A) Both (A) and (R) are true but (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 true and (R) is false
 - (D) (A) is false and (R) is true
3. For a clear sunny day with sun higher than 60° above horizon and wind speed greater than 6 m/sec, the atmosphere is :
 - (A) Stable
 - (B) Slightly unstable
 - (C) Moderately unstable
 - (D) Very unstable
4. The mass of the earth's crust is approximately :
 - (A) 2.5×10^{25} gm
 - (B) 3.2×10^{20} gm
 - (C) 2.8×10^{32} gm
 - (D) 1.8×10^{35} gm
5. The time scale of meso-scale meteorological phenomenon is :
 - (A) Hours to a day
 - (B) 3 – 4 days
 - (C) Few weeks
 - (D) Few weeks to several months
6. The reaction is in equilibrium if Gibb's free energy (G) :
 - (A) Increases i.e., $\Delta G > 0$
 - (B) Decreases i.e., $\Delta G < 0$
 - (C) Remains same i.e., $\Delta G = 0$
 - (D) Varies i.e., $\Delta G > 0$ or $\Delta G < 0$
7. How CO emitted by automobiles prevents transfer of O_2 in the body tissue :
 - (A) By changing O_2 into CO
 - (B) By destroying the haemoglobin
 - (C) By forming stable compound with haemoglobin
 - (D) By obstructing the reaction of O_2 with haemoglobin

8. In qualitative analysis the sulphides of Group-II are precipitated in presence of dilute HCl, while of Group-IV are precipitated only in the presence of NH_4OH . It is because :
- (A) Solubility product of sulphides of Group-II is greater than that of Group-IV
 (B) Solubility product of sulphides of Group-II is less than that of Group-IV
 (C) Sulphides of Group-II are insoluble in acids
 (D) Sulphides of Group-IV are insoluble in alkalies
9. Arrange the following atmospheric gases in the decreasing order of their abundance :
 I. Oxygen II. Carbon di-oxide III. Argon IV. Methane
Code :
- (A) I > III > II > IV (B) II > I > III > IV
 (C) I > III > II > IV (D) III > I > IV > II
10. Which of the following is equivalent to the number of substrate molecules converted to product in a given unit of time by a single enzyme molecule when the enzyme is saturated with substrate ?
- (A) Specific constant (B) Michaelis constant
 (C) Dissociation constant (D) Turn-over number
11. DDT is harmful from the ecological point of view mainly because it undergoes :
- (A) Biotransformation (B) Bioaccumulation
 (C) Biomagnification (D) Biodegradation
12. Which of the following radiations continuously act on ^{14}N to produce ^{14}C isotope in the atmosphere ?
- (A) X-rays (B) γ -rays (C) UV-rays (D) Cosmic rays
13. The proteins in the cell walls of microorganisms have an overall net negative charge at pH of most soil environments, because :
- (A) the pH of the environment is greater than the pI
 (B) the pH of the environment is less than the pI
 (C) the pH of the environment is the same as pI
 (D) none of the above
14. Oxidoreductases :
- (A) oxidize a substrate by removing a pair of electrons and the accompanying hydrogen atoms
 (B) break molecules apart by adding water across bonds
 (C) hydrolyse the substrate
 (D) put molecules together
15. Which of the following is a nematofungus ?
- (A) *Rhizoctonia solani* (B) *Penicillium* sp.
 (C) *Phanerochaete chrysosporium* (D) *Mucor mucedo*
16. The diatomaceous earth is used as a :
- (A) chemical insecticide (B) non-chemical insecticide
 (C) fungicide (D) bactericide

