Test Booklet Code & Serial No.
प्रश्नपत्रिका कोड व क्रमांक

A

Paper-III
ENVIRONMENTAL SCIENCE

Signature and Name of Invigilator

1. (Signature) .....

(Name) .....

2. (Signature) .....

(Name) .....

Seat No. | | | | | | |

(In figures as in Admit Card)

Seat No. .....

(In words)

OMR Sheet No. | | | | | | |

(To be filled by the Candidate)

APR - 31317

Time Allowed : 2½ Hours] **[Maximum Marks : 150**

Number of Pages in this Booklet : **20** Number of Questions in this Booklet : **75**

Instructions for the Candidates

1. Write your Seat No. and OMR Sheet No. in the space provided on the top of this page.
2. This paper consists of **75** objective type questions. Each question will carry *two* marks. *All* questions of Paper-III will be compulsory, covering entire syllabus (including all electives, without options).
3. At the commencement of examination, the question booklet will be given to the student. In the first 5 minutes, you are requested to open the booklet and compulsorily examine it as follows :
   (*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 or 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 missing pages/questions or questions repeated or not in serial order or any other discrepancy should not be accepted and correct booklet should be obtained from the invigilator within the period of 5 minutes. Afterwards, neither the Question Booklet will be replaced nor any extra time will be given. The same may please be noted.**
   (*iii*) After this verification is over, the OMR Sheet Number should be entered on this Test Booklet.
4. Each question has four alternative responses marked (A), (B), (C) and (D). You have to darken the circle as indicated below on the correct response against each item.
   Example : where (C) is the correct response.
   (A) (B) ● (D)
5. Your responses to the items are to be indicated in the **OMR Sheet given inside the Booklet only.** If you mark at any place other than in the circle in the OMR Sheet, it will not be evaluated.
6. Read instructions given inside carefully.
7. Rough Work is to be done at the end of this booklet.
8. If you write your Name, Seat 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, you will render yourself liable to disqualification.
9. You have to return original OMR Sheet to the invigilator at the end of the examination compulsorily and must not carry it with you outside the Examination Hall. You are, however, allowed to carry the Test Booklet and duplicate copy of OMR Sheet on conclusion of examination.
10. **Use only Blue/Black Ball point pen.**
11. **Use of any calculator or log table, etc., is prohibited.**
12. **There is no negative marking for incorrect answers.**

