

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 5

PAPER - III

Time : 2½ hours]

ENVIRONMENTAL SCIENCE [Maximum Marks : 150

Number of Pages in this Booklet : 16

Number of Questions in this Booklet : 75

Instructions for the Candidates

- Write your roll number in the space provided on the top of this page.
- This paper consists of seventy five 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 Test Booklet Number should be entered on the OMR Sheet and the OMR Sheet Number should be entered on this Test Booklet.
- Each item has four alternative responses marked (1), (2), (3) and (4). You have to darken the circle as indicated below on the correct response against each item.
Example : ① ② ● ④ where (3) is the correct response.
- Your responses to the items are to be indicated in the **OMR Sheet given inside the Booklet only**. If you mark your response 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, such as change of response by scratching or using white fluid, you will render yourself liable to disqualification.
- You have to return the 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 original question booklet and 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 are no negative marks for incorrect answers.

परीक्षार्थियों के लिए निर्देश

- इस पृष्ठ के ऊपर नियत स्थान पर अपना रोल नम्बर लिखिए।
- इस प्रश्न पत्र में पचहत्तर 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 पुस्तिका 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 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।
 - इस जाँच के बाद प्रश्न पुस्तिका का नंबर OMR पत्रक पर अंकित करें और OMR पत्रक का नंबर इस प्रश्न पुस्तिका पर अंकित कर दें।
- प्रत्येक प्रश्न के लिए चार उत्तर विकल्प (1), (2), (3) तथा (4) दिये गये हैं। आपको सही उत्तर के वृत्त को पेन से भरकर काला करना है जैसा कि नीचे दिखाया गया है।
उदाहरण : ① ② ● ④ जबकि (3) सही उत्तर है।
- प्रश्नों के उत्तर केवल प्रश्न पुस्तिका 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 चिह्नित 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, जैसे कि अंकित किये गये उत्तर को मिटाना या सफेद स्याही से बदलना तो परीक्षा के लिये अयोग्य घोषित किये जा सकते हैं।
- आपको परीक्षा समाप्त होने पर 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 मूल प्रश्न पुस्तिका तथा 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 नकारात्मक अंक नहीं हैं।

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P.T.O.

ENVIRONMENTAL SCIENCE

PAPER - III

Note : This paper contains **seventy five (75)** objective type questions of **two (2)** marks each. **All** questions are **compulsory**.

- Which one of the following statements is not true in the case of point source Gaussian Plume Model ?
 - Wind speeds are constant in time.
 - Pollutants are conservative
 - Rate of emission of pollutants from the stack is constant
 - The ground level concentration is inversely proportional to effective stack height
- Consider the simple regression equation $Y = a + bX$ between the variables Y and X. If the standard deviation S_X and S_Y are 3 and 2 respectively and correlation coefficient $r = 0.75$, the estimate of b is :
 - 0.25
 - 0.5
 - 1.125
 - 1.5
- Consider two normal populations with variances of 10 and 20, respectively. If two independent random samples drawn from the two populations are of the sizes 30 and 24 and their variances 10 and 15 respectively, the value of static $F_{(29,23)}$ is :
 - 1.33
 - 2.50
 - 1.56
 - 3.0
- A normal population has $\sigma^2 = 6$. The sum of squares of deviations of 15 sample values from their mean being 120, what is the χ^2 (chi-square) value ?
 - 9
 - 48
 - 20
 - 1.33
- Choose the correct sequence of phases associated with a population growth that exhibits logistic model represented by $\frac{dN}{dt} = rN \left(1 - \frac{N}{k} \right)$.
 - Stationary phase \rightarrow Exponential phase \rightarrow Lag phase
 - Lag phase \rightarrow Stationary phase \rightarrow Exponential phase
 - Lag phase \rightarrow Exponential phase \rightarrow Stationary phase
 - Exponential phase \rightarrow Stationary phase \rightarrow Lag phase