17. **Assertion (A)** : Among micro-organisms white-rot fungi most efficiently degrade lignin.
Reason (R) : White-rot fungi produce ligninolytic enzymes.
 (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
18. In deep oceans the phenomenon of inverted biomass pyramid occurs mainly due to :
 I. Fast growth rate and high nutrient requirement of producers.
 II. Rapid turnover rate and short life span of producers.
 III. Slow growth rate and high nutrient requirement of herbivores.
 IV. Slow turnover and long life span of herbivores.
 Which of the following combinations is correct ?
 (A) I and III (B) I and IV (C) II and III (D) II and IV
19. Alpha diversity represents :
 (A) species richness (B) species evenness
 (C) species richness and evenness (D) species richness and dominance
20. Populations of two species may interact in several ways. One of these called protocooperation occurs when :
 (A) One population inhibits the other
 (B) Interaction is favourable to both but not obligatory
 (C) Interaction is favourable to both but obligatory
 (D) Neither population affects the other
21. The term benthos refers to communities which grow :
 (A) Attached on the bark of trees
 (B) Attached on submerged plants
 (C) Attached at the bottom of a waterbody
 (D) Attached on submerged woody roots
22. Pelagic sediments are found in the :
 (A) continental shelf (B) continental slope
 (C) mid-oceanic ridges (D) deep oceanic plains
23. Pleistocene period began :
 (A) 5.0 million years ago (B) 1.7 million years ago
 (C) 10 million years ago (D) 28 million years ago
24. Sodium and Potassium in rock and soil materials are generally estimated by :
 (A) UV - Visible spectrophotometry (B) Flame photometry
 (C) HPLC (D) Colorimetry

25. Match the *List-I* and *List-II* in respect of the geochemical affinity of the elements :

<i>List-I</i>					<i>List-II</i>				
(a)	Chalcophile				(i)	Carbon			
(b)	Lithophile				(ii)	Nitrogen			
(c)	Siderophile				(iii)	Sulphur			
(d)	Atmophile				(iv)	Oxygen			
(e)	Biophile				(v)	Iron			
	(a)	(b)	(c)	(d)	(e)				
(A)	(v)	(iv)	(iii)	(i)	(ii)				
(B)	(iii)	(iv)	(v)	(ii)	(i)				
(C)	(iv)	(v)	(i)	(ii)	(iii)				
(D)	(iii)	(i)	(ii)	(iv)	(v)				

26. Match the *List-I* and *List-II* :

<i>List-I</i>					<i>List-II</i>				
<i>(Sedimentary Environment)</i>					<i>(Rock Material)</i>				
(a)	Deep Sea				(i)	till			
(b)	Lakes				(ii)	loess			
(c)	Desert				(iii)	evaporite			
(d)	Glacier Margins				(iv)	ooze			
	(a)	(b)	(c)	(d)					
(A)	(iv)	(iii)	(ii)	(i)					
(B)	(iii)	(ii)	(i)	(iv)					
(C)	(iv)	(i)	(ii)	(iii)					
(D)	(iii)	(ii)	(iv)	(i)					

27. Chemical weathering of rock material is most effective in which of the following regions ?

- (A) Aravalli Hills (B) Vindhyan Hills (C) Ladakh (D) Western Ghats

28. Fission of 1 gm of ^{235}U liberates energy equivalent to about :

- (A) 1 metric ton of coal (B) 1.5 metric ton of coal
(C) 2.2 metric ton of coal (D) 2.7 metric ton of coal

29. Under operating conditions of maximum power output from an ideal Magnetohydrodynamic power plant, the electrical efficiency is :

- (A) 50 % (B) 25 % (C) 75 % (D) 100 %

30. The maximum value of the coefficient of performance for a wind turbine is :

- (A) $\frac{3}{4}$ (B) $\frac{5}{6}$ (C) $\frac{11}{27}$ (D) $\frac{16}{27}$

31. **Assertion (A)** : Electrostatic precipitators are very efficient devices for removal of particulate matter from the gas stream.

Reason (R) : Corona discharge helps in charging of particulate matter which are collected on the grounded electrodes (plates).