विद्यार्थ्यांसाठी महत्त्वाच्या सूचना

1. परिक्षार्थींनी आपला आसन क्रमांक या पृष्ठावरील वरच्या कोपऱ्यात लिहावा. तसेच आपणांस दिलेल्या उत्तरपत्रिकेचा क्रमांक त्याखाली लिहावा.
2. सदर प्रश्नपत्रिकेत **75** बहुपर्यायी प्रश्न आहेत. प्रत्येक प्रश्नास **दोन** गुण आहेत. या प्रश्नपत्रिकेतील **सर्व** प्रश्न सोडविणे अनिवार्य आहे. सदरचे प्रश्न हे या विषयाच्या संपूर्ण अभ्यासक्रमावर आधारित आहेत.
3. परीक्षा सुरू झाल्यावर विद्यार्थ्याला प्रश्नपत्रिका दिली जाईल. सुरुवातीच्या 5 मिनीटांमध्ये आपण सदर प्रश्नपत्रिका उघडून खालील बाबी अवश्य तपासून पहाव्यात.
   (*i*) प्रश्नपत्रिका उघडण्यासाठी प्रश्नपत्रिकेवर लावलेले सील उघडावे. सील नसलेली किंवा सील उघडलेली प्रश्नपत्रिका स्विकारू नये.
   (*ii*) **पहिल्या पृष्ठावर नमूद केल्याप्रमाणे प्रश्नपत्रिकेची एकूण पृष्ठे तसेच प्रश्नपत्रिकेतील एकूण प्रश्नांची संख्या पडताळून पहावी. पृष्ठे कमी असलेली/कमी प्रश्न असलेली/प्रश्नांचा चुकीचा क्रम असलेली किंवा इतर त्रुटी असलेली सदोष प्रश्नपत्रिका सुरुवातीच्या 5 मिनिटातच पर्यवेक्षकाला परत देऊन दुसरी प्रश्नपत्रिका मागवून घ्यावी. त्यानंतर प्रश्नपत्रिका बदलून मिळणार नाही तसेच वेळही वाढवून मिळणार नाही याची कृपया विद्यार्थ्यांनी नोंद घ्यावी.**
   (*iii*) वरीलप्रमाणे सर्व पडताळून पहिल्यानंतरच प्रश्नपत्रिकेवर ओ.एम.आर. उत्तरपत्रिकेचा नंबर लिहावा.
4. प्रत्येक प्रश्नासाठी (A), (B), (C) आणि (D) अशी चार विकल्प उत्तरे दिली आहेत. त्यातील योग्य उत्तराचा रकाना खाली दर्शविल्याप्रमाणे ठळकपणे काळा/निळा करावा.
   उदा. : जर (C) हे योग्य उत्तर असेल तर.
   (A) (B) ● (D)
5. या प्रश्नपत्रिकेतील प्रश्नांची उत्तरे **ओ.एम.आर. उत्तरपत्रिकेतच दर्शवावीत.** इतर ठिकाणी लिहीलेली उत्तरे तपासली जाणार नाहीत.
6. आत दिलेल्या सूचना काळजीपूर्वक वाचाव्यात.
7. प्रश्नपत्रिकेच्या शेवटी जोडलेल्या कोऱ्या पानावरच कच्चे काम करावे.
8. जर आपण ओ.एम.आर. वर नमूद केलेल्या ठिकाणा व्यतिरीक्त इतर कोठेही नाव, आसन क्रमांक, फोन नंबर किंवा ओळख पटेल अशी कोणतीही खूण केलेली आढळून आल्यास अथवा असभ्य भाषेचा वापर किंवा इतर गैरमार्गांचा अवलंब केल्यास विद्यार्थ्याला परीक्षेस अपात्र ठरविण्यात येईल.
9. परीक्षा संपल्यानंतर विद्यार्थ्याने मूळ ओ.एम.आर. उत्तरपत्रिका पर्यवेक्षकांकडे परत करणे आवश्यक आहे. तथापी, प्रश्नपत्रिका व ओ.एम.आर. उत्तरपत्रिकेची द्वितीय प्रत आपल्याबरोबर नेण्यास विद्यार्थ्यांना परवानगी आहे.
10. **फक्त निळ्या किंवा काळ्या बॉल पेनचाच वापर करावा.**
11. **कॅलक्युलेटर किंवा लॉग टेबल वापरण्यास परवानगी नाही.**
12. **चुकीच्या उत्तरासाठी गुण कपात केली जाणार नाही.**

Environmental Science
Paper III

Time Allowed : 2½ Hours] **[Maximum Marks : 150**

Note : This paper contains **Seventy Five (75)** multiple choice questions, each question carrying **Two (2)** marks. Attempt *All* questions.

1. A classified sewage can be treated using aerobic oxidation pond method. Which two types of organisms are complementary to each other :

   (A) Bacteria

   (B) Algae

   (C) Algae and Bacteria

   (D) Aquatic plants

2. .....is used to know the settleable solids from the waste water.

