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. | | | | | | | | |

(In figures as per admission card)

Roll No._____

(In words)

J 8 9 1 1

Time : **1 $^{1}/_{4}$** 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) ● (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, 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 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 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 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 उत्तर-पुस्तिका 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 ।
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 प्वाईंट 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.

1. Identify the correct sequence of energy flow through various levels of an ecosystem :

(A) Sun's energy → Primary producers → Carnivores

(B) Sun's energy → Primary producers → Carnivores → Herbivores

(C) Sun's energy → Herbivores → Primary producers

(D) Sun's energy → Primary producers → Herbivores → Carnivores

2. When environmental lapse rate is more than dry adiabatic lapse rate, the atmosphere is said to be in

(A) Stable state

(B) Unstable state

(C) Neutral state

(D) Conditionally stable state

3. Which of the following accounts for nearly 75% of the available fresh water in the world ?

(A) Groundwater

(B) Glaciers

(C) River water

(D) Lakes

4. The summers in Taiga climatic zone are

(A) hot, humid and long

(B) warm and short

(C) cool, rainy and short

(D) hot and dry

5. Utilitarian conservation theory was established by

(A) Roosevelt and Pinchot

(B) John Muir

(C) Rachel Carson

(D) Brundtland

6. Ozone undergoes photolysis due to ultra-violet radiations of wavelength

(A) < 315 nm

(B) < 400 nm

(C) < 500 nm

(D) < 600 nm

7. Which of the following types of pesticides are least biodegradable ?

(A) Organo chloro compounds

(B) Organo phosphorous compounds

(C) Organo carbamates

(D) All of the above

8. $MgSO_4$ can be expressed as

(A) 120 equivalent of $CaCO_3$

(B) 117 equivalent of $CaCO_3$

(C) 195 equivalent of $CaCO_3$

(D) 84 equivalent of $CaCO_3$

9. Cattle waste has COD several times higher than BOD because of

(A) high levels of fibre

(B) high levels of microflora

(C) high levels of cellulose

(D) high levels of fibre, cellulose and lignin

10. In urban areas, the main constituents of photochemical smog in winter season are

(A) $SO_2 + NO_x + PAN$

(B) Hydrocarbons + CO + PAN

(C) Hydrocarbons + SO_2 + PAN

(D) Hydrocarbons + NO_x + O_3 + PAN

11. Redox potential in soil is governed by

(A) strong oxidizing agent

(B) weak oxidizing agent

(C) organic matter

(D) soil particle size

12. The process of invasion is completed through the following stages :

(A) Migration and establishment of species in bare area

(B) Migration, ecesis and aggregation

(C) Ecesis and aggregation

(D) Migration, aggregation and settlement of species

13. Which one is not matched correctly ?

(A) Kaziranga – Assam

(B) Periyar – Kerala

(C) Ranthambore – Rajasthan

(D) Hemis High Altitude – Himachal Pradesh

14. Hyporhric biodiversity is linked with

(A) Ecotone of surface water and groundwater

(B) Ecotone of terrestrial and aquatic ecosystem

(C) Groundwater

(D) Asian region

15. E. coli displays diauxic growth pattern when grown in a medium containing

(A) glucose and fructose

(B) glucose and citrate

(C) glucose and lactose

(D) glucose alone

16. El Nino effect refers to the periodic extension of warm equatorial current along which coast ?

(A) Peru Coast

(B) African Coast

(C) East Coast of India

(D) Somalia Coast

17. Which of the following options is correct for concentration of elements in sea water ?

(A) Na > Mg > Ca

(B) Ca > Na > Mg

(C) Mg > Na > Ca

(D) $CO_3 > SO_4 > Cl$

18. Land use planning requires which of the following base maps ?

(A) Soil type map

(B) Slope map

(C) Soil depth map

(D) All of the above

19. Gutenberg discontinuity is found at the depth of

(A) 333 km

(B) 700 km

(C) 1500 km

(D) 2900 km

20. Landslides are generally associated with heavy rainfall because

(A) Water is universal solvent.

(B) Water enhances chemical weathering.

(C) Water increases the weight of overburden.

(D) Water reduces the shear strength of rock.

21. The optimal pH for Methane production ranges between

(A) 7 to 7.2

(B) 5 to 5.6

(C) 8 to 9.5

(D) 2.3 to 4.5

22. Average life time (τ) and half life ($T_{½}$) of a radioactive substances are related as

(A) $\tau = 1.44\ T_{½}$

(B) $\tau = 0.5\ T_{½}$

(C) $\tau = 0.63\ T_{½}$

(D) $\tau = 2\ T_{½}$

23. The maximum contribution to world electricity generation from non-hydro renewable energy sources is from

(A) Wind

(B) Biomass

(C) Solar PV

(D) Geothermal

24. The maximum efficiency of a commercial solar photovoltaic cell attainable today is in the range

(A) 3 % to 10 %

(B) 12 % to 20 %

(C) 30 % to 40 %

(D) 40 % to 50 %

25. Which of the following does not lead to global warming ?

(A) Stratospheric ozone

(B) Tropospheric ozone

(C) Black carbon aerosols

(D) N_2O

26. The instrument used for determination of transparency of water is

(A) Spectrophotometer

(B) Ekman dredge

(C) Conductivity bridge

(D) Sechhi disc

27. Which of the following is an aerobic waste water treatment method ?

(A) Sludge digester

(B) Septic tank

(C) Percolating filter

(D) Imhoff tank

28. Nitrogen Oxides (NO_x) consist of

(A) $NO + NO_2$

(B) $NO + NO_2 + N_2O$

(C) $NO + NO_2 + N_2O_5$

(D) $NO + NO_2 + N_2O + N_2O_5$

29. For controlling emission of particulates from thermal power plants, the vertical wires placed in between the grounded collector plates in an electrostatic precipitator are biased typically to voltages of

