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Total Number of sheets used: **13**

Name of Examination: **Ph.D Entrance Test (Environmental Science)** 2023-2024

Time: 2 hours Maximum Marks: 200

Instructions: There are 100 MCQ in the entrance test.

Student has to attempt all questions.

There shall be no negative marking

Q1. In a positively skewed distribution, how are the mean, median, and mode related?

A) Mean < Median < Mode

B) Mean > Median > Mode

C) Mean = Median = Mode

D) Mean > Median < Mode

Q2. Which measure of central tendency is not affected by extreme values or outliers?

A) Mean B) Median C) Mode D) Range

Q3. The cultivated area in a SOI topographic sheet is shown in the color of:

A) Red B) Green C) Blue D) Yellow

Q4. If a dataset has a normal distribution, which measure of central tendency is the most representative of the data?

A) Mean B) Median C) Mode D) Range

Q5. The interquartile range (IQR) is defined as:

A) The difference between the maximum and minimum values.

B) The range of the middle 50% of the data.

C) The sum of the deviations from the mean. D) The square root of the variance.

Q6. In a standard deck of 52 playing cards, what is the probability of drawing an ace?

A) 1/13 B) 1/26 C) 1/52 D) 1/4

Q7. In georeferencing, for a 4th order of transformation we need how many ground control points?

A) 12 B) 16 C) 20 D) 24

Q8. In regression analysis, what does the intercept represent?

A) The point where the regression line intersects the x-axis

B) The point where the regression line intersects the y-axis

C) The average of the independent variable D) The coefficient of determination

Q9. How is the *p*-value interpreted in ANOVA?

A) If *p*-value < 0.05, reject the null hypothesis

B) If *p*-value > 0.05, reject the null hypothesis

C) If *p*-value < 0.05, fail to reject the null hypothesis

D) If *p*-value > 0.05, fail to reject the null hypothesis

Q10. Across track scanners in satellite remote sensing uses:

A) Mirror scanners oriented across the swath

B) Mirror scanners combined with pushbroom motion

C) Linear array of detectors combined with pushbroom motion

D) Linear array of detectors and mirror scanners oriented across the swath

Q11. What is the purpose of a control group in an experimental design?

A) To provide a baseline for comparison

B) To manipulate the independent variable

C) To ensure random assignment D) To control for confounding variables

Q12. What is the primary goal of ecological restoration?

A) To create entirely new ecosystems B) To maximize biodiversity in an ecosystem

C) To restore ecosystem services and functions

D) To eliminate all human impact on ecosystems

Q13. What is the concept of "adaptive management" in ecological restoration?

A) The use of non-native species for rapid restoration

B) The continuous adjustment of restoration strategies based on monitoring and learning

C) The exclusion of all human intervention in restoration projects

D) The reliance on natural processes without any intervention

Q14. An aerial photograph was taken from a camera having a 180 mm focal length at a flying height of 2840m above ground. What is an approximate scale of the photograph provided that the average elevation of the terrain from mean sea level is 1200m?

A) 1097 B) 1500 C) 9111 D) 15777

Q15. What is the role of native species in ecological restoration?

A) To compete with and replace non-native species

B) To provide food for wildlife

C) To serve as indicators of ecosystem health

D) To hinder the restoration process

Q16. What is "assisted natural regeneration" in the context of forest restoration?

A) Allowing natural processes to restore forests without human intervention

B) Encouraging natural regeneration with minimal human assistance

C) Artificially creating forests without considering natural processes

D) Completely replacing natural regeneration with exotic species

Q17. A system where agricultural crops are intercropped with tree crops in the interspace between the trees is known as:

A) Agrisilvicultural Systems B) Silvopastoral Systems

C) Agrisilvopastoral Systems D) All of the above

Q18. Choose the false statement about the Cohen's Kappa coefficient measures serves as an indicator of the:

A) The values of Kappa coefficient ranges between 0 to +1.

B) It is a degree of agreement between a pair of variables.

C) It deals with the data that are the result of a judgment.

D) All of the above.

Q19. What is the concept of "natural capital" in ecological economics?

A) Financial assets derived from natural resources

B) The stock of renewable and non-renewable resources in ecosystems

C) The value of manufactured goods in an economy

D) The total income generated by a country

Q20. Which of the following statements best describes the concept of "steady-state economy"?

A) An economy with rapid growth and high consumption levels

B) An economy that maintains a constant level of production and consumption

C) An economy that prioritizes resource extraction and depletion

D) An economy without any natural resource constraints

Q21. Which of the following is NOT a core principle of ecological economics?

A) Sustainable resource use

B) Valuation of natural capital

C) Maximization of economic growth

D) Equity and social justice

Q22. Choose the false statement about the maximum likelihood classifier:

A) It assumes that the distribution of pixels forming classes in training area is equally distributed.

B) The pattern of distribution of pixels can be completely described by mean vector and variance-covariance matrix.

C) The diagonal elements of the matrix contain the covariances between all possible pairs of variables and the off-diagonal elements contain the variances of the variables.

D) It classifies each pixel to the class to which it has the highest probability of being a member.

Q23. In ecological succession, the plant community establishing first in an area is known as:

A) Climax community B) Seral community

C) Pioneer community D) All of the above

Q24. The darker zone in lakes where light penetration is negligible is called:

A) Littoral zone B) Limnetic zone C) Profundal zone D) Euphotic zone

Q25. Alpha richness of species means:

A) The number of species found at a single point

B) The rate of change in species composition across different habitats

C) The rate of change in species across large landscape gradients

D) Richness and evenness of individuals within a habitat unit

Q26. National park situated in Uttarakhand is:

A) Kanha national park B) Dudwa national park

C) Sariska national park D) Jim Corbett national park

Q27. Calculate the value of vegetation index (VI), given that the value of a pixel in near infra- red wavelength spectrum is 172 and in red band is 52.

A) 120 B) 0.53 C) 224 D) 1.86

Q28. International day for Biological diversity is celebrated on:

A) September 16 B) June 05 C) March 21 D) May 22

Q29. Declining population trend is predicted for the coming years when age-pyramid is:

A) Bell-shaped B) Urn-shaped C) Pyramid shaped D) All of the above

Q30. Is an example of lentic ecosystem:

A) River Yamuna B) River Ganga C) Sukhna lake D) Rain water

Q31. Choose the correct statement about Indian satellite missions:

A) Aryabhata was the first Indian Satellite launched on 1974.

B) Bhaskara-I was the first experimental satellite launched for earth observations.

C) Indian National Satellite system (INSAT)-1A was launched in 1982.

D) Rakesh Sharma is the first Indian citizen to land on moon.

Q32. The first national park in India was:

A) Kaziranga B) Jim Corbett C) Dudwa D) Ranthambore

Q33. Secondary productivity refers to:

A) Producers B) Photosynthetic and chemosynthetic microorganisms

C) Producers and Consumers D) Consumers or heterotrophs

Q34. Is a Hotspot of biodiversity in India:

A) Great Indian Desert B) Western Ghats C) Sunderbans D) Great Rann of Kutch

Q35. PSLV stands for:

A) Polar Satellite Launch Vehicle B) Polargeosynchronous Satellite Launch Vehicle

C) Payload Satellite Launch Vehicle D) Payload Space Launch Vehicle

Q36. Is not an invasive species in India:

A) Eichhornia B) Parthenium C) Lantana D) Azadirachta

Q37. What type of coal has maximum carbon and calorific value?

A) Anthracite coal B) Bituminous coal C) Lignite coal D) Wood coal

Q38. One horse power is equal to:

A) 754.7 watts B) 775.5 watts C) 745.7 watts D) 705.7 watts

Q39. Which energy source installation causes migration routes change and death of birds?

A) Hydropower B) Thermal power C) Nuclear power D) Wind energy

Q40. The Chandrayan-3 was launched in to orbit on:

A) 10 July 2023 B) 14 July 2023 C) 18 July 2023 D) 21 July 2023

Q41. Which fertilizers can cause Methemoglobinemia disorder?

A) Phosphorus fertilizers B) Potassium fertilizers

C) Zinc fertilizers D) Nitrogen fertilizers

Q42. Paul Hermann Muller synthesize a pesticide known as:

A) Aldrin B) Endosulfan C) HCH D) DDT

Q43. In ISRO satellite missions 'NavIC' stand for:

A) Navigation with Indian Constellation

B) National Vehicle launch for International Constellation

C) Indian National Communication for Space

D) Navigation for International Communication

Q44. _____ is a pollutant in troposphere but life saving in startosphere:

A) Ozone B) Oxygen C) Carbon D) Nitrogen

Q45. Carboxyhaemoglobin is formed when haemoglobin of blood combines with:

A) Carbon dioxide B) Carbon C) Carbon monoxide D) Carbon sulphide

Q46. Consumption of methyl mercury contaminated fish in Japan caused:

A) Minimata disease B) Lung disease C) Ouch-ouch disease D) Skin disease

Q47. The microwave region in electromagnetic radiation lies in the spectral region of:

A) 400nm to 700nm B) 700nm to 0.1mm

C) 0.1mm to 1mm D) 1mm to 1m

Q48. As per waste water treatment terminology "RBC" means:

A) Red blood corpuscles B) Rotating biological contactors

C) Reflecting biological contractors D) All of the above

Q49._____ accumulates in the bones and causes leukemia or bone marrow cancer:

A) Strontium-90 B) Iodine-131 C) Uranium-235 D) Cesium-137

Q50. Following is a false statement about the LiDAR:

A) It is an active remote sensing technology

B) It uses a monochromatic beam of laser radiation

C) It uses laser pulses of a very short duration

D) It uses multiple return echoes of an emitted laser pulse

Q51. Thermal pollution can be controlled by:

A) Cooling ponds B) Cooling towers C) Spray ponds D) All of the above

Q52. Dobson (DU) unit is for measuring:

A) Atmospheric oxygen B) Atmospheric carbon

C) Atmospheric ozone D) Atmospheric nitrogen

Q53. The National Geospatial Policy in India was launched in the year:

A) 2018 B) 2020 C) 2022 D) 2024

Q54. Montreal protocol is related with

A) Green house effect B) Ozone layer depletion

C) Acid rain D) Wasteland management

Q55. Gas, leaked in Bhopal gas tragedy, was:

A) Methyl isocyanate B) Butyl isothiocynate

C) Ethyl isothiocynate D) Sodium isothiocynate

Q56. Sounding balloons are used for:

A) Exploring the atmosphere B) Exploring the space
C) Exploring the sound D) Exploring the oceans

Q57. Itai-itai disease in Japan caused by consumption of rice contaminated with

A) Mercury B) Iron C) Cadmium D) Zinc

Q58. In the absence of particles and scattering, the sky would appear:

A) White B) Black C) Red D) Yellow

Q59. Activated sludge process used for wastewater treatment is a:

A) Physical treatment technique B) Biological treatment technique

C) Chemical treatment technique D) Tertiary treatment technique

Q60. Which is not true for Loktak lake:

A) Is the largest fresh water lake in Northeast India B) Located in the state of Meghalaya

C) Recognised as Ramsar site D) Have world's only floating national park in it

Q61. The spectral signature is the reflectance as a function of:

A) Reflectance as a function of wavelength B) Transmittance in a space

C) Scattering due to refraction D) None of the above

Q62. Which one is not matched correctly?

A) Stockholm conference	A) Sweden, 1972
B) Copenhagen summit	B) Denmark, 2009
C) Rio+10	C) Johannesburg, 2002
D) Kyoto Protocol	D) Our Common Future, 1987

Q63. Collision-coalescence theory was propounded to explain:

A) Cyclones B) Tornadoes C) Hurricanes D) Precipitation

Q64. Select the correct statement about the atmospheric window

A) It is a spectral region where light can be transmitted through the atmosphere.

B) It is a space in the atmosphere where light reaches to the Earth's surface.

C) It is a spectral region where light is reflected back from the Earth's surface.

D) It is an absorption portion of the electromagnetic spectrum in the atmosphere which is blocked.

Q65. Which form of chromium is more toxic:

A) Trivalent B) Hexavalent C) Metallic D) None of these

Q66. Anand is a:

A) LiDAR satellite B) Hyperspectral satellite

C) Navigation satellite D) Weather satellite

Q67. The anthrosphere is:

A) The outer mantle of the solid earth

B) The protective blanket of gases surrounding the earth

C) The part of environment made or modified by humans

D) The realm of living organisms and their interaction with the environment

Q68. Is true for stratosphere layer of atmosphere:

A) Having negative lapse rate with less vertical mixing

B) Having positive lapse rate with less vertical mixing

C) Having positive lapse rate with more vertical mixing

D) Having negative lapse rate with more vertical mixing

Q69. Pattern relates to:

A) General outline of individual objects

B) Spatial arrangement of objects in an image

C) Frequency of tonal change on an image

D) Presence of certain features in relation to other recognizable features

Q70. The permissible limit of fluoride as per Bureau of Indian Standard is:

A) 1.0 mg/L B) 1.5 mg/L C) 0.5 mg/L D) 0.05 mg/L

Q71. The most common chemical used for cloud seeding is:

A) Silver iodide B) Zinc iodide C) Sodium chloride D) Potassium chloride

Q72. Select the false statement

A) Raster is a simple grid or pixel data structure

B) Vector is a complex data structure

C) The geometry of a vector feature describes its shape and position

D) Raster data occupies less disk space than the vector data

Q73. The term insolation denotes:

A) Albedo B) Scattered radiations

C) Direct and diffuse shortwave radiations D) Diffuse shortwave radiations

Q74. Author of the book entitled "Silent Spring" is

A) E. P. Odum B) Rachel Carson C) Ernst Haekel D) A. G. Tansely

Q75. Slope is the ratio of:

A) Elevation difference between the higher neighbours and the lower neighbours

B) Elevation difference between the horizontal distance between the neighbours.

C) Elevation difference between the higher and lower neighbors, and horizontal distance between those neighbours.

D) Horizontal distance between the higher and lower neighbours and the elevation difference between those neighbours

Q76. Who is the Father of Indian Remote Sensing:

A) Homi Jehangir Bhabha B) P. R. Pisharoty

C) C. V. Raman D) Satish Dhawan

Q77. In EIA, a method in which maps are prepared on individual environmental components and displayed on transparencies is known as:

A) Overlays B) Matrix C) Checklists D) Leopold matrix

Q78. Select the false statement about the triangulated irregular network

A) It is a series of triangular polygons

B) The triangles are three dimensional

C) Each triangle is represents one face of the terrain surface

D) x, y and z coordinates are located on each node of the triangle, respectively.

Q79. After oxygen and silicon which element has highest abundance (% by wt.) in the earth's crust?

A) Potassium B) Sodium C) Calcium D) Aluminium

Q80. Names like "The Little Boy" or "Christ Child" in Spanish are for:

A) Monsoon B) Cyclone C) La Nina D) El Nino

Q81. Father of lasers is:

A) Albert Einstein B) Theodore Maiman

C) Charles H. Townes D) Arthur Leonard Schawlow

Q82. Bhukosh is the web-based utility for all the:

A) Geoscientific data of GSI B) Geographic content prepared by the ISRO.

C) Geological data of GSI D) All of the above.

Q83. Wien's displacement law describes:

A) Relationship between total energy emitted and the absolute temperature.

B) Spectral brightness of black body radiation as a function of wavelength at any given temperature.

C) Spectral density of the emission can be determined for each wavelength at a particular temperature.

D) A blackbody radiation curve for different temperatures peaks at a wavelength inversely proportional to the temperature.

Q84. Pyrolysis of Solid Waste refers to:

A) High-temperature aerobic incineration

B) High-temperature anaerobic distillation of waste for energy production

C) Ambient anaerobic distillation

D) Ambient aerobic distillation

Q85. Which of the following microbes is known as the superbug that could clean up oil spills?

A) *Bacillus nitrificans* B) *Pseudomonas denitrificans*

C) *Pseudomonas putida* D) *Bacillus subtillis*

Q86. In GIS, boundary dissolving leads to:

A) Reclassification of the information

B) Retrieval of the 3-D information

C) Select features within the feature network

d) Identify a feature which is near to any other feature based on location

Q87. The bioremediation technology which involves the addition of microbial culture is called as:

A) Bioventing B) Phytotechnology C) Bioaugmentation D) Biosorption

Q88. The clouds are seen as white bodies due to:

A) Mie scattering B) Rayleigh scattering

C) Selective scattering D) Non-selective scattering

Q89. The toxic compounds are generally detoxified by:

A) Reduction B) Oxidation C) Sterilization D) Hydrolysis

Q90. Immobilized cell bioreactors are based on:

A) Cells cultures in solid medium B) Cells cultures in liquid medium

C) Cells entrapped in gels d) All of these

Q91. The Chandrayan-3 rover ramped down on the moon from the lander on:

A) 22 August 2023 B) 23 August 2023 C) 24 August 2023 D) 25 August 2023

Q92. Mass spectrometers are used to determine which of the following?

A) Composition in sample B) Properties of sample

C) Relative mass of atoms D) Concentration of elements in sample

Q93. Which technique is commonly used to analyze the composition of air pollutants?

A) Fourier-transform infrared spectroscopy B) X-ray diffraction

C) Atomic force microscopy D) Mass spectrometry

Q94. What is the purpose of validation in environmental analysis?

A) To optimize the sample preparation method B) To reduce the analysis time

C) To verify the accuracy and reliability of the analytical method

D) To determine the limit of detection of the analytical technique

Q95. Calculate the length of a synthetic antenna for a SAR system orbiting at 1000km, given that the real antenna length is 40m and the wavelength of transmitted radar pulse is 125mm.

A) 5000km B) 3.125km C) 10000km D) 1.562km

Q96. Which of the following detectors used in liquid chromatography is also called micro-adsorption detectors?

A) Refractive index detectors B) Thermal detectors

C) Electrochemical detectors D) Fluorescence detectors

Q97. Bt toxin is considered to be _____.

A) An organic insecticide produced by bacteria B) Gene for modifying insect DNA

C) Useful for humans to fight against insects D) A recombinant protein

Q98. Which of the following biosensors is a formaldehyde biosensor?

A) Calorimetric biosensor B) Piezo-electric biosensor

C) Optical biosensor D) None of these

Q99. Photogrammatically compute an approximate height of a chimney from the two stereo aerial photographs captured from an aircraft flying at an altitude of 225m. The difference in distance between the top and bottom of the chimney on the two photographs is 5cm, and the average photo base length for the two photographs is 80cm.

A) 87m B) 138m C) 98m D) 225m

Q100. Which technique is used to determine the concentration of metals in sediments and soils?

A) Atomic absorption spectroscopy B) Inductively coupled plasma mass spectrometry

C) X-ray fluorescence spectroscopy D) High-performance liquid chromatography