   (A) Imhoff cone

   (B) Imhoff chamber

   (C) Measuring cylinder

   (D) Beaker

3. Analysis of polluted water for D.O. and free CO_2 will show the following pattern :

   (A) Absense of CO_2 and higher D.O

   (B) Higher CO_2 and higher D.O

   (C) Higher CO_2 and low D.O

   (D) No change in D.O and CO_2

4. Restriction Fragment Length Polymorphism method is used to study :

   (A) Genetic variation

   (B) Biochemical variation

   (C) Morphological variations

   (D) Physiological variation

5. Stenophagic and euryphagic terms are used w.r.t. :

(A) Food

(B) Water

(C) Salinity

(D) Temperature

6. Removal of rags, floatables grit, sticks etc. in the wastewater treatment is called :

(A) Primary clarifier

(B) Preliminary clarifier

(C) Solid clarifier

(D) Secondary clarifier

7. Diversity of habitat over the total landscape or geographical area is called :

(A) Alfa diversity

(B) Beta diversity

(C) Gamma diversity

(D) Zeta diversity

8. The pioneer of Xerosere are :

(A) Mosses

(B) Ephimeral herbs

(C) Lichens

(D) Shrubs

9. Biologically the richest region of the world is :

(A) Indo-Malay region

(B) Russia

(C) West Africa

(D) South America

10. Natural ecosystem depends upon :

(A) Animal

(B) Plant

(C) Man

(D) Self-operating system

11. An animal that feeds on plants and also on animals is called :

(A) Carnivores

(B) Herbivores

(C) Omnivores

(D) Tertiary carnivores

12. The Eco-mark of Indian consumer product :

(A) Peacock

(B) Lotus

(C) Swan

(D) Earthen pot

13. Which of the following states have highest wasteland ?

(A) U.P. and Bihar

(B) A.P. and TN

(C) Rajasthan and Madhya Pradesh

(D) Assam and Tripura

14. International agency that adopted rehabilitation of the displaced ones due to construction of dams etc. is :

(A) World Bank

(B) WHO

(C) WWF

(D) UNEP

15. Ambient air quality standard for sulphur dioxide in notified ecologically sensitive area, in micrograms per cu. meter ($\mu g/m^3$), annual average is prescribed at :

(A) 100

(B) 80

(C) 50

(D) 20

16. Regulation and management of consent to establish/operate is done by :

(A) MOEF & CC

(B) CPCB

(C) SPCB

(D) State Environment Deptt.

17. Provision under Article 48A of the Constitution of India deals with :

(A) Trade in wildlife

(B) Pollution control

(C) Agriculture soil conservation

(D) Protection and improvement of environment

18. Method of treatment and disposal of domestic solid waste is :

(A) Compost plant

(B) Catalytic converter

(C) Multiple effect evaporator

(D) Catalytic converter

19. Best suitable technique for the separation and quantify the impurities in drugs is .....

(A) NMR

(B) HPLC

(C) IR

(D) MS

20. Least soluble compound in NH_4OH is .....

(A) AgBr

(B) AgCl

(C) AgI

(D) AgF

21. Which one of the following has the strongest ionic bond ?

(A) H-F

(B) H-Cl

(C) H-N

(D) H-O

22. Oxidation state of Mn in $KMnO_4$ is .....

(A) +2

(B) +5

(C) +7

(D) +8

23. No. of valence electrons in carbon is .....

(A) One

(B) Two

(C) Three

(D) Four

24. No. of electrons present in H^+ is .....

(A) One

(B) Two

(C) Three

(D) Zero

25. Most electropositive element is.....

(A) K

(B) Na

(C) Cs

(D) Ca

26. Half life of a substance is 4 hrs. 2 g of this substance will be left with the following amount after 12 hrs :

(A) 1 g

(B) 0.5 g

(C) 0.25 g

(D) 0.125 g

27. Paris climate deal which was adopted on December 12, 2015 will be effective from.....

(A) November 04, 2016

(B) December 04, 2016

(C) November 14, 2016

(D) December 14, 2016

28. First law of thermodynamics states that the :

(A) Energy is always conserved

(B) Energy is doubled

(C) Energy is decreased

(D) Energy is trippled

29. The composition (Mean molecular) of the atmosphere remains almost unchanged upto a height of ..... km.

(A) 15

(B) 50

(C) 80

(D) 40

30. The inversion layer near the ground is common during ..... in North India.

(A) Early morning in winter

(B) Morning hours in summer

(C) Afternoon in summer

(D) Afternoon in winter

31. Arithmetic mean and Geometric mean of 9 and 4 are .....

(A) 6.5 and 4.0 respectively

(B) 4 and 6.5 respectively

(C) 6.5 and 6.0 respectively

(D) 6.0 and 6.0 respectively

32. Nearly ..... percentage of the incident solar energy at the top of the atmosphere is in the infrared region of the electromagnetic spectrum.

(A) 60

(B) 35

(C) 46

(D) 25

33. Which of the following measures does *not* contribute to "Mitigation" with reference to climate change ?

(A) Use of solar energy

(B) Use of wind energy

(C) Deforestation

(D) Use of fuel efficient vehicles

34. One of the major causes for eustatic sea level changes, those that are synchronous throughout the world, is a change in the mass of the :

(A) Polar ice caps

(B) Alpine ice caps

(C) Himalayan ice caps

(D) Kilimanjaro ice caps

35. Carbonate reefs, fringing reefs, barrier reefs and atoll are the characteristics of .....

(A) Emergent Coast

(B) Biogenic Coast

(C) Depositional Coast

(D) Glacial Coast

36. Fjords are the long, narrow bays with steep valley sides that characterize the coast of Norway are examples of .....

(A) Glacial Coast

(B) Emergent Coast

(C) Biogenic Coast

(D) Depositional Coast

37. Chilika lakes recognised as one of the hot spots of biodiversity is the largest brackish water ..... that sprawls along the East Coast of India in Mahanadi Delta.