6. The toxic substances of special concern emitted during incineration process from waste to energy plants are :

- (a) Carbon monoxide (b) Carbon dioxide
(c) Dioxins (d) Furans

Choose the **correct** answer :

- (1) (a) and (b) only
(2) (b) and (c) only
(3) (a) and (d) only
(4) (c) and (d) only

7. Sanitary land fills have following properties. They :

- (a) reduce trash volume in a short time
(b) release CH_4 and CO_2
(c) eventually produce leachate which contaminate ground water

Choose the **correct** answer :

- (1) (a) and (b) only
(2) (b) only
(3) (a) and (c) only
(4) (a), (b) and (c)

8. For providing information related to environment to decision makers, policy makers, scientists and environmental engineers all over the country, ENVIS was established in the year belonging to :

- (1) Sixties (2) Seventies (3) Eighties (4) Nineties

9. The total radiative forcing of all major and minor green-house gases in the year 2014 is estimated to be :

- (1) $\sim 2.51 \text{ W/m}^2$ (2) $\sim 2.93 \text{ W/m}^2$ (3) $\sim 1.87 \text{ W/m}^2$ (4) $\sim 2.7 \text{ W/m}^2$

10. For the range of temperatures observed in the earth's atmosphere, the saturation mixing ratio (W_s) and the total pressure are related as :

- (1) $W_s \propto \frac{1}{p}$ (2) $W_s \propto p$ (3) $W_s \propto p^{3/2}$ (4) $W_s \propto p^{-3/2}$



11. A thermal power plant based on coal produces 100 MW of electrical power with conversion efficiency of 30%. If the ash content of coal is 5% and net heating value is 30 MJ per kg, how much ash is produced daily ?
- (1) 48 metric tons (2) 24 metric tons (3) 90 metric tons (4) 60 metric tons
12. Under which section of Wildlife (Protection) Act 1972, the state government can declare an area closed to hunting for a specified period ?
- (1) Section 35 (2) Section 27 (3) Section 38 - A (4) Section 37
13. Which one of the following criteria should **not** contribute to the process of establishing significance of the impact of a developmental project on environment ?
- (1) Sensitivity of surrounding environment
(2) Probability of the impact occurring
(3) Views and values of the developer
(4) Views and suggestions of the public
14. The following benefits may accrue as a result of environmental audit :
- (a) Material audit leads to improvement in the production efficiency and cost
(b) Pollution monitoring leads to environmental quality improvement
(c) Approach towards zero discharge and zero emission leads to clean development
(d) Incentive for pollution abatement in the form of reduction in import tax leads to cleaner environment
- Choose the **correct** answer :
- (1) (a) only
(2) (b) and (c) only
(3) (b) and (d) only
(4) (a), (b), (c) and (d)
15. Environmental Impact Assessment (EIA) was incorporated under which one of the following legislations ?
- (1) Air (Prevention and Control of Pollution) Act 1981
(2) Wildlife (Protection) Act, 1981
(3) Indian Forest Act, 1927
(4) Environmental (Protection) Act 1986



16. A company operating a vehicle Manufacturing plant has developed Environmental Management System (EMS) to enhance its performance and to improve quality of its products. The key aspects of this EMS would include :
- (1) Audit of manufacturing plant safety procedure
 - (2) Maximizing returns to stakeholders of the company
 - (3) The development of an overall framework for environmental affairs of the company
 - (4) The aspects of costs involved in developing an environmental policy.

17. Best practice in scoping requires :
- (a) A site visit
 - (b) Relevant experience of other similar developmental projects
 - (c) Employing formal scoping techniques

Choose the **correct** answer :

- (1) (a) only
- (2) (a) and (b) only
- (3) (b) and (c) only
- (4) (a), (b) and (c)

18. Match the **List - I** and **List - II**. Identify the **correct** answer from the codes given below :

List - I

(Stages in EIA)

- (a) Screening
- (b) Scoping
- (c) Baseline description
- (d) Mitigation measures

List - II

(Actions in EIA)

- (i) Reduce or avoid the impacts
- (ii) Establish present and future stages of environment
- (iii) Early indication of crucial impacts
- (iv) Narrowing the application of EIA

