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Environmental Science Paper II

Time Allowed : 120 Minutes]

[Maximum Marks : 200

Note : This Paper contains Hundred (100) multiple choice questions. Each question carrying Two (2) marks. Attempt *All* questions.

- 1. Select the suspended growth process of biological treatment from the following :
 - (A) Activated sludge process
 - (B) Trickling filter
 - (C) Rotating biological contactor
 - (D) Anaerobic filter
- 2. In microwave remote sensing, significant wave heights (SWH) over ocean surface can be determined by :
 - (A) Radar Altimeter
 - (B) Synthetic Aperture Radar
 - (C) Shuttle Imaging Radar
 - (D) Thematic Mapper
- 3. Which of the following sequence is correct for the energy flow in the ecosystem ?
 - $\begin{array}{ll} \text{(A)} & \text{Consumers} \rightarrow \text{Decomposers} \rightarrow \\ & \text{Producers} \end{array}$
 - (B) Producers \rightarrow Consumers \rightarrow Decomposers

- 4. Which method of rainwater harvesting can be adopted by individual house owner ?
 - (A) Creation of new water body
 - (B) Roof top rainwater harvesting
 - (C) Construction of recharge trenches
 - (D) Construction of large storage tanks
- 5. Which of the following are the *correct* criteria which meet to prescribe Eco-logo ?
 - (i) Product must cause less pollution in comparison to other products.
 - (*ii*) It should contribute to environmental health disorder.
 - (iii) It should be recycled.
 - *(iv)* It should contribute to save non-renewable resources.
 - (A) (*ii*) (*iii*) (*iv*)
 - (B) (*i*) (*ii*) (*iv*)
 - (C) (i) (iii) (iv)
 - (D) (*i*) (*iii*) (*ii*)

- 6. The process in which the microorganisms produce metabolic products in soil which inhibit growth or cause killing of other microorganisms is known as :
 - (A) Antibiotics
 - (B) Antibiosis
 - (C) Antibodies
 - (D) Antigen
- 7. The colour of Red soil is due to presence of :
 - (A) Magnesium
 - (B) Iron
 - (C) Copper
 - (D) Aluminium
- 8. Which one of the following soils has the highest porosity ?
 - (A) Silty soil
 - (B) Sand soil
 - (C) Clay soil
 - (D) Loam soil
- 9. Tropical Savanna biomes include :
 - (A) Climax vegetation consisting trees and herbs
 - (B) Succulent life forms of plants
 - (C) Tall grasses and short grasses as dominant species
 - (D) Grasslands with scattered trees

- 10. Which of the following is not ethical principle of conservation biology ?
 - (A) The diversity of organism is good
 - (B) The ultimately extinction of species is bad
 - (C) Ecological complexity is bad
 - (D) Evolution is good
- 11. Match the following :
 - (a) Autecology
 - (b) Synecology
 - (c) Biome ecology
 - (d) Ecosystem ecology
 - (1) To study of interactions and interrelationships of more than one biological community with environment
 - (2) To study complex interrelationships of groups of organism and environment
 - (3) To study relationship of individual species to its environment
 - (4) To study interaction and interrelationships of all organisms amongst themselves and environment

	(a)	(<i>b</i>)	(c)	(d)
(A)	(4)	(3)	(2)	(1)
(B)	(3)	(2)	(1)	(4)
(C)	(1)	(2)	(3)	(4)
(D)	(3)	(1)	(2)	(4)

- 12. Genetic diversity in biodiversity is :
 - (A) Sum of total chromosomes in an individual
 - (B) Sum of total chromosomes in the individual species
 - (C) Sum of total genes in an individual
 - (D) Sum of total genetic information in genes of individuals of a species
- 13. Which of the following is not correct for a major project ?
 - (A) Substantial capital investment
 - (B) Cover large area
 - (C) Wide range impacts
 - (D) Employ less numbers
- 14. Match the pairs :

EIA Steps

- (a) Environmental inventory
- (b) Screening
- (c) Scoping
- (d) Environmental setting **Objective**
- (1) Need of EIA
- (2) Defining content of EIA
- (3) Description of affected environment
- (4) Description of environment as it exists
 - (a) (b) (c) (d)
- $(A) \ (2) \ (3) \ (4) \ (1)$
- (B) (3) (4) (1) (2)
- (C) (1) (2) (3) (4)
- $(D) \ (4) \ (1) \ (2) \ (3)$

- 15. Which of the following are the high energy neutral particles ?
 - (A) α -particles
 - (B) y-particles
 - (C) β -particles
 - (D) Neutrons
- 16. Match the following :

Group of Corrosive Substance

- (a) Strong acids
- (b) Strong alkali
- (c) Strong oxidants
- (d) Strong dehydrating agents

Example

- (1) Bromine trifluoride
- (2) Oxygen difluoride
- (3) Sulphuric acid
- (4) Potassium hydroxide
- (*b*) (c)(d)(a)(A) (3)(4)(2)(1)(2)(3)(B) (1) (4)(C) (2) (3)(1)(4)(D) (2) (1) (4)(3)

- 17. Primarily which gas is produced in the open dumps from the decomposition of biodegradable waste ?
 - (A) Ethane
 - (B) Methane
 - (C) Propane
 - (D) Ethene
- 18. What is the range of methane (CH_4) percentage in the biogas ?
 - (A) 30—60
 - (B) 40-70
 - (C) **1—5**
 - (D) 20 30
- 19. The permanent hearing loss in human being under the impact of noise is due to disfunctioning of
 - (A) Tympanic membrane
 - (B) Semicircular canals
 - (C) Sensory cells
 - (D) Malleus, incus and stapes

- 20. What is the resultant noise of 8 equal sound levels of 40 dB(A) emitted at the workplace of an industry ?
 - $(A) \quad 43 \quad dB(A)$
 - $(B) \ 46 \ dB(A)$
 - (C) 49 dB(A)
 - $(D) \ \ 52 \ \ dB(A)$
- 21. Which of the following is a correct statement ?
 - (A) Measurement of sound is a function of electroacoustic method
 - (B) Measurement of sound is a function of electrochemical method
 - (C) Measurement of sound is a function of biophysical method
 - (D) Measurement of sound is a function of electrophysical method

- 22. Which of the following is *correct* for the wavelength of sound wave ?
 - (A) Number of cycles per second
 - (B) Distance travelled by sound wave per second
 - (C) Distance travelled by sound per cycle
 - (D) Distance travelled by sound wave in two cycles
- 23. Seasonal variation means the variation occurring within :
 - (A) A number of years
 - (B) Parts of a year
 - (C) Parts of a month
 - (D) All of the above
- 24. A ground level accidental release of 0.5 g/s occurs at a 4 m height in terrain with a roughness length of $Z_0 = 0.01$ m. Assuming a wind speed of 1 m/s, what is the maximum ground level concentration 4 km downwind estimated from the Gaussian plume equation ?
 - (A) $0.56 \ \mu g/m^3$
 - (B) $0.66 \ \mu g/m^3$
 - $(C) \hspace{0.2cm} 56 \hspace{0.2cm} \mu \text{g/m}^3$
 - $(D) \ \ 66 \ \ \mu g/m^3$

- 25. The P-value in hypothesis testing represents which of the following :
 - (A) The probability of failing to reject the null hypothesis, given the observed results
 - (B) The probability that the null hypothesis is true, given the observed results
 - (C) The probability that the observed results are statistically significant, given that the null hypothesis is true
 - (D) The probability of observing results as extreme or more extreme than currently observed, given that the null hypothesis is true
- 26. In a year there are 900 births in a town a of which 51.5% were males, while in town a and b combined, this proportion in a total of 1350 births was 0.50. What is the proportion of male births in the town b ?
 - (A) 0.47
 (B) 0.49
 (C) 0.50
 (D) 0.51

27. For the following set of consistent equations what is the value of constant K ?

> x - y + z = 1 2x + 2y - z = 2 3x - y + 2z = 34x + y + z = K

- (A) 12
- (B) 8
- (C) 6
- (D) 4
- 28. Which of the following distribution has, mean = variance ?
 - (A) Binomial
 - (B) Poisson
 - (C) Normal
 - (D) Chi-square
- 29. When the correlation coefficientr = 0, then the two regression lines are :
 - (A) Perpendicular to each other
 - (B) Parallel to each other
 - (C) Coincide
 - (D) Do not exist

- 30. A man travelling 900 km by train at an average speed of 60 km per hour and 3000 km by boat at an average speed of 25 km/hr. What is the average speed of a man for the entire distance ?
 - (A) 24.88 km per hour
 - (B) 30.88 km per hour
 - (C) 26.88 km per hour
 - (D) 28.88 km per hour
- 31. The mean of the distribution in which the value of x are 1, 2 n.The frequency of each being unity is :

(A) $\frac{n}{2}$ (B) $\frac{n(n+1)}{2}$ (C) $\frac{(n+1)}{2}$ (D) $\frac{(n-1)}{2}$ 32. A random variable x has the following probability function : Values of x : 0 1 2 3 4 P(x) : 0 k 2k 2k 3kWhat is the value of k ? (A) 0.100 (B) 0.125 (C) 0.166

- (D) 0.150
- 33. What is the maximum limit for oil and grease content of treated effluent ?
 - (A) 1 mg/L
 - (B) 5 mg/L
 - $(C) \ 20 \ mg/L$
 - $(D) \ 10 \ mg/L$
- 34. A body of water enclosed between river mouth and sea salt water is :
 - (A) Estuary
 - (B) Coast
 - (C) River bank
 - (D) Lakes

- 35. Which of the following is not used for removal of particulate pollutants ?
 - (A) Electrostatic precipitator
 - (B) Bag filter
 - (C) Incinerator
 - (D) Cyclone
- 36. Agenda 21 is related to :
 - (A) Climate change issue
 - (B) Sustainable development issue
 - (C) Acid rain issue
 - (D) Global warming issue
- 37. Environmental Pollution Control Authority (EPCA) has been mandated to control air pollution in NCR-Delhi through :
 - (A) National Air Pollution Monitoring Programme
 - (B) Zonal Action Plan
 - (C) Graded Response Action Plan
 - (D) Environmental Pollution Control Plan

- 38. The sun releases energy by :
 - (A) Nuclear fission
 - (B) Nuclear fusion
 - (C) Spontaneous combustion
 - (D) Hydrothermal process
- 39. Maximum mass of the atmosphere exists in the :
 - (A) Troposphere
 - (B) Stratosphere
 - (C) Mesosphere
 - (D) Thermosphere
- 40. Article 51(A) of the Indian Constitution states that :
 - (A) The state has to ensure as its primary duty to bring improvement in public health
 - (B) The state has to protect and improve the environment
 - (C) The state has to ensure as its primary duty to raise the standard of living
 - (D) The citizens are required to protect and improve the natural environment

- 41. Winds in the boundary layer (upto about 1000 m from ground upwards) are controlled by :
 - (A) Pressure gradient force and Coriolis force
 - (B) Pressure gradient force and frictional force
 - (C) Pressure gradient force, frictional force, Coriolis force and centripetal force
 - (D) Pressure gradient force and centripetal force
- 42. In areas away from tropics (high Coriolis force) geotrophic wind is a steady wind which is a balanced motion where :
 - (A) Pressure gradient force is balanced by Coriolis force
 - (B) Pressure gradient force is balanced by centripetal force
 - (C) Coriolis force is balanced by centripetal force
 - (D) Coriolis force and centripetal force are balanced by pressure gradient force

- 43. Atmosphere is a mechanical mixture of several gases and principal components are Nitrogen, Oxygen and Argon. The remain gases which amount to of the total mass are called minor gases.
 - (A) 10%
 - (B) 15%
 - (C) 5%
 - (D) Less than 1%
- 44. A body which is radiating energy such as the sun has a wavelength where it has maximum energy emission (λ_m) that is given by, where T is temperature, P is pressure :
 - (A) $\lambda_m T$ = Constant
 - (B) λ_m/P = Constant
 - (C) λ_m/T = Constant
 - (D) $\lambda_m P$ = Constant

- 45. Equinoxes are the periods when :
 - (A) The sun is directly overhead at $23\frac{1}{2}^{\circ}S$
 - (B) The sun is directly overhead at $23\frac{1}{2}^{\circ}$ N
 - (C) The earth is nearest to the sun
 - (D) The sun shines equally on both Northern and Southern hemisphere
- 46. The mean molecular weight of AIR is nearly 28.9. It remains constant upto a height of and then
 - (A) 80 km, increases
 - (B) 60 km, increases
 - (C) 80 km, decreases
 - (D) 50 km, increases
- 47. Thunderstorms are generally characterised by :
 - (A) Thunder, lightning and showery precipitation
 - (B) Light drizzle type precipitation
 - (C) Light drizzle without thunder and lightning
 - (D) No precipitation but thunder and lightning

- 48. A parcel of air initially at 4000 m descends dry adiabatically to 1000 m height. If the initial temperature was 280 K, what will be its temperature at 1000 m ? (Given DALR = 9.8°/km).
 - (A) 290 K
 - (B) 309.4
 - (C) 200.6
 - (D) 256.4
- 49. Thunderstorms are quite common in India during premonsoon season (March-May). They are most frequently reported from areas in
 - (A) NE India and Bengal
 - (B) Central India
 - (C) Rajasthan and Gujarat
 - (D) Punjab and Haryana
- 50. Tropical cyclones are called hurricanes in regions and are considered as very destructive weather system.
 - (A) South Indian Ocean
 - (B) NE Pacific Ocean
 - (C) N. W. Pacific Ocean
 - (D) North Atlantic Ocean

- 51. First law of Thermodynamics for an adiabatic process is given by the equation :
 - (A) $CvdT = -pd\alpha$
 - (B) CpdT = $-pd\alpha$
 - (C) $CvdT = -\alpha dp$
 - (D) dq = dE + vdp
- 52. Formation of O('D) atom in the ${\rm O}_3 + hv \rightarrow {\rm O}_2 + {\rm O}('{\rm D}) ~~{\rm reaction}~{\rm is}$ due to :
 - (A) Collision
 - (B) Photolysis
 - (C) Termolecular reaction
 - (D) Nuclear fusion
- 53. What range of electromagnetic radiation are most abundantly emitted by the Earth surface ?
 - (A) Microwave
 - (B) Radio wave
 - (C) Ultraviolet
 - (D) Infrared

54.	Ozone-hole in the atmosphere is largely caused by the presence of :	58.	Formation of ozone is maximum over :			
	(A) Oxygen		(A) Africa			
	(B) Hydrogen		(B) America			
	(C) Chloro-fluoro-carbon		(C) Antarctica			
	(D) Radioactive-waste		(D) China			
55.	Which instrument is used to measure the relative humidity of the	59.	Which one of the following has a shortest lifetime in the atmosphere ?			
	air ?		(A) NH ₃			
	(A) Hydrometer		(B) O ₃			
	(B) Hygrometer		(C) CO			
	(C) Barograph		(D) OH			
	(D) Barometer	60.	Lightning in the atmosphere			
56.	The major gases responsible for acid rain are :		produces : (A) CO			
	(A) O_3 and NO_2		(B) NO			
	(B) CO_2 and CO		(C) CO ₂			
	(C) SO_3 and CO	61.	(D) NH_3 An element ${}_{94}A^{238}$ forms another			
	(D) SO_2 and NO_2					
57.	Which of the following is not benefit of vegetation in a watershed ?		element B after one α -particle. The atomic number and the atomic mass of the element B will be :			
	(A) Increases soil compaction		(A) 92 and 236 respectively			
	(B) Slows runoff		(B) 95 and 238 respectively			
	(C) Reduces raindrop splash		(C) 92 and 234 respectively			
	(D) Reduces sediment runoff		(D) 93 and 234 respectively			

- 62. Earth Summit at Rio de Janeiro in 1992 released a blueprint for Environment and Development is known as :
 - (A) Conference of Parties
 - (B) Clean Development Mechanism
 - (C) Agenda 21
 - (D) Kyoto Protocol
- 63. Number of minerals in Mohs scale of hardness is :
 - (A) 8
 - (B) 10
 - (C) 12
 - (D) 15
- 64. Denitrification is a process of :
 - (A) Hydration
 - (B) Carbonation
 - (C) Oxidation
 - (D) Reduction
- 65. Which one of the following is a Ramsar site ?(A) Koyana reservoir(B) Ujani dam
 - (C) Chilka lake
 - (D) Jayakwadi

- 66. According to Beer's law, the intensity of transmitted light is decreased in proportion of :
 - (A) Distance
 - (B) Concentration
 - (C) Volume
 - (D) Time
- 67. The role of suppresser in ion chromatography is to :
 - (A) Maintain the pH of eluent
 - (B) Reduce the baseline conductivity
 - (C) Increase the concentration of eluent
 - (D) Control the interference of metals
- 68. Density of water is maximum at :
 - (A) $10^{\circ}C$
 - (B) 5°C
 - (C) 4°C
- (D) 0°C

69. Five days BOD is taken at a 73. Which one of the following will not react with water to produce H_2 gas temperature of : even at red hot conditions ? (A) 0°C (A) Li (B) 5°C (B) Be (C) $15^{\circ}C$ (C) Ca $(D) 20^{\circ}C$ (D) Mg 70. Chlorination of water is done to 74. One molecule of pentane has : remove : (A) 17 hydrogen atoms (A) Hardness (B) 12 hydrogen atoms (B) Bacteria (C) 5 hydrogen atoms (C) Sediments (D) 9 hydrogen atoms (D) Suspended solids How many electrons are in Ba⁺⁺ ? 75. 71. Molar mass of a compound is the : (A) 46 (B) 54 (A) Mass in 1 lit solvent (C) 56 (B) Mass in 1 mol of a substance (D) 62 (C) Mass in 1 ml of solvent In an aquatic ecosystem level of D.O. 76. (D) Mass in 1 g of a compound from top to bottom shows : 72. 63 g/mol HNO₃ contains : (A) Same D.O. level at all the depth (A) 6.022×10^{23} HNO₃ molecules (B) Less on the top and more at (B) 1000 molecules of HNO₃ bottom (C) 1 molecule of HNO_3 (C) An increase from top to bottom (D) A decrease from top to bottom (D) 100 HNO₃ molecules

- 77. An example of a lentic ecosystem is :
 - (A) River
 - (B) Stream
 - (C) Flowing water
 - (D) Lake
- 78. The various sources of pollutants cause a body of water becomes rich with nutrients. This process is known as :
 - (A) Trophic level
 - (B) Oligotrophic
 - (C) Entropic
 - (D) Entropy
- 79. Which one of the following units of sewage treatment plant is used for removal of dissolved substances ?
 - (A) Activated sludge
 - (B) Secondary clarifier
 - $(C) \ \ Grit \ \ chamber$
 - (D) Sludge digestion

- 80. Role of eukaryotic and prokaryotic organisms is been utilized in the oxidation pond method for treatment of clarified sewage. These organisms are :
 - (A) Bacteria and Algae
 - (B) Algae and Mushrooms
 - (C) Mushroom and Lichens
 - (D) Lichens and Mosses
- 81. Which one of the following nutrients cycle have biological fixation ?
 - (A) Phosphate
 - (B) Oxygen
 - (C) Carbon dioxide
 - (D) Nitrogen
- 82. Shanon index measures :
 - (A) Species richness
 - (B) Relative abundance
 - (C) Frequency
 - (D) Relative frequency

- 83. The species of plants and animalswhich are geographically restrictedin distribution are known as :
 - (A) Rare
 - (B) Extinct
 - (C) Endangered
 - (D) Endemics
- 84. BOD value of sewage indicates :
 - (A) Microbial load of sewage
 - (B) Low oxygen content of sewage
 - (C) High organic matter content of sewage
 - (D) Presence of oxygen dependent microorganisms in sewage
- 85. MPN test is carried out for :
 - (A) Drinking water
 - (B) Waste water
 - (C) Milk or milk products
 - (D) Air

- 86. Eisenia fetida, lumbricus rubellus,Eudrilus eugeniae are importantin :
 - (A) Nitrogen fixation
 - (B) Vermicomposting
 - (C) Phosphate solubilization
 - (D) Insect-biocontrol
- 87. GRIHA is a rating tool for which of the following fields ?
 - (A) Airlines
 - (B) Buildings
 - (C) Industries
 - (D) Automobiles
- 88. Which aquatic fern is used to increase the yield of paddy crops ?
 - (A) Marselia
 - (B) Salvinia
 - (C) Azolla
 - (D) Ariadnaesporites

- 89. Which of the following is an airborne bacterial disease ?
 - (A) Pertussis
 - (B) Influenza
 - (C) Polio
 - (D) Chickenpox
- 90. Which one of the following helps to identify the objects on aerial photographs of the earth surface ?
 - (A) Atmospheric window
 - (B) Signature
 - (C) Radiometric error
 - (D) Atmospheric absorption bands
- 91. Which wavelength can be most useful for remote sensing from satellite in cloud covered conditions ?
 - (A) 0.4 µm
 - $(B) \ 0.4 \ nm$
 - (C) 1.4 μm
 - (D) 4 cm

- 92. Magnitude of the earthquake in scale is a measure of the energy released at the source of earthquake.
 - (A) Richter
 - (B) Mercalli
 - (C) Moh's
 - (D) Levis
- 93. What is the mandatory notice period for public hearing ?
 - (A) 15 days
 - (B) 1 month
 - (C) 2 months
 - (D) 1 week
- 94. The purpose of screening step in EIA is :
 - (A) To assess the quality of project design
 - (B) To determine whether a fullEIA is needed
 - (C) To consult the stakeholders
 - (D) To study the baseline

95. In EIA, the multiattribute theory is used to describe :

(A) The identification of alternativesto be evaluated and structuring ofenvironmental parameters

- (B) Existing environmental quality of study area
- (C) Socio-economic status of the area
- (D) Risk involved in a development project
- 96. Ramsar Convention is aimed at saving :
 - (A) Wetlands
 - (B) Endangered animals
 - (C) Wild habitat
 - (D) All of the above
- 97. The State Government can declare a sanctuary under which section of the Wild Life (Protection) Act, 1972 ?
 - (A) Section 18(1)
 - (B) Section 17(A)
 - (C) Section 12
 - (D) Section 35(1)

- 98. In which form are annual returns for hazardous waste submitted to SPCB annually ?
 - (A) Form 4
 - $(B) \ Form \ 5$
 - (C) Form 10
 - (D) Form 6
- 99. An environmental audit helps in achieving :
 - (A) Waste minimization
 - (B) Resource optimization
 - (C) Compliance to environmental laws
 - $(D) \ All \ of \ the \ above$
- 100. Which of the following is a waste generated in the pulp and paper industry ?
 - (A) Black liquor
 - (B) Spentwash
 - (C) Filter cake
 - (D) All of the above

ROUGH WORK