- (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

32. Stratospheric ozone is produced by electromagnetic radiations of wavelength in the range :
- (A) 180 – 240 nm (B) 280 – 320 nm
(C) 320 – 400 nm (D) 150 – 180 nm
33. PM_{2.5} refers to :
- (A) mass of particles of size less than 2.5 μm.
(B) mass of particles of size greater than 2.5 μm.
(C) number of particles of size less than 2.5 μm.
(D) number of particles of size greater than 2.5 μm.
34. A person is exposed to noise of 87 dB for 2 hours. If 100% noise dose corresponds to 90 dB noise exposure for 8 hours, the person is subjected to a noise dose of :
- (A) 50 % (B) 2.5 % (C) 12.5 % (D) 6.25 %
35. If the EIA indicates that another state is likely to be affected, the state, in which EIA is planned, has to :
- (A) transmit to the affected state any relevant information from the EIA concerning it
(B) keep the relevant information fully secret
(C) handover the information to the central pollution control board
(D) none of the above
36. The combination of primary and secondary treatment reduces the original sewage BOD by :
- (A) 30 – 40 % (B) 50 – 60 % (C) 60 – 70 % (D) 80 – 90 %
37. A simple and relatively inexpensive film-flow type of aerobic treatment method is :
- (A) Septic tank (B) Activated sludge process
(C) Percolating filter system (D) All the above
38. Which of the following is not a molecular method for the detection of microbial population from water/soil ?
- (A) Dot-blot hybridization (B) MPN (C) RT-PCR (D) PCR
39. Under Kyoto Protocol, the percentage reduction sought to be achieved in CO₂ emissions from 1990 levels by the year 2012 is :
- (A) ~ 10 % (B) ~ 5.2 % (C) ~ 15.2 % (D) ~ 20.5 %
40. In a simple regression model $Y = \alpha + \beta X + \epsilon$ (Y = dependent variable, X = independent variable, α , β are regression coefficients, ϵ = random error), the variance of ϵ is :
- (A) 0 (B) $\frac{\alpha^2}{\beta^2}$
(C) $\frac{\beta^2}{\alpha^2}$ (D) σ^2 ; (σ = standard deviation)

41. In the Box-model the pollutant concentration (C) over an area varies with mixing height (H) as :
- (A) $C \propto H$ (B) $C \propto \frac{1}{H}$ (C) $C \propto H^{\frac{1}{2}}$ (D) $C \propto H^{-\frac{1}{2}}$
42. For a Binomial distribution, the first moment is :
- (A) 1 (B) 3 (C) -1 (D) 0
43. The Harmonic mean of the data 2, 2, 1 is :
- (A) $\frac{3}{2}$ (B) $\frac{5}{3}$ (C) 2 (D) $\frac{3}{5}$
44. For a Normal distribution, the moment coefficient of skewness is :
- (A) 0 (B) 1 (C) 3 (D) -1
45. Which of the following water purification technology removes minerals from drinking water ?
- (A) Filtration (B) Ultra-filtration
(C) Reverse osmosis (D) UV treatment
46. Identify the correct sequence of gases in the decreasing order of their contribution to global warming :
- (A) $\text{CO}_2 > \text{CFCs} > \text{CH}_4 > \text{N}_2\text{O}$ (B) $\text{CO}_2 > \text{CH}_4 > \text{N}_2\text{O} > \text{CFCs}$
(C) $\text{CO}_2 > \text{CH}_4 > \text{CFCs} > \text{N}_2\text{O}$ (D) $\text{CO}_2 > \text{N}_2\text{O} > \text{CH}_4 > \text{CFCs}$
47. Convention on Biological Diversity, adopted at the UN Conference on Environment and Development in 1992, aims to curb destruction of :
- (A) Biological species (B) Habitats
(C) Ecosystems (D) All of the above
48. According to IPCC, during the 20th century earth's mean surface temperature has risen by :
- (A) $\sim 0.4^\circ\text{C}$ (B) $\sim 0.6^\circ\text{C}$ (C) $\sim 0.8^\circ\text{C}$ (D) $\sim 1.0^\circ\text{C}$
49. According to US water standards, the maximum permissible coliform count (number/100 ml) in recreational waters is :
- (A) 10,000 (B) 5,000 (C) 1,000 (D) 500
50. **Assertion (A)** : At present in India, the use of solar energy is rather limited.
Reason (R) : Large scale use of solar energy has uncertain environmental implications.
- (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

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Space For Rough Work