Codes :

- | | (a) | (b) | (c) | (d) |
|-----|-------|-------|-------|-------|
| (1) | (iv) | (iii) | (ii) | (i) |
| (2) | (i) | (iv) | (iii) | (ii) |
| (3) | (ii) | (i) | (iv) | (iii) |
| (4) | (iii) | (ii) | (i) | (iv) |

19. The decision making process in EIA generally **does not** include :
- (1) Cost - benefit analysis
 - (2) Procedural information
 - (3) Socio - economic aspects
 - (4) Operational management

20. Which of the following actions may be recommended for acidified lakes ?
- (1) Ammoniation
 - (2) Liming
 - (3) Ozonation
 - (4) Chlorination



21. Given below are two statements. One labelled as **Assertion (A)** and the other labelled as **Reason (R)** :
- Assertion (A)** : All types of aerosols contribute to radiative forcing.
Reason (R) : Aerosol effectively absorb electromagnetic radiations.
- Choose the **correct** answer :
- (1) Both **(A)** and **(R)** are correct and **(R)** is the correct explanation of **(A)**.
 - (2) Both **(A)** and **(R)** are correct and **(R)** is not the correct explanation of **(A)**.
 - (3) **(A)** is true, but **(R)** is false.
 - (4) **(A)** is false, but **(R)** is true.
22. Given below are two statements. One labelled as **Assertion (A)** and the other labelled as **Reason (R)** :
- Assertion (A)** : The efficiency of fuel cells is not limited by the second law of thermodynamics.
Reason (R) : There is no intermediate heat to work conversion in a fuel cell.
- Choose the **correct** answer :
- (1) Both **(A)** and **(R)** are correct and **(R)** is the correct explanation of **(A)**.
 - (2) Both **(A)** and **(R)** are correct and **(R)** is not the correct explanation of **(A)**.
 - (3) **(A)** is true, but **(R)** is false.
 - (4) **(A)** is false, but **(R)** is true.
23. Given below are two statements. One labelled as **Assertion (A)** and the other labelled as **Reason (R)** :
- Assertion (A)** : A wind rose with approximately equal length spokes (or petals) represents great variation of wind direction over a given duration.
Reason (R) : The length of the spokes is a measure of wind speeds in a given duration.
- Choose the **correct** answer :
- (1) Both **(A)** and **(R)** are correct and **(R)** is the correct explanation of **(A)**.
 - (2) Both **(A)** and **(R)** are correct and **(R)** is not the correct explanation of **(A)**.
 - (3) **(A)** is true, but **(R)** is false.
 - (4) **(A)** is false, but **(R)** is true.
24. Given below are two statements. One labelled as **Assertion (A)** and the other labelled as **Reason (R)** :
- Assertion (A)** : Large scale OTEC development may exacerbate the green-house effect.
Reason (R) : Methane is a green-house gas.
- Choose the **correct** answer :
- (1) Both **(A)** and **(R)** are correct and **(R)** is the correct explanation of **(A)**.
 - (2) Both **(A)** and **(R)** are correct and **(R)** is not the correct explanation of **(A)**.
 - (3) **(A)** is true, but **(R)** is false.
 - (4) **(A)** is false, but **(R)** is true.



