Instructions for the Candidates

1. Write your roll number in the space provided on the top of this page.
2. Answer to short answer/essay type questions are to be given in the space provided below each question or after the questions in the Test Booklet itself.
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.
4. Read instructions given inside carefully.
5. One page is attached for Rough Work at the end of the booklet before the Evaluation Sheet.
6. If you write your name 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, you will render yourself liable to disqualification.
7. You have to return the test booklet to the invigilators at the end of the examination compulsorily and must not carry it with you outside the Examination Hall.
8. Use only Blue/Black Ball point pen.
9. Use of any calculator or log table etc., is prohibited.

J-8910

Test Booklet No.

PAPER-III

ENVIROMENTAL SCIENCES

Number of Pages in this Booklet : 24

Number of Questions in this Booklet : 26

Instructions for the Candidates

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Roll No. ______________________________ (In figures as per admission card)

Roll No. ______________________________ (In words)

P.T.O.
ENVIRONMENTAL SCIENCE
PAPER – III

Note: This paper is of two hundred (200) marks containing four (4) sections. Candidates are required to attempt the questions contained in these sections according to the detailed instructions given therein.
SECTION – I

Note: This section consists of two essay type questions of twenty (20) marks each, to be answered in about five hundred (500) words each. (2 × 20 = 40 marks)

1. How do you differentiate in vitro and in vivo conservation of biodiversity? Explain the main steps involved in cryopreservation of a particular genome through micropropagation.

   OR

   Compare & contrast the availability of ground water in hard rocks & in sedimentary rock region with suitable example from India.

   OR

   Explain the techniques of nuclear power generation. Add a note on various methods of radioactive waste disposal.

   OR

   Estimation of iron (5-10 ppm) from a waste water sample can be achieved by any of the following techniques.
   • volumetric titration with external indicator.
   • volumetric titration involving potentiometry.
   • spectro photometry.
   • atomic absorption spectrometry.
   Identify the most suitable techniques keeping in mind the selectivity and sensitivity of the technique. Justify your answer.

OR

Principal component analysis is used for certain types of environmental statistical interpretation. Explain PCA, the eigen values & factors that is part of data calculations. Explain these values with suitable examples.

OR

Define wildlife. Name five wildlife sanctuaries of India. What major steps can be adopted to save mangrove ecosystem of the country?

OR

Describe methods enumerating the reasons in site selection and the parameters adopted in assessing the water quality.
SECTION – II

Note: This section contains three (3) questions of fifteen marks each to be answered in about three hundred (300) words.  

(3 × 15 = 45 marks)

4. Discuss scope & content of EIA of any river valley project.
5. Discuss linkages between ‘Green-House effect’, ‘Ozone depletion’ and ‘Global Climate Change’.
SECTION – III

Note: This section contains nine (9) questions of ten (10) marks, each to be answered in about fifty (50) words. (9 × 10 = 90 marks)

6. The ionization constant of water, kW at 37 °C is $2.42 \times 10^{-14}$ mole$^2$ litre$^{-2}$. Calculate the pH for a neutral solution at the normal temperature of the human body.

7. In a pond ecosystem, the pyramid of number and energy are upright whereas that of biomass is inverted. Explain it.
8. Describe the principle of photovoltaic cell. Add a note on various types of photovoltaic cells.

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9. Describe the effects of particulate matters of various sizes in our atmosphere on plants and human health.

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10. Differentiate clay and clay minerals. What are their major properties that are important to environment?

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11. Radioactive decay equation is similar to some aspects of Lodka-Volterra equation. Examine the comparison and explain your observation.

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12. Describe the principle of electrophoresis. Why does SDS-PAGE used to identify the effects of any hazardous chemical?

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13. Explain the concept of ‘Gondwana Pond’ and discuss the economic importance.

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14. Describe in brief methods used in reducing desertification.

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SECTION – IV

Note: This section contains five (5) questions of five (5) marks each based on the following passage. Each question should be answered in about thirty (30) words.

(5 × 5 = 25 marks)

Rapid developmental activities over the last few decades and the consequent increase in urbanization in our country has led to an ever growing problem of disposal of waste of all types. The waste generated are commonly classified based on characteristics in terms of its impacts on the environment. The hazardous waste (HW) such as chemical and the specific biological one is of great concern due to its toxicity even at low levels and some are greatly infectious. The disposal of these HW requires very specialized methods. These HW may be gaseous, liquid and solids, which may be reactive, toxic, flammable, corrosive, radio-active and particularly of biological origin may be infectious. All such wastes are directly or indirectly involved in health and environmental hazards.

In order to tackle the problem of hazardous waste, authorities have identified types of industries generating HW. These industries store and transport as per the guidelines and unload at the specific designated disposal sites. There are also well defined criteria for selection and preparation of the disposal sites. The Government of India has issued management and handling rules for such chemical and bio-chemical waste. There are various categories of HW and the steps involved in its management. The steps involved in this process also include the EIA in the selection and preparation of disposal sites.
15. Define hazardous waste. Describe various types of hazardous waste.

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16. Explain colour coding for segregation of biomedical waste.

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17. What are the steps involved in management of chemical hazardous waste?

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18. Describe rules & regulations in safe disposal of hazardous waste.
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19. List the categories of industries based on generation of hazardous waste.
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