(A) Tidal Lagoon

(B) Tidal Swamp

(C) Blue Lagoon

(D) Atoll Lagoon

38. When pyroclastic debris comes in contact with water, snow or ice on the slopes of volcano, a high density slurry can be generated that moves downslope are called :

(A) Lahars

(B) Tephra falls

(C) Structural collapse

(D) Debris avalanches

39. Wastewater treatment is described in terms of three possible phases primary, secondary, tertiary, primary treatment involves.....

(A) Screening and settling

(B) Removal of organics and inorganics

(C) Waste stabilizing lagoon

(D) Variety of chemical methods

40. Flood magnitude can be measured as the elevation to which a river rise during a flood, but more commonly it is reported as the ..... of the stream during the event.

(A) Less discharge

(B) Maximum discharge

(C) Rating curve

(D) Maximum recharge

41. The ratio of the resisting forces to the during forces is a quantitative indication of slope stability known as .....

(A) Frictional force

(B) Safety factor

(C) Coefficient of friction

(D) Residual strength

42. Which is the major source of carbon monoxide to the Urban air environment ?

(A) Industrial processes

(B) Solid waste

(C) Stationary fuel combustion

(D) Transportation

43. The spectral signature of water ranges between .....

(A) 0.3 to 0.7 μm

(B) 0.9 to 1.3 μm

(C) 0.5 to 1.5 μm

(D) 0.9 to 1.2 μm

44. What is *incorrect* condition for efficient anaerobic digestion process ?

(A) Maintain pH between 6.8–7.2

(B) SRT/HRT >> 1–10

(C) Volatile fatty acids (100–500 ppm)

(D) Presence of more butyric acid (> 500 ppm)

45. Which high rate anaerobic digester retains very high concentration of active biomass and operate at high loading rate of 5-20 kg COD/m^3-day ?

(A) Upflow anaerobic sludge blanket reactor (UASB)

(B) Anaerobic baffled reactor

(C) Floating dome bioreactor

(D) Plug flow bioreactor

46. Which high rate process adopts high upflow velocity of influent waste-water to expand the biocarrier by 15-30% ?

(A) Static Granular Bed Reactor (SGBR)

(B) Anaerobic Filter Reactor (AFR)

(C) Expanded Bed Bioreactor (EBR)

(D) Fluidized Bed Bioreactor (FBR)

47. Which plant has endosymbiotic *Anabaena* and used as biofertilizer for paddy fields ?

(A) *Orchid*

(B) *Monotropoid*

(C) *Arbutus*

(D) *Azolla*

48. A group of metabolically related bacterial population in a microbial ecosystem are commonly known as .....

(A) Ecotone

(B) Population

(C) Communities

(D) Guilds

49. What simple and effective strategy is recommended in case the compositing material "ball up" and restrict the air flow due to excess initial moisture (> 65%) ?

(A) Incorporate bulking agent

(B) Amendment with anhydrous sodium sulphite

(C) Extend thermophilic phase during composting

(D) Continue the composting for prolong period

50. Why is moisture level of 50-60% desirable for more microbial activity at the initial stages of composting ?

(A) To increase compact structure of compost

(B) To lower down diffusion of air

(C) To allow biofilm formation on compost material

(D) To increase micropore formation for holding water

51. What chemical property of a pesticide confers resistance to microbial degradation ?

(A) More solubility of pesticide in water

(B) Inert resonance structure of pesticide

(C) Less complex structure of pesticide

(D) Pesticide with more acetyl group.

52. Which microbial process metabolize the pesticide to CO_2 and water as end product ?

(A) Biomineralization

(B) Co-dissimilation

(C) Bioreduction

(D) Conjugate with sugars

53. What is *true* about characteristic of filter packing media used in trickling filter system for treatment of waste-water ?

(A) Less surface area per unit volume

(B) Low durability and biodegradable

(C) High porosity to minimize clogging

(D) Inert and toxic to microbes

54. Which process has capacity to remove nitrogen in effluent with low C : N ratio and operate alternate aerobic and anaerobic conditions ?

(A) Bardenpho process

(B) Air stripping of ammonia

(C) Anammox process

(D) Ludzack-Ettinger process

55. Which of the following bacterial activities contributes to the formation of natural sulphur deposits from hydrogen sulphide gas ?

(A) *Baggiota* spp.

(B) *Methanosarcina* spp.

(C) *Thiobacillus thioxidans*

(D) *Desulfovibrio* spp.

56. What is the basis used for identification of positive interactions within the microbial population ?

(A) Prolong stationary phase of microbes

(B) Extended lag period of microbial growth

(C) Short log period of microbial growth

(D) Rapid decline in microbial population

57. Which bacterium contributes to the conversion of nitrates to elemental nitrogen in biogeochemical cycle ?

(A) *Nitrosomonas europaea*

(B) *Nitrobacter winogradskyi*

(C) *Rhizobium leguminosarum*

(D) *Micrococcus denitrificans*

58. In what way is nitrogenase activity protected from oxygen in nodules of Rhizobium-legume symbiosis ?

(A) Rhizobium secret slime

(B) Leghaemoglobin

(C) Rhizobium secret oxygen insensitive nitrogenase

(D) Nodules provide anaerobic environment

59. The harvester ant *Pogonomyrmex occidentalis* enriches its nest with the following microbe that possess high endophytic infection :

(A) Orchid mycorrhizae

(B) VAM spores

(C) Monotropoid mycorrhizae

(D) Arbutus mycorrhizae

60. Maize appears in the American southwest around ....., in the east around .....

(A) 6000 BP; 5800 BP

(B) 4000 BP; 3200 BP

(C) 3500 BP; 1800 BP

(D) 2000 BP; 1600 BP

61. The term ..... is related to the distribution of equal amount sunshine.

(A) Isonephs

(B) Isophene

(C) Isophaline

(D) Isohel

62. The maximum concentration of ozone in the atmosphere is observed between .....

(A) 10 to 20 km.

(B) 20 to 30 km.

(C) 30 to 50 km.

(D) 50 to 60 km.

63. ..... affects the angle at which the sun's rays reach the earth.

(A) Weather

(B) Wind

(C) Latitude

(D) Sea level

64. Identify a group of hazards caused by endogenous forces of the earth :

(A) Earthquake – landslide – drought

(B) Earthquake – volcano – flood

(C) Volcano – landslide – tsunami

(D) Earthquake – tsunami – forest fire

65. ..... the type of boundary where Nepal earthquake happened in year 2015.

(A) Destructive boundary

(B) Conservative boundary

(C) Continent–continent collision boundary

(D) Island-arc boundary

66. The data products of the India region are generally produced in ..... projection for LISS I, II and III and PAN images.

(A) Polyconic

(B) Cylindrical

(C) Mercator

(D) Azimuthal

67. Which of the following errors can be reduced by taking repeated measurement ?

(A) Random error

(B) Systematic error

(C) Both of the above

(D) None of the above

68. Which of the following impact identification is problematic in the EIA process ?

(A) Direct

(B) Positive

(C) Negative

(D) Cumulative

69. What will be the resultant noise at the workshop operating four equipments each emitting equal sound of 55 dB (A) ?

(A) 60 dB (A)

(B) 61 dB (A)

(C) 110 dB (A)

(D) 58 dB (A)

70. Which of the following is *correct* for the cross impact matrix ?

(A) Display of environmental factor against other environmental factor

(B) Display of environmental factors against project action

(C) Display of environmental factors against constructional activities of initiating action

(D) Display of environmental factors against operational activities of initiating action

71. Who developed the network method for impact identification in EIA ?

(A) Soloman et al, 1977

(B) Odum et al, 1975

(C) Sorensen, 1971

(D) Stover, 1972

72. Which of the following indicates the necessity of EIS preparation under Section 102 of NEPA 1969 ?

(A) Part A

(B) Part B

(C) Part C

(D) Part D

73. Narrow sandy islands that form offshore from a coastline are called .....

(A) Oceanic Islands

(B) Island Arcs

(C) Barrier Islands

(D) Seamounts

74. Deeper lakes are characterized by the presence of a warmer upper layer that is mixed by the wind and colder, deep layer is not mixed, the two layers are separated by a distinctive temperature transition zone called the.....

(A) Thermofrost

(B) Thermostat

(C) Thermocline

(D) Thermoline

75. ..... is a biofertilizer.

(A) Nostoc

(B) Pediamstrum

(C) Scenedesmus

(D) Nitzschia

ROUGH WORK

ROUGH WORK