(A) + (100 V to 500 V)

(B) + (20 kV to 100 kV)

(C) – (20 kV to 100 kV)

(D) – (100 V to 500 V)

30. Noise levels of 60 dB imply atmospheric pressure perturbations of root-mean-square value corresponding to

(A) 200 μPa

(B) 2000 μPa

(C) 20,000 μPa

(D) 200,000 μPa

31. ISO 14040 is related to

(A) Environmental audit

(B) Energy audit

(C) Cost benefit analysis

(D) Life cycle analysis

32. Definition of Impact Assessment was given by

(A) Kozlowski (1989)

(B) Graham Smith (1993)

(C) Heer and Hagerty (1977)

(D) Bartlett (1989)

33. **Assertion (A) :** Environmental and social impact assessment never overlap with each other.

Reason (R) : Environmental and social impact assessment are effectively opposite ends of the same spectrum.

(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. One of the best known matrix methods for environmental impact assessment is

(A) Leopold Matrix

(B) Sphere Matrix

(C) Saratoga Matrix

(D) Component Interaction Method

35. The method for systematically evaluating alternative development schemes and weighing relevant social cost with social benefits is known as

(A) Cost – benefit analysis

(B) Social cost – benefit analysis

(C) Social benefit – cost analysis

(D) Cost – effectiveness analysis

36. Gases emitted from municipal landfill sites include

(A) SO_2 and CH_4

(B) NH_4, CO, SO_2, CH_4

(C) NH_4, H_2S, CO

(D) CH_4, H_2S, CO_2, NH_4

37. The Air (Prevention and Control of Pollution) Act, 1981 was first amended in the year

(A) 1986 (B) 1987

(C) 1988 (D) 1990

38. Identify the correct sequence of materials in order of their heating values :

(A) Methane > fuel oil > coal > wood

(B) Fuel oil > coal > methane > wood

(C) Coal > wood > fuel oil > garbage

(D) Methane > coal > garbage > wood

39. Urban air quality is basically decided by

(A) CO, SPM, SO_2, NO_2, Surface ozone

(B) SPM, NO_2, SO_2

(C) SPM, NO_2, CO

(D) SPM, SO_2, Surface ozone

40. If N is the population size at any given instant t, r its growth rate in an environment having carrying capacity K, the environmental resistance to population growth is given by

(A) N/K

(B) $1 - \frac{N}{K}$

(C) $\frac{N}{K} e^{-tr}$

(D) $\frac{N}{K} e^{tr}$

41. Which of the following statistical attributes is used to test the null hypothesis in Regression Analysis ?

(A) Mean

(B) Standard deviation

(C) t-statistic

(D) R^2

42. A chimney of height 'h' is emitting plume of particles which follow Gaussian distribution. Assuming that the ground is a perfect reflector of particles, the maximum ground level concentration of particles varies with 'h' as

(A) αh

(B) αh^{-2}

(C) $\alpha\sqrt{h}$

(D) $\alpha h^{-3/2}$

43. The geometric mean of 5, 5 and 40 is

(A) 16.66

(B) 25

(C) 31.6

(D) 10

44. The Eigen values of the matrix $\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$ are

(A) 1, 1

(B) 0, 1

(C) 0, 2

(D) 1, –1

45. In a simple regression model $y = \alpha + \beta x + E$ (where the symbols have their usual meanings), the expectation value of <E> is assumed as

(A) 0

(B) $\bar{y}$

(C) $\frac{\sigma}{\sqrt{2}}$; where σ is standard deviation

(D) σ^2

46. In the Earth Summit at Rio de Janeiro, 1992, which of the following was not an agenda ?

(A) Ozone depletion

(B) Global warming

(C) CO_2 reduction targets

(D) Biodiversity conservation

47. **Assertion (A) :** Most of the corporate sector in India has become conscious of the ethical dimensions pertaining to its impact on environment.

Reason (R) : Indian people are increasingly becoming aware of the environmental issues.

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.

48. 'Slash and Burn' or milpa farming is often blamed for

(A) habitat destruction

(B) forest destruction

(C) hydrological imbalance

(D) mine destruction

49. **Assertion (A) :** Climate change is going to increase social tensions in India.

Reason (R) : The frequency and intensity of the extreme weather events will have serious consequences for food security.

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.

50. Snow blindness is caused due to

(A) Ultra-violet radiations

(B) Excessive flux of visible radiations

(C) Infra-red radiations

(D) Microwave radiations

Space For Rough Work