25. In a spectrophotometric cell of 2.0 cm pathlength, the solution of a substance shows the absorbance value of 1.0. If the molar absorptivity of the compound is $2 \times 10^4 \text{ L mol}^{-1} \text{ cm}^{-1}$, calculate the concentration of the substance in solution. What is the concentration of the substance in that solution ?
- (1) $2.5 \times 10^{-5} \text{ mol L}^{-1}$ (2) $4.0 \times 10^{-4} \text{ mol L}^{-1}$
 (3) $1.0 \times 10^4 \text{ mol L}^{-1}$ (4) $5.0 \times 10^{-4} \text{ mol L}^{-1}$
26. In order to obtain useful fusion energy from a thermonuclear fusion reactor, if the confinement time of the D+T Plasma ions is 1 μ sec, the ion density (per m^3) must be :
- (1) $\geq 10^{26} \text{ m}^{-3}$ (2) $\geq 10^{23} \text{ m}^{-3}$ (3) $\geq 10^{20} \text{ m}^{-3}$ (4) $\geq 10^{14} \text{ m}^{-3}$
27. Which of the following is **not** a detrivore ?
- (1) Vultures (2) Earthworms (3) Insects (4) *Hydrilla*
28. Secondary succession begins at :
- (1) base rock (2) newly cooled lava
 (3) burnt forest (4) newly created shallow pond
29. Given below are two statements. One labelled as **Assertion (A)** and the other labelled as **Reason (R)** :
- Assertion (A)** : It is generally agreed that life on earth began between 3.5 and 4.5 billion years ago.
- Reason (R)** : The first form of life was the anaerobic bacteria as environment was devoid of oxygen.
- Choose the **correct** answer :
- (1) Both **(A)** and **(R)** are correct and **(R)** is the correct explanation of **(A)**.
 (2) Both **(A)** and **(R)** are correct and **(R)** is not the correct explanation of **(A)**.
 (3) **(A)** is true, but **(R)** is false.
 (4) **(A)** is false, but **(R)** is true.
30. The total number of Sustainable Development Goals (SDGs) announced by UN in 2015 are :
- (1) 15 (2) 17 (3) 19 (4) 21
31. The total area of productive ecosystem required to support the population sustainably is known as :
- (1) Ecological footprint (2) Ecological handprint
 (3) Carrying capacity (4) Ecological services



32. Carrying capacity of a population determines that a particular habitat for a given species can sustain :
- (1) Minimum Population (2) Maximum Population
(3) Average Population (4) A Fraction of Migrating Population
33. Which one of the following is the most productive ecosystem ?
- (1) Lakes and Streams (2) Estuaries
(3) Continental shelf (4) Open ocean
34. A measure that combines the number of species and their relative abundances compared with one another is termed :
- (1) Species richness (2) Species evenness
(3) Species diversity (4) Species relationships
35. The figures of humanity's global footprint (million hectares) for different countries estimated by WWF and Global Footprint Network in 2008 fall in the sequence :
- (1) US > China > European Union > Japan > India
(2) China > US > Japan > India > European Union
(3) European Union > US > China > Japan > India
(4) US > European Union > China > India > Japan
36. A common features of the synoptic and mesoscale motions in the atmosphere is that their :
- (1) Vertical motion component is more in magnitude than the horizontal wind component.
(2) Vertical motion component is roughly comparable to horizontal wind component.
(3) Vertical motion component is an order of magnitude smaller than the horizontal wind component.
(4) Properties can be studied by conventional synoptic networks.
37. The shape of a plume from a tall stack located on a flat terrain is found to be of "fanning" type. It implies that the atmosphere is under the condition of :
- (1) Strong lapse rate (2) Weak lapse rate
(3) Inversion (4) Weak lapse rate below inversion



38. Given below are two statements. One labelled as **Assertion (A)** and the other labelled as **Reason (R)** :

Assertion (A) : Thunderstorm is a violent convective event accompanied by thunder and lightening.

Reason (R) : Thunderstorm is not associated with vertical air movement, humidity and instability.

Choose the **correct** answer :

- (1) Both **(A)** and **(R)** are correct and **(R)** is the correct explanation of **(A)**.
- (2) Both **(A)** and **(R)** are correct and **(R)** is not the correct explanation of **(A)**.
- (3) **(A)** is true, but **(R)** is false.
- (4) **(A)** is false, but **(R)** is true.

39. According to National Ambient Air Quality Standards in India, the permissible 24 hour average concentration of lead in ambient air of an industrial area is :

- (1) $1.0 \mu\text{g}/\text{m}^3$
- (2) $2.0 \mu\text{g}/\text{m}^3$
- (3) $3.03 \mu\text{g}/\text{m}^3$
- (4) $4.0 \mu\text{g}/\text{m}^3$

40. Peat soils, which have undergone prolonged drought in the forests are prone for :

- (a) ground forest fire
- (b) underground forest fire
- (c) tree crown fire

Choose the **correct** code :

- (1) (a) only
- (2) (b) only
- (3) (a) and (b) only
- (4) (a), (b) and (c)

41. Insect pests can be controlled by the use of :

- (a) Insecticide
- (b) Pheromones
- (c) Juvenile Hormones
- (d) Nitrophosphate

Choose the **correct** answer :

- (1) (a) only
- (2) (a) and (b) only
- (3) (a), (b) and (c) only
- (4) (a), (b), (c) and (d)

42. Dioxins and Furans are two toxic gaseous pollutants which can be measured by :

- (1) GC - MS
- (2) TLC
- (3) ICP - AES
- (4) AAS

43. Based on the pE value for four water samples given below, the concentration of dissolved oxygen shall be highest in :

- (1) pE = -4.1
- (2) pE = 13.9
- (3) pE = 1.0
- (4) pE = 7.0



44. A total of 10 instantaneous sound pressure level measurements at 10 sec intervals for a traffic site are given in the table below :

S. No.	1	2	3	4	5	6	7	8	9	10
SPL (dB)	71	75	70	78	80	84	76	74	75	74

The estimated L_{90} from these measurement is :

- (1) ~ 71 dB (2) ~ 70 dB (3) ~ 74 dB (4) ~ 75 dB

45. The composition of rhizospheric micro organisms are dependent on the soil :

- (a) Texture (b) Organic matter (c) pH (d) Elasticity

Choose the **correct** answer :

- (1) (a) only (2) (a) and (b) only
(3) (a), (b) and (c) only (4) (a), (b), (c) and (d)

46. Given below are two statements. One labelled as **Assertion (A)** and the other labelled as **Reason (R)** :

Assertion (A) : The fundamental goal of a dose - response assessment is to obtain a mathematical relationship between the amount of a toxicant that a human is exposed to and the risk that there will be.

Reason (R) : To apply dose - response data obtained from animal bioassay to humans, a scaling factor must be introduced.

Choose the **correct** answer :

- (1) Both **(A)** and **(R)** are correct and **(R)** is the correct explanation of **(A)**.
(2) Both **(A)** and **(R)** are correct and **(R)** is not the correct explanation of **(A)**.
(3) **(A)** is true, but **(R)** is false.
(4) **(A)** is false, but **(R)** is true.

47. Tropical grasslands with scattered trees are also known as :

- (1) Taigas (2) Steppe (3) Savannas (4) Meadows

48. On 18th April 2015, Global Alliance to Eliminate Lead Paint (GAELP) announced the goal of eliminating lead paint around the world by :

- (1) 2020 (2) 2025 (3) 2028 (4) 2022



49. The form of coal/fuel in the ascending order of heating value can be best represented as :
- (1) Lignite < Peat < Bituminous < Anthracite
 - (2) Bituminous < Lignite < Peat < Anthracite
 - (3) Peat < Lignite < Bituminous < Anthracite
 - (4) Peat < Lignite < Anthracite < Bituminous
50. In India wetland conservation is presently done by the Ministry of Environment, Forest and Climate Change under :
- (1) National Wetland Conservation Programme
 - (2) National Plan for Conservation of Aquatic Ecosystems
 - (3) National Lake Conservation Programme
 - (4) Coastal Regulation Zone
51. Soil salination is **not** caused by :
- (1) Agricultural area with high ground water irrigation
 - (2) Coastal swampy area
 - (3) Flood prone area
 - (4) Upland lateritic area with waste water irrigation
52. Ground water occurs under :
- (a) Unconfined condition in shallow aquifers
 - (b) Semi Confined aquifers
 - (c) Confined aquifers
- Choose the **correct** answer :
- (1) (a) only
 - (2) (a) and (b) only
 - (3) (b) and (c) only
 - (4) (a), (b) and (c)
53. DEM (Digital Elevation Model) is best represented using :
- (1) Vector Data Models
 - (2) Raster Data Models
 - (3) Coverage Data Structure
 - (4) Non - Topological Data Structure
54. Delta are classified into six basic types taking cognisance and importance of :
- (a) Rivers
 - (b) Waves
 - (c) Tides
- Choose the **correct** answer :
- (1) (a) only
 - (2) (a) and (b) only
 - (3) (a) and (c) only
 - (4) (a), (b) and (c)



55. Large elongated depression with steep walls formed by the downward displacement of a block of the earth surface between nearly parallel faults or fault system :
- (1) Thrust faults (2) Horst (3) Grabben (4) Rift Valley
56. Which form of scattering in visible region in the atmosphere is not dependent on wavelength ?
- (a) Rayleigh (b) Mie (c) Non-Selective
- Choose the **correct** answer :
- (1) (a) only (2) (a) and (b) only (3) (c) only (4) (b) and (c) only
57. Best spatial configuration for designing a core natural area is :
- (1) Circular (2) Rectangular (3) Square (4) Triangle
58. Ecosystem resilience is the capacity of an ecosystem to sustain its :
- (a) Fundamental function
 (b) Structure
 (c) Feedbacks in the face of a spectrum of shock and perturbations
- Choose the **correct** answer :
- (1) (a) and (b) only (2) (b) and (c) only (3) (a) and (c) only (4) (a), (b) and (c)
59. With regard to ozone depletion over Antarctica, select the false statement :
- (1) Circumpolar vortex acts as a reaction chamber
 (2) Polar Stratospheric Clouds (PSCs) are formed within the vortex
 (3) There is very low temperature inside the vortex
 (4) The heterogenous reaction
 $\text{ClONO}_2(\text{s}) + \text{HCl}(\text{g}) \rightarrow \text{Cl}_2(\text{g}) + \text{HNO}_3(\text{s})$ takes over PSCs

60. Match the **Lists - I** and **- II**. Choose the **correct** answer from the codes given below :

List - I

(Horizon)

- (a) A - horizon
 (b) O - horizon
 (c) C - horizon
 (d) B - horizon

List - II

(Type/Characteristics)

- (i) Subsoil
 (ii) Leaf litter
 (iii) Parent material
 (iv) Top soil

Codes :

- | | (a) | (b) | (c) | (d) |
|-----|------------|------------|------------|------------|
| (1) | (iv) | (ii) | (iii) | (i) |
| (2) | (i) | (iii) | (iv) | (ii) |
| (3) | (ii) | (iv) | (i) | (iii) |
| (4) | (iii) | (i) | (ii) | (iv) |



61. A laboratory analysis of a waste water sample indicated BOD of 750 mg L^{-1} with rate constant (K) 0.20 day^{-1} at 20°C . The 5-day BOD at 20°C is :

- (1) 675 mg L^{-1} (2) 650 mg L^{-1} (3) 400 mg L^{-1} (4) 600 mg L^{-1}

62. A stream with a flow of $0.2 \text{ m}^3/\text{sec}$ and a chloride concentration of 50 mg/L receives a discharge of mine drainage water with a flow of $0.05 \text{ m}^3/\text{sec}$ and chloride concentration of 1500 mg/L . The downstream concentration of chloride is :

- (1) 150 mg/L (2) 200 mg/L (3) 340 mg/L (4) 380 mg/L

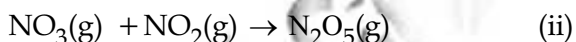
63. Four students (**List A**) working independently in a chromatographic analysis (**List B**) reported the Retention Factor (R_f) values :

List - A		List - B	
(Students)		$(R_f \text{ Values})$	
(a) R	→	(i) 0	
(b) S	→	(ii) 0.5	
(c) T	→	(iii) 1.3	
(d) U	→	(iv) 1.0	

The result of which student(s) is (are) definitely **incorrect** :

- (1) R and U (2) S and T (3) S, T and U (4) T

64. The mechanism of the formation of gaseous N_2O_5 from NO_2 and O_2 gases in the gas phase within clouds is :



The experimentally determined rate law is

$$-d [\text{NO}_2(\text{g})] / dt$$

$$= K [\text{NO}_2(\text{g})] [\text{O}_3(\text{g})]$$

Based on the information provided which of the following statement is **incorrect** ?

- (1) Overall reaction is : $2\text{NO}(\text{g}) + \text{O}_3(\text{g}) \rightarrow \text{N}_2\text{O}_5(\text{g}) + \text{O}_2(\text{g})$
 (2) The reaction intermediate is NO_3
 (3) The rate determining step is reaction (i)
 (4) The rate reaction (ii) is slower than the rate of reaction (i)



65. In a rain water sample of pH=8.45, the dominant species of dissolved sulphur dioxide shall be :
- (1) $\text{SO}_2 \cdot \text{H}_2\text{O}$ (2) HSO_3^- (3) SO_3^{2-} (4) $\text{S}_2\text{O}_5^{2-}$
66. An aquifer of sand has a saturated column of cross - sectional area 0.2×5 m and a depth of 3 m. If the specific yield of sand is 25% , how much water can be extracted from the aquifer ?
- (1) 0.5 m^3 (2) 0.75 m^3 (3) 1.2 m^3 (4) 1.5 m^3
67. Atmospheric life times of CFCs is typically in the range :
- (1) 50 - 102 years (2) 140 - 200 years (3) 200 - 400 years (4) 152 - 210 years
68. With respect to CO_2 , Global Warming Potential (GWP) for N_2O over a time horizon of 100 years is estimated to be :
- (1) 156 (2) 210 (3) 296 (4) 240
69. The green-house gas N_2O strongly absorbs infra-red radiations of wavelength(s) :
- (1) $\sim 4.5 \mu\text{m}$ (2) $\sim 7.8 \mu\text{m}$ and $8.6 \mu\text{m}$
 (3) $\sim 9.6 \mu\text{m}$ (4) $\sim 10.6 \mu\text{m}$
70. By the year 2022, Indian government has set a new target of Solar Power generation of :
- (1) 4 GW (2) 60 GW (3) 75 GW (4) 100 GW
71. Match the Lists - I and - II. Identify the **correct** answer from the codes given below the lists.

List - I

(Causes)

- (a) Soil organisms
 (b) Phosphorous assimilation
 (c) Water pollution
 (d) Air pollution

List - II

(Effects)

- (i) Algal bloom
 (ii) Chronic obstructive pulmonary diseases
 (iii) Decomposition
 (iv) Complexing agent

Codes :

- | | (a) | (b) | (c) | (d) |
|-----|-------|-------|-------|-------|
| (1) | (i) | (ii) | (iii) | (iv) |
| (2) | (iii) | (iv) | (i) | (ii) |
| (3) | (ii) | (iii) | (iv) | (i) |
| (4) | (iv) | (ii) | (i) | (iii) |



72. The Wavelengths that are most important in the context of stratospheric ozone depletion are :

- (1) 280 - 320 nm (2) 400 - 700 nm (3) 700 - 900 nm (4) > 900 nm

73. Remote sensing satellites such as RESOURCESAT are usually placed in polar :

- (a) Low Earth Polar orbit
(b) Sunynchronous orbit
(c) Geosynchronous orbit

Codes :

- (1) (b) and (c) only (2) (a) and (b) only (3) (a) and (c) only (4) (a), (b) and (c)

74. Gills of marine fishes perform the functions of the following :

- (1) Water loss and salt excretion (2) Water gain and salt excretion
(3) Water uptake and solute uptake (4) Water loss and solute uptake

75. The instrument used for determination of soil water loss by percolation, evapotranspiration and run off is called :

- (1) Lysimeter (2) Rain Gauze
(3) Soil moisture meter (4) Soil porosity meter

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Space For Rough Work

