



Post Graduate School
Indian Agricultural Research Institute, New Delhi
Examination for Admission to Ph.D. Programme 2013-2014

Discipline : Environmental Sciences

Discipline Code : 11

Roll No.

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Please Note:

- (i) This question paper contains **13** pages. **Please check whether all the pages are printed in this set.** Report discrepancy, if any, **immediately** to the invigilator.
- (ii) **There shall be NEGATIVE marking for WRONG answers in the Multiple Choice type questions (No. 1 to 130) which carry one mark each. For every wrong answer 0.25 mark will be deducted.**

PART – I (General Agriculture)

Multiple choice questions (No. 1 to 30). Choose the correct answer (a, b, c or d) and enter your choice in the circle (by shading with a pencil) on the OMR - answer sheet as per the instructions given on the answer sheet.

1. Who is the present Chairman of Protection of Plant Varieties and Farmers' Right Authority (PPV&FRA)?
 - a) Dr. R.R. Hanchinal
 - b) Dr. P.L. Gautam
 - c) Dr. S. Nagarajan
 - d) Dr. Swapan K. Datta
2. Which among the following is another name for vitamin B₁₂?
 - a) Niacin
 - b) Pyridoxal phosphate
 - c) Cobalamin
 - d) Riboflavin
3. The largest share in India's farm export earning in the year 2011-12 was from
 - a) Basmati rice
 - b) Non-basmati rice
 - c) Sugar
 - d) Guar gum
4. The National Bureau of Agriculturally Important Insects was established by ICAR in _____, was earlier known as _____.
 - a) Bangalore; PDBC
 - b) New Delhi; National Pusa Collection
 - c) Ranchi; Indian Lac Research Institute
 - d) New Delhi; NCIPM
5. The most important sucking pests of cotton and rice are respectively
 - a) *Nilaparvata lugens* and *Aphis gossypii*
 - b) *Aphis gossypii* and *Thrips oryzae*
 - c) *Amrasca biguttula biguttula* and *Scirtothrips dorsalis*
 - d) *Thrips gossypii* and *Orseolia oryzae*
6. Which of the following microorganism causes fatal poisoning in canned fruits and vegetables?
 - a) *Aspergillus flavus*
 - b) *Penicillium digitatum*
 - c) *Clostridium botulinum*
 - d) *Rhizoctonia solani*
7. The cause of the great Bengal Famine was
 - a) Blast of rice
 - b) Brown spot of rice
 - c) Rust of wheat
 - d) Karnal bunt of wheat
8. Actinomycetes belong to
 - a) The fungi
 - b) Eukaryote
 - c) *Mycelia sterilia*
 - d) None of the above
9. A virus-free clone from a virus infected plant can be obtained by
 - a) Cotyledonary leaf culture
 - b) Axenic culture
 - c) Stem culture
 - d) Meristem tip culture
10. Which of the following is not an objective of the National Food Security Mission?
 - a) Sustainable increase in production of rice, wheat and pulses
 - b) Restoring soil fertility and productivity at individual farm level
 - c) Promoting use of bio-pesticides and organic fertilizers
 - d) Creation of employment opportunities

11. Agmarknet, a portal for the dissemination of agricultural marketing information, is a joint endeavour of
 - a) DMI and NIC
 - b) DMI and Ministry of Agriculture
 - c) NIC and Ministry of Agriculture
 - d) DMI and Directorate of Economics and Statistics
12. The share of agriculture and allied activities in India's GDP at constant prices in 2011-12 was
 - a) 14.1%
 - b) 14.7%
 - c) 15.6%
 - d) 17.0%
13. The average size of land holding in India according to Agricultural Census 2005-06 is
 - a) 0.38 ha
 - b) 1.23 ha
 - c) 1.49 ha
 - d) 1.70 ha
14. 'Farmers First' concept was proposed by
 - a) Paul Leagans
 - b) Neils Rolling
 - c) Robert Chamber
 - d) Indira Gandhi
15. In the year 2012, GM crops were cultivated in an area of
 - a) 150 million hectare in 18 countries
 - b) 170 million hectare in 28 countries
 - c) 200 million hectare in 18 countries
 - d) 1.70 million hectare in 28 countries
16. The broad-spectrum systematic herbicide glyphosate kills the weeds by inhibiting the biosynthesis of
 - a) Phenylalanine
 - b) Alanine
 - c) Glutamine
 - d) Cysteine
17. At harvest, the above ground straw (leaf, sheath and stem) weight and grain weight of paddy crop are 5.5 and 4.5 tonnes per hectare, respectively. What is the harvest index of paddy?
 - a) 45%
 - b) 50%
 - c) 55%
 - d) 100%
18. Crossing over between non-sister chromatids of homologous chromosomes takes place during
 - a) Leptotene
 - b) Pachytene
 - c) Diplotene
 - d) Zygotene
19. The term 'Heterosis' was coined by
 - a) G.H. Shull
 - b) W. Bateson
 - c) T.H. Morgan
 - d) E.M. East
20. When a transgenic plant is crossed with a non-transgenic, what would be the zygosity status of the F₁ plant?
 - a) Homozygous
 - b) Heterozygous
 - c) Hemizygous
 - d) Nullizygous
21. The highest per capita consumption of flowers in the world is in
 - a) The USA
 - b) India
 - c) Switzerland
 - d) The Netherlands
22. Which of the following is a very rich source of betalain pigment?
 - a) Radish
 - b) Beet root
 - c) Carrot
 - d) Red cabbage
23. Dog ridge is
 - a) Salt tolerant rootstocks of mango
 - b) Salt tolerant rootstocks of guava
 - c) Salt tolerant rootstocks of grape
 - d) Salt tolerant rootstocks of citrus
24. Which of the following micronutrients are most widely deficient in Indian soils?
 - a) Zinc and boron
 - b) Zinc and iron
 - c) Zinc and manganese
 - d) Zinc and copper
25. Which of the following fertilizers is not produced in India?
 - a) DAP
 - b) Urea
 - c) Muriate of potash
 - d) TSP
26. What is the estimated extent of salt affected soils in India?
 - a) 5.42 mha
 - b) 7.42 mha
 - c) 11.42 mha
 - d) 17.42 mha
27. Which of the following is not a feature of watershed?
 - a) Hydrological unit
 - b) Biophysical unit
 - c) Socio-economic unit
 - d) Production unit

28. Correlation coefficient 'r' lies between
 a) 0 and 1
 b) -1 and 1
 c) -1 and 0
 d) 0 and ∞
29. For the data 1, -2, 4, geometric mean is
 a) 2
 b) 4
 c) $-\frac{7}{3}$
 d) -2
30. The relationship between Arithmetic mean (A), Harmonic mean (H) and Geometric mean (G) is
 a) $G^2=AH$
 b) $G=\sqrt{A+H}$
 c) $H^2=GA$
 d) $A^2=GH$

PART – II (Subject Paper)

Multiple choice questions (No. 31 to 130). Choose the correct answer (a, b, c or d) and enter your choice in the circle (by shading with a pencil) on the OMR - answer sheet as per the instructions given on the answer sheet.

31. A pollutant which can mimic hormones and also known as environmental estrogen is
 a) Carbamates
 b) Dioxins
 c) VC
 d) Mercaptans
32. CO can be suitably determined by
 a) NDIR spectrophotometry
 b) Potentiometry
 c) GC-MS
 d) Chemiluminescence
33. Which of the following areas will be wiped off by water due to melting of polar ice resulted by global warming?
 a) Kuwait
 b) Kiribati
 c) Korea
 d) Kolkata
34. Which of the following soil types of India is rendered infertile by the presence of iron?
 a) Desert sand
 b) Alluvial
 c) Podzolic
 d) Lateritic

35. Where is the Headquarter of Worldwide Fund for Nature (WWF)?
 a) Switzerland
 b) Sweden
 c) Italy
 d) USA
36. Which of the following chemicals acts as chemical scavenger in plants exposed to SO_2 pollution?
 a) Ascorbic acid
 b) Pyruvic acid
 c) Oxaloacetic acid
 d) Methionine
37. Who had coined the term ecosystem?
 a) Joseph Grinnel
 b) E.P. Odum
 c) R.D. Mishra
 d) A.G. Tansley
38. Which of the following pairs serves as biofertilizer?
 a) Albugo and Nostoc
 b) Frankia and Nostoc
 c) Pseudomonas and *E.coli*
 d) *Aspergillus* and *Actinomyces*
39. The first Act in India passed in confirmation to the United Nations Conference on the Human Environment held in Stockholm in 1972 was
 a) The Air (Prevention and Control of Pollution Act, 1981)
 b) The Water (Prevention and Control of Pollution Act, 1974)
 c) The Environment (Protection) Act, 1986
 d) The Water (Prevention and Control of Pollution) Act, 1975
40. Which of the following is a fungicide?
 a) Malathion
 b) Fenitrothion
 c) Diphenyl mercury
 d) Phorate
41. If a lake is contaminated with DDT, then its highest concentration would be found in
 a) Algae
 b) Protozoans
 c) Weeds
 d) Fish and fish eating birds
42. Noise pollution results when the sound increases beyond _____ decibels?
 a) 45
 b) 80
 c) 120
 d) 200

43. Which one of the following elements has no role in P-cycle?
- Fe
 - Ca
 - Al
 - Na
44. Most commonly used element for the fabrication of solar semiconductor cells is
- Carbon
 - Germanium
 - Silicon
 - Platinum
45. In a septic tank, the BOD is normally
- 50-400 mg/l
 - 60-300 mg/l
 - 60-400 mg/l
 - 70-400 mg/l
46. Orchids, cucumber and marigold are suitable for biomonitoring of _____ air-pollutant.
- O₃
 - SO₂
 - PAN
 - C₂H₂
47. The infrared band range in the selected region of the electromagnetic spectrum, which one employed in remote sensing include
- 0.4 - 0.7 μm
 - 0.7 - 3.0 μm
 - 3 - 5 μm
 - 8 - 14 μm
48. In the overall biochemical reaction for nitrogen fixation _____ ATPs are used in the reaction.
- 16
 - 14
 - 12
 - 11
49. In gel permeation chromatography, the phase system is
- Liquid - liquid
 - Liquid - solid
 - Gas - solid
 - Gas - liquid
50. The quantitative spectrophotometric analysis for proteins can be done at
- 360 nm
 - 280 nm
 - 260 nm
 - 240 nm
51. Which of the following country is not a signatory of Kyoto Protocol?
- United Kingdom
 - United States of America
 - India
 - Denmark
52. Arrange the following constituents of earth according to their percentages:
- 1) Silica
 - 2) Magnesium
 - 3) Aluminium
 - 4) Iron
- 1, 2, 3, 4
 - 2, 1, 3, 4
 - 1, 3, 4, 2
 - 2, 3, 1, 4
53. Greenhouse Effect is caused by which property of CO₂?
- Transparency to long-wave radiations and opaqueness to shortwave radiations
 - Transparency to shortwave radiations and opaqueness to long-wave radiations
 - Its capacity to absorb heat
 - Its quality of having high heat of condensation
54. Ozone gas is perceptibly _____ in colour.
- Green
 - Yellow
 - White
 - Blue
55. The average amount of solar energy received per unit area, per unit time at the outermost boundary of atmosphere is referred to as
- Solar constant
 - Sun spot average
 - Albedo
 - Annual constant
56. Which of the following is the correct formula for converting meq/l into ppm?
- (meq/l) ÷ (Equivalent weight) = ppm
 - (meq/l) + (Equivalent weight) = ppm
 - (meq/l) × (Equivalent weight) = ppm
 - (meq/l) - (Equivalent weight) = ppm
57. Sulphur in plants is generally available as
- Sulphydryl (-SH)
 - SO₂
 - SO₃
 - SO₄
58. The primary energy equivalent of hydroelectricity production is expressed in terms of
- Electrical energy content of the fossil fuel
 - Heat energy content of the fossil fuel
 - Thermal energy content of the fossil fuel
 - Nuclear energy content of the fossil fuel

59. In EIA, the methodology which works from a list of project activities to establish cause condition - effect relationship is known as
- Checklist
 - Overlays
 - Networks
 - Matrices
60. Detection limits for metal ions of chromium in aqueous solution is ____ PPb.
- 7
 - 6
 - 5
 - 4
61. In conductivity measurement, to convert to millisiemens per meter, $\mu\text{mhos/cm}$ are divided by
- 1000
 - 100
 - 10
 - 1
62. When certain types of molecules absorb UV energy, energy in the UV or visible regions is emitted as the excess energy. This phenomenon is known as
- Fluorescence
 - Phosphorescence
 - Transmittance
 - Absorbance
63. Arsenic exerts its toxic action by attacking
- CH group of enzyme
 - CO group of enzyme
 - SH group of enzyme
 - Phosphorous group of enzyme
64. India is designated as a
- Alpha diversified country
 - Beta diversified country
 - Gamma diversified country
 - None of the above
65. How many hotspots are there on the earth?
- 8
 - 16
 - 18
 - 25
66. Following the application of farm residues in the fields, the crop plants generally suffer from nitrogen deficiency because
- The nitrogen demand of microorganism is increased
 - There is competition between crop plants and bacteria for N
 - C/N ratio of soil is increased
 - All these are responsible collectively for N deficiency
67. Which is the correct statement given by IPCC, 2007?
- Global atmospheric temperature increased by 0.74°C during last century
 - Present global atmospheric CO_2 concentration is around 480 ppm
 - Present rate of CO_2 is increased about 1.5 ppm a year
 - Atmospheric CO_2 and CH_4 rose by 57 and 50%, respectively
68. Which rice variety has been evolved from Indica \times Japonica hybridization programme?
- Intan
 - Mahsuri
 - IR-36
 - Sita
69. Which of the following is not a correct statement?
- Tiger project was launched during Indira Gandhi regime
 - Environmental Protection Act was launched during Rajiv Gandhi regime
 - Chipko Andolan (Movement) was launched by Sunderlal Bahuguna
 - Earth Summit 1992 held in China
70. Which property of the ice core samples from Antarctica provides the information about average global temperature over the last 1,60,000 years?
- Their thickness
 - Their carbon-dioxide concentration
 - Their $1\text{H}/2\text{H}$ ratio
 - Their temperature
71. Hydrogen gas is a promising alternative fuel because it does not produce greenhouse gases. How many molecules are present in 1.0 kg of hydrogen gas?
- 3.0×10^{23}
 - 6.0×10^{23}
 - 3.0×10^{26}
 - 6.0×10^{26}
72. In gas chromatography, the basis for separation of the components of the volatile material is the difference in
- Partition coefficients
 - Conductivity
 - Molecular weight
 - Molarity

73. Suppose your friend lives in a small town in southeastern Poland, where there are a few chemical plants. One of the plants always has a noticeable orange-coloured plume of smoke hanging above its smokestack. The odour from the plant is pungent. What kind of air pollutant is it?
- Carbon dioxide
 - Sulfur dioxide
 - Carbon monoxide
 - Nitrous dioxide
74. Which of the following energy sources does not produce carbon dioxide?
- Oil
 - Uranium
 - Coal
 - Natural gas
75. An electrical conductivity of $120 \mu\text{mhos cm}^{-1}$ is equivalent to
- 0.12 dSm^{-1}
 - 1.2 dSm^{-1}
 - 12 dSm^{-1}
 - 120 dSm^{-1}
76. Name the proponent of GAIA hypothesis saying that "Planet earth functions as a single organism or a giant cell".
- Haeckel
 - Tansley
 - Lovelock
 - Darwin
77. The Coriolis effect is related to
- Earth's rotation
 - The process of cooling of ascending air
 - Infiltration and percolation in the unsaturated zone
 - The existing hydrostatic pressure at the water table
78. Arrange the following constituents of the atmosphere in descending order
- Oxygen, argon, CO_2 , neon
 - Argon, CO_2 , neon, oxygen
 - CO_2 , neon, oxygen, argon
 - Neon, oxygen, argon, CO_2
79. The natural rate of nitrogen fixation on land is estimated to be
- 140 Tg of nitrogen a year
 - 150 Tg of nitrogen a year
 - 160 Tg of nitrogen a year
 - 170 Tg of nitrogen a year
80. One molecule of CFC is capable of destroying how many molecules of ozone in the stratosphere?
- 10
 - 100
 - 1000
 - 100000
81. UNEP was established with its headquarters in the year
- Paris, 1975
 - Nairobi, 1972
 - Osaka, 1980
 - New York, 1978
82. Which radioactive pollutant has recently drawn attention of the public due to its occurrence in building materials?
- Plutonium
 - Thorium
 - Radon
 - Radium
83. If EC of water is 3.28 dSm^{-1} , what would be its total dissolved solids (TDS)?
- 328 mg l^{-1}
 - 1300 mg l^{-1}
 - 2100 mg l^{-1}
 - 3280 mg l^{-1}
84. Maximum permissible concentration of copper in public water supply is
- $10 \mu\text{g/l}$
 - $50 \mu\text{g/l}$
 - $1000 \mu\text{g/l}$
 - $5000 \mu\text{g/l}$
85. Who proposed the binomial theory of plant classification?
- Hooker
 - Hutchinson
 - Carolus Linnaeus
 - Benthom
86. The temperature decreases with increasing altitude at
- 0.6°C per kilometer above the sea level
 - 1.0°C per 165 meters above the sea level
 - 1.6°C per kilometer above the sea level
 - 2.0°C per 100 meters above the sea level
87. Which of the following COP were held in Kyoto and Delhi?
- COP-3 and COP-8
 - COP-1 and COP-10
 - COP-5 and COP-6
 - COP-4 and COP-9

88. Which of the following instrument can map the concentration of SO₂ over an area of land?
- LIDAR
 - GC
 - Spectrophotometer
 - Mass spectroscopy
89. Remote sensing satellites use sensors that detect radiation reflected from the earth's surface in the range of
- 0.1 to 0.3 μm
 - 0.3 μm to 30 cm
 - 1.0 cm to 30 cm
 - 1.0 mm to 15 mm
90. What is the approximate U.N. projection for world population in 2030?
- >8 bn
 - >8.5 bn
 - >9.0 bn
 - >9.5 bn
91. Noise levels generated by various aircrafts are generally found between
- 70-80 db
 - 80-100 db
 - 100-120 db
 - 120-150 db
92. How is fluoride removed from drinking water?
- Reverse osmosis
 - Distillation
 - Freezing water
 - Boiling water
93. In ion exchange chromatography, protein are separated by
- Size
 - Binding specificities
 - Magnitude of net electric charge at a given pH
 - Mass
94. The repeat unit is a single turn of the α-helix with _____ residues.
- 3.2
 - 3.4
 - 3.6
 - 3.8
95. Two gram of soil was treated with 10 ml methanol. A 100 ml aliquot of methanol extract was injected into 5 ml reagent grade water for analysis of volatile organic compound. The concentration of the analyte was found to be 22 mg/l. Determine the concentration in soil.
- 55 mg/kg
 - 550 mg/kg
 - 5500 mg/kg
 - 55000 mg/kg
96. _____ is grown as reddish gelatinous masses encrusting polluted, ammonia rich soil in shaded areas.
- Cyanidium
 - Porphyridium
 - Botrydium
 - Heterothrix
97. The allowance level of nitrate-nitrogen in water for children of 6 months is
- <10 mg/l
 - <20 mg/l
 - <30 mg/l
 - <40 mg/l
98. Photoorganotroph uses _____ electron acceptor.
- O₂
 - NAD⁺
 - ATP
 - Minerals or inorganic ions
99. _____ is new genera being proposed in addition to the already existing genera involved in nitrogen fixation.
- Bacillus*
 - Sinorhizobium*
 - Bradyrhizobium*
 - Azorhizobium*
100. C:N ratio in the grain straw is
- 20:1
 - 60:1
 - 80:1
 - 200:1
101. Complete or partial inhibition or death of one organism by another through production of some substance is known as
- Antibiosis
 - Antagonistic
 - Competition
 - Exploitation
102. Interspecific competition between plants may manifest itself by
- Competition
 - Allelopathy
 - Ecological segregation
 - Exploitation
103. Overall atmospheric fixation represents about ____% of global nitrogen assimilation.
- 1%
 - 2%
 - 3%
 - 7%

104. Which of the following techniques is most suitable for the estimation of organic pesticides or their residues?
- Gel electrophoresis
 - Flame photometry
 - Gas chromatography
 - Atomic absorption spectrophotometry
105. The 'World Conservation Strategy' was prepared by
- UNEP
 - IUCN
 - WWF
 - All of the above
106. The catalytic converter used in motor vehicles cannot convert
- NO_x to N_2
 - HC to CO_2
 - CO to CO_2
 - SO_2 to S
107. One light year is equal to how many meters?
- 9.46×10^{15}
 - 9.46×10^{10}
 - 9.46×10^8
 - 9.46×10^6
108. Which of the following is correct about the important chemical species found in mesosphere?
- O_2^+
 - NO^+
 - Both a) & b)
 - Neither a) nor b)
109. The mesosphere shows negative lapse time, i.e., temperature falls with increasing altitude is due to
- Low levels of UV absorbing species
 - High levels of UV absorbing species
 - Moderate levels of UV absorbing species
 - Absence of UV absorbing species
110. The earth absorbs radiation mainly in the visible region but emits radiation at the same rate in the IR region of about
- 2-40 μ
 - Less than 2 μ
 - More than 40 μ
 - 100-1000 μ
111. The relative contribution of CFC, radiatively active gas to temperature rise is about
- 50%
 - 17%
 - 8%
 - 4%
112. Which of the following enzymes of citric acid cycle inhibits by AS(III)?
- Glyceraldehyde-3-phosphate
 - Phosphoglycerate
 - Pyruvate dehydrogenase
 - 1,3-diphosphoglycerate
113. The sedimentary type of biogeochemical cycle is found in the case of
- Nitrogen
 - Sulphur
 - Carbon
 - Oxygen
114. Which of the following Acts is the oldest one?
- Wildlife (Protection) Act
 - The Wild Birds and Animals Protection Act
 - Madras Wild Elephant Preservation Act
 - Bengal Rhinoceros Preservation Act
115. The GHG can absorb radiation of wavelength
- <0.3 μm
 - <4.0 μm
 - >4.0 μm
 - >2.3 μm
116. Which of the following articles of Constitution of India quote as "It shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers and wildlife"?
- 21
 - 42
 - 48A
 - 52A
117. The per capita solid waste generated in India is approximately
- 0.4 kg/d
 - 1.2 kg/d
 - 2.2 kg/d
 - 4.5 kg/d
118. In modelling chemical reaction compounds, which model can be used?
- Gaussian plume model
 - Time series model
 - Eulerian model
 - Empirical-Statistical model
119. Hydrazine (N_2H_4) is widely used in boiler feed water in industries to
- Prevent scaling
 - Prevent corrosion
 - Increase thermal efficiency
 - Prevent growth of microorganisms

120. Thermal precipitators may be used for collection of aerosol particles of size
- $10^{-3} \mu$
 - $10^{-4} \mu$
 - $10^{-5} \mu$
 - $10^{-6} \mu$
121. Which category of waste water does not require seeding during a BOD test?
- Distillery spent wash
 - Dyeing unit effluent
 - Domestic sewage
 - Pulp and paper mill effluent
122. Derivatisation can be used to enhance detectability of samples by increasing the sensitivity and selectivity of which of the following methods?
- Column chromatography
 - X-ray fluorescence
 - AAS
 - HPLC
123. Fresh water has salinity in the order of
- Zero
 - <0.5 ppt
 - <0.1 ppt
 - 50-200 ppm
124. In most situations to quantify the photobiological effects of UV-B, biological effectiveness (BE) of UV-B is calculated. It is done by weighing the solar spectral irradiance as a function of wavelength integrated over time span and wavelength range
- Defined by the user
 - Between 220 to 400 nm
 - Between 290 to 320 nm
 - Between 320 to 400 nm
125. The density of atmosphere at sea level is
- 0.5 kg/m^3
 - 0.57 kg/m^3
 - 1.12 kg/m^3
 - 1.23 kg/m^3
126. The phytotoxic concentration for ammonia is
- 0.0005 - 10 PPm/h
 - 0.001 - 0.10 PPm/h
 - 100 - 500 PPm/h
 - 100 - 200 PPm/h
127. On an average, of 1000 KCal of energy available to any plant ecosystem, only _____ KCal are stored in the plant tissue as energy rich material.
- 2
 - 10
 - 11
 - 12
128. In a hollow cathode lamp, which of the following steps lead to the emission of light?
- Ionization, sputtering, excitation, emission
 - Sputtering, ionization, excitation, emission
 - Excitation, ionization, sputtering, emission
 - Excitation, sputtering, ionization, emission
129. Fluorescence spectrometry can be used to measure concentration in the range of
- 10^{-2} to 10^{-5} g/ml
 - 10^{-6} to 10^{-9} g/ml
 - 10^{-8} to 10^{-10} g/ml
 - 10^{-11} to 10^{-13} g/ml
130. Conductivity of freshly distilled water is _____ $\mu\text{mho cm}^{-1}$.
- 3-60
 - 2-4
 - 0.5-2
 - 50-1500
- Matching type questions (No. 131 to 140); all questions carry equal marks. Choose the correct answer (a, b, c, d or e) for each sub-question (i, ii, iii, iv and v) and enter your choice in the circle (by shading with a pencil) on the OMR - answer sheet as per the instructions given on the answer sheet.**
131. Match the ecological group of plants with their growing condition
- | | |
|-------------------|------------------|
| i) Oxyphytes | a) Acid soil |
| ii) Halophytes | b) Sand |
| iii) Psammophytes | c) Saline soil |
| iv) Lethophytes | d) Rock crevices |
| v) Chasmophytes | e) Rock surfaces |
- 132.
- | <u>Act</u> | <u>Year</u> |
|---|-------------|
| i) The Motor Vehicles Act | a) 1963 |
| ii) The Public Liability Insurance Act | b) 1988 |
| iii) The (Water Prevention and Control of Pollution) Cess Amendment Act | c) 1991 |
| iv) The Earth Summit held in Rio-de-Janerio | d) 1992 |
| v) The IUCN Red List System Initiation | e) 1977 |
- 133.
- | | |
|----------------------------|--------------|
| i) Ecosystem | a) Algore |
| ii) Law of limiting factor | b) Tausley |
| iii) law of tolerance | c) Blackmann |
| iv) Inconvenient Truth | d) R. Carson |
| v) Silent Spring | e) Shelford |

134. Match the following toxic elements with their least permissible maximum concentrations in irrigation waters (in ppm)

- | | |
|---------------|---------|
| i) Fluoride | a) 70 |
| ii) Cadmium | b) 1.5 |
| iii) Chloride | c) 0.01 |
| iv) Boron | d) 1.0 |
| v) Nitrate | e) 45 |

135.

- | | |
|-------------------------------------|----------------------------|
| i) Chloroplast | a) Submontane zone |
| ii) Shorea robusta | b) Geological distribution |
| iii) Actinomycetes | c) Quantasomes |
| iv) Distribution of animals in time | d) Sewage lagoons |
| v) Desulfovibrio | e) Streptomycin |

136. Match the following contaminants with their major sources

- | | |
|---------|--------------------------|
| i) As | a) Battery units |
| ii) Cr | b) Phosphate fertilizers |
| iii) Pb | c) Insecticides |
| iv) Ni | d) Pigments and dyes |
| v) Cd | e) Steel works |

137. Match the following elements with their excitation wavelengths

- | | |
|---------|-----------|
| i) Fe | a) 589 nm |
| ii) Mg | b) 423 nm |
| iii) Ca | c) 214 nm |
| iv) Na | d) 289 nm |
| v) Zn | e) 249 nm |

138. Match the following agricultural activities with their carbon emission potentials (Terra kg/yr)

- | | |
|----------------------------------|----------|
| i) Deforestation | a) 92 |
| ii) Shifting cultivation | b) 62.8 |
| iii) Annual burning of grassland | c) 187.5 |
| iv) Arable land use | d) 6.3 |
| v) Pasture | e) 154.3 |

139. Match the following plants with the air pollutants they can (bio-) monitor

- | | |
|-------------------|----------------------------------|
| i) Tobacco | a) Particulates and heavy metals |
| ii) White pine | b) MO_x |
| iii) Lettuce | c) O_3 |
| iv) Tomato | d) PAN |
| v) Moss & Lichens | e) SO_2 |

140.

- | | |
|------------------------|-------------------------|
| i) Gas | a) C_5 to C_{12} |
| ii) Gasoline (Petrol) | b) C_{12} to C_{16} |
| iii) Lubricating oil | c) C_1 to C_7 |
| iv) Gas oil and diesel | d) C_{15} to C_{18} |
| v) Kerosene | e) C_{16} to upwards |

Short questions (No. 141 to 146); each question carries FIVE marks. Write answers, including computation / mathematical calculations if any, in the space provided for each question on the question paper itself.

141. Application of FYM along with gypsum hastens sodic soil reclamation. Why?

142. Discuss the sources and sinks of carbon monoxide. Explain its atmospheric chemistry.

143. How do you differentiate between an index and indicator? List five major types of water quality indices.

144. 'Green Audit' is a prerequisite for environmental management. Explain why is it required?

145. Describe some important acts and legislation pertaining to environmental protection in India. Briefly mention about how the environmental governance is being practiced in India?

146. Define life cycle analysis (LCA). What are the various steps in LCA? What are its limitations?