Test Booklet Series

A

Test Booklet No.

Test Booklet
(Environment Studis)

Name of Applicant ..... Answer Sheet No. .....

Applicant ID/Roll No. : ..... Signature of Applicant : .....

Date of Examination : ..... Signature of the Invigilator(s)

Time of Examination : ..... 1. .....

2. .....

Duration : 2 Hour] **[Maximum Marks : 100**

IMPORTANT INSTRUCTIONS

(i) The question paper is in the form of Test-Booklet containing **100 (Hundred)** questions. All questions are compulsory. Each question carries four answers marked (A), (B), (C) and (D), out of which only one is correct. Choose the correct option or the most appropriate option.

(ii) On receipt of the Test-Booklet (Question Paper), the candidate should immediately check it and ensure that it contains all the pages, i.e., **100** questions. Discrepancy, if any, should be reported by the candidate to the invigilator immediately after receiving the Test-Booklet.

(iii) A separate Answer-Sheet is provided with the Test-Booklet/Question Paper. On this sheet there are **100** rows containing four circles each. One row pertains to one question.

(iv) The candidate should write his/her Application ID/Roll number at the places provided on the cover page of the Test-Booklet/Question Paper and on the Answer-Sheet and NOWHERE ELSE.

(v) No second Test-Booklet/Question Paper and Answer-Sheet will be given to a candidate. The candidates are advised to be careful in handling it and writing the answer on the Answer-Sheet.

(vi) For every correct answer of the question **One (1) mark will be awarded**.

(vii) Marking shall be done only on the basis of answers responded on the Answer-Sheet.

(viii) To mark the answer on the Answer-Sheet, candidate should darken the appropriate circle in the row of each question with Blue or Black pen.

(ix) For each question only **one** circle should be **darkened** as a mark of the answer adopted by the candidate. If more than one circle for the question are found darkened or with one black circle any other circle carries any mark, the answer will be treated as incorrect.

(x) The candidates should not remove any paper from the Test-Booklet/Question Paper. Attempting to remove any paper shall be liable to be punished for use of unfair means.

(xi) Rough work may be done on the blank space provided in the Test-Booklet/Question Paper only.

(xii) *Mobile phones (even in Switch-off mode) and such other communication/programmable devices are not allowed inside the examination hall.*

(xiii) No candidate shall be permitted to leave the examination hall before the expiry of the time.

DO NOT OPEN THIS QUESTION BOOKLET UNTIL ASKED TO DO SO.

PART–A

1. Research is
   (A) Searching again and again
   (B) Finding a solution to any problem
   (C) Working in a scientific way to search for the truth of any problem
   (D) None of the above

2. The conceptual framework in which research is conducted is called a
   (A) Synopsis of research
   (B) Research design
   (C) Research hypothesis
   (D) Research paradigm

3. What are the main characteristics of Scientific Research?
   (A) Empirical
   (B) Theoretical
   (C) Experimental
   (D) All the above

4. Which research design will be most appropriate to study the relationship between the level of aspirations and achievement of rural children?
   (A) Experimental Research Design
   (B) Ex Post Facto Research Design
   (C) Historical Research Design
   (D) Survey Research Design

5. The principles of fundamental research are used in:
   (A) action research
   (B) applied research
   (C) philosophical research
   (D) historical research

6. A shift in attitude in respondents between two points during data collection is called
   (A) Reactive effect
   (B) Maturation effect
   (C) Regression effect
   (D) Conditioning effect

7. Ethical Norms in research do not involve guideline for:
   (A) Thesis Format
   (B) Copyright
   (C) Patenting Policy
   (D) Data sharing Policy

8. The primary objective of an experimental research design is to:
   (A) Explore an unknown topic.
   (B) Establish cause-and-effect relationships.
   (C) Describe a population or situation.
   (D) Examine the relationship between variables without manipulation.

9. The research that aims at immediate application is:
   (A) Action Research
   (B) Empirical Research
   (C) Conceptual Research
   (D) Fundamental Research

10. A null hypothesis is
   (A) when there is no difference between the variables
   (B) the same as research hypothesis
   (C) subjective in nature
   (D) when there is difference between the variables

11. When the researcher rejects a true null hypothesis a ---------- error occurs.
   (A) Type I
   (B) Type A
   (C) Type II
   (D) Type B

12. The researcher is usually interested in supporting ..... when he or she is engaging in hypothesis testing:
   (A) The alternative Hypothesis
   (B) The null Hypothesis
   (C) Both alternative and null Hypothesis
   (D) Neither the alternative or null Hypothesis

13. A research design is often described as the "blueprint" for a research project. This emphasizes its role in:
   (A) Collecting data
   (B) Analysing data
   (C) Providing a strategy and framework for the study
   (D) Presenting findings

14. What is a cross-sectional research design?

(A) A design in which a data is collected at one point of time.

(B) A design in which data is collected over a period of time.

(C) A design in which data is collected from a representative sample of the population.

(D) A design in which data is collected from a non-representative sample of the population.

15. Match the measurement scale to the given variables:

Scale of measurement	**Variable**
(a) Nominal	(i) Height of student
(b) Ordinal	(ii) Time of day
(c) Interval	(iii) Caste
(d) Ratio	(iv) Rank of Army Personnel

Choose the correct answer from the options given below:

(A) (a) – (i), (b) – (ii), (c) – (iii), (d) – (iv)

(B) (a) – (ii), (b) – (iii), (c) – (iv), (d) – (i)

(C) (a) – (iii), (b) – (iv), (c) – (ii), (d) – (i)

(D) (a) – (iv), (b) – (i), (c) – (ii), (d) – (iii)

16. Which is the simplest form of Measurement?

(A) Ordinal (B) Nominal

(C) Ratio (D) Interval

17. The data is obtained through a survey conducted is called:

(A) Primary data (B) Secondary data

(C) Continuous data (D) Qualitative data

18. A survey in which the information is collected from each and every individual of the population is known as:

(A) Sample survey (B) Pilot survey

(C) Biased survey (D) Census survey

19. Interview is an example of which data?

(A) Primary data (B) Secondary data

(C) Both (A) and (B) (D) None of the above

20. What is the process of organizing raw data into rows and columns for systematic analysis called?
(A) Compilation
(B) Presentation
(C) Tabulation
(D) Classification

21. The graphical representation of a frequency distribution is called
(A) Bar chart
(B) Line chart
(C) Histogram
(D) Pie char

22. Identify the correct sequence of research steps:
(A) Selection of topic, review of literature, data collection, interpretation of findings
(B) Review of literature, selection of topic, data collection, and interpretation of findings
(C) Selection of topic, data collection, review of literature, interpretation of findings
(D) