Signature and Name of Invigilator

1. (Signature) _____

   (Name) _____

2. (Signature) _____

   (Name) _____

Roll No. | | | | | | | | |

(In figures as per admission card)

Roll No. _____

(In words)

Test Booklet No.

J—8906

PAPER—III

ENVIRONMENTAL SCIENCE

Time : 2½ hours] **[Maximum Marks : 200**

Number of Pages in this Booklet : **32** Number of Questions in this Booklet : **26**

Instructions for the Candidates

1. Write your roll number in the space provided on the top of this page.
2. Answers 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.

   No Additional Sheets are to be used.
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 Test 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.**
10. **There is NO negative marking.**

परीक्षार्थियों के लिए निर्देश

1. पहले पृष्ठ के ऊपर नियत स्थान पर अपना रोल नम्बर लिखिए।
2. लघु प्रश्न तथा निबंध प्रकार के प्रश्नों के उत्तर, प्रत्येक प्रश्न के नीचे या प्रश्नों के बाद में दिये हुये रिक्त स्थान पर ही लिखिये।

   इसके लिए कोई अतिरिक्त कागज का उपयोग नहीं करना है।
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 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 ले। 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।**
4. अन्दर दिये गये निर्देशों को ध्यानपूर्वक पढ़ें।
5. उत्तर-पुस्तिका के अन्त में कच्चा काम (Rough Work) करने के लिए मूल्यांकन शीट से पहले एक पृष्ठ दिया हुआ है।
6. 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।
7. आपको परीक्षा समाप्त होने पर उत्तर-पुस्तिका निरीक्षक महोदय को लौटाना आवश्यक है और इसे परीक्षा समाप्ति के बाद अपने साथ परीक्षा भवन से बाहर न लेकर जायें।
8. **केवल नीले / काले बाल प्वाईंट पैन का ही इस्तेमाल करें।**
9. **किसी भी प्रकार का संगणक (कैलकुलेटर) या लाग टेबल आदि का प्रयोग वर्जित है।**
10. **गलत उत्तर के लिए अंक नहीं काटे जायेंगे।**

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 contains five (5) questions based on the following paragraph. Each question should be answered in about thirty (30) words and each carries five (5) marks.

(5x5=25 marks)

Read the passage below, and answer the questions that follow based on your understanding of the passage :

Coral reefs are highly complex and diverse ecosystems that develop in the warm, shallow and nutrient - poor waters typical of many tropical and subtropical oceans. They are highly productive systems and are often likened to rainforests in terms of both diversity and productivity. This very high biodiversity reflects the large variety of available microhabitats and niches within the complex physical structure of a reef. It has been estimated that at least a third of all marine fish are associated with coral reefs. Many reef dwellers are primary producers, either marine plants or symbiotic algae (*zooxanthellae*) living within or between the cells of the corals themselves.

Coral reefs grow slowly and are easily disrupted, thriving only in clear, warm (always above 18°C), nutrient - poor water with a constant high salinity. They comprise a calcareous framework made up mainly of the interlocked and encrusted exoskeletons of reef - building corals, calcareous red algae and other associated organisms. They occur in a variety of broadly distinct forms, namely fringing reefs, barrier reefs and atolls. Fringing reefs are continuous with the shoreline of the associated landmass although a shallow and narrow channel may develop behind the reef. A barrier reef lies some distance offshore from its associated landmass, separated from it by a lagoon generally more than 10 m in depth. An atoll is an offshore reef formation, roughly circular in shape and surrounding a central lagoon, but no exposed landmass is associated with it. The sustained existence of flourishing and productive coral reefs in nutrient - poor oceanic waters appears at first to be paradoxical. However, the symbiotic corals have developed highly effective internal mechanisms for the recycling of nutrients within the system and so require little external nutrient supply. However, despite their high diversity and apparent stability, they are very susceptible to disturbance and they

are being destroyed or damaged in many parts of the world. This is largely a consequence of human activity although these are also natural problems such as hurricanes, predation by crown - of - thorns starfish (*Acanthaster spp.*) and ocean warming (which can produce bleaching). Many of the greatest threats come from the fact that socio - economic forces often encourage the immediate exploitation of reef resources, particularly in developing countries. Another major problem is the increase in sediments and nutrients in the water as a result of urbanisation, deforestation, agriculture and poor land management. Sediment smothers the reef and blocks out the vital sunlight, while the increase in nutrients leads to colonisation of the reef by macroalgae and again it becomes smothered by this new growth.

Some 300 coral reefs in 65 countries are protected as reserves or marine parks but protecting, managing and restoring reefs is very difficult and expensive. Ten percent of the world's reef area is estimated to have been degraded beyond recovery already and about another 30 per cent is under severe threat. These are very imperfectly understood ecosystems so prediction and management are particularly difficult.

Answer the following questions :

1. Why management of coral reefs is difficult ?

2. Why coral reefs are considered complex ecosystems ?

3. How do corals obtain their nutrients for their survival ?

4. What are the major types of coral reefs ?

5. Why coral reefs are considered as endangered species ?

SECTION - II

Note : This section contains fifteen (15) questions each to be answered in about thirty (30) words. Each question carries five (5) marks.

(5x15=75 marks)

Define the following :

6. Diagenesis

7. Braided river

8. Ecological niche

9. Turbidity

10. Secondary succession

11. Speciation

12. Photochemical smog

13. Sanctuary

14. Wetland

15. Incineration

16. Respirable Suspended Particulate Matter (RSPM)

17. Relative humidity in terms of mixing ratios

18. Infrared radiation

19. Wind rose

20. t - statistic

SECTION - III

Note : This section contains five (5) questions. Each question carries twelve (12) marks and is to be answered in about two hundred (200) words.

(12x5=60 marks)

21. Give geochemical classification of elements.

22. Explain the radiation budget of the earth - atmospheric system.

23. Discuss the application of recombinant DNA in environmental biology.

24. Describe microbial method to screen a mutagen present in effluents.

25. Enumerate the salient features of Gaussian Plume model for prediction of pollutant concentration.

SECTION - IV

Note : This section consists of one essay type question of forty (40) marks to be answered in about one thousand (1000) words on any of the following topics.

(40x1=40 marks)

26. Write an essay on any one of the following :

Sumatra earthquake of 26th December 2004 and the resultant Tsunami in the Indian Ocean.

OR

Solid waste management in metropolitan cities.

OR

Soil types of India.

OR

Role of biotechnology in environmental management.

OR

Merits and demerits of proposed river linking project in India.

OR

Conservation of biodiversity.

OR

Climate change - reality or myth.

OR

Population growth and sustainable development in India.

FOR OFFICE USE ONLY							
Marks Obtained							
Question Number	Marks Obtained	Question Number	Marks Obtained	Question Number	Marks Obtained	Question Number	Marks Obtained
1		26		51		76	
2		27		52		77	
3		28		53		78	
4		29		54		79	
5		30		55		80	
6		31		56		81	
7		32		57		82	
8		33		58		83	
9		34		59		84	
10		35		60		85	
11		36		61		86	
12		37		62		87	
13		38		63		88	
14		39		64		89	
15		40		65		90	
16		41		66		91	
17		42		67		92	
18		43		68		93	
19		44		69		94	
20		45		70		95	
21		46		71		96	
22		47		72		97	
23		48		73		98	
24		49		74		99	
25		50		75		100	

Total Marks Obtained (in words) .....

(in figures) .....

Signature & Name of the Coordinator .....

(Evaluation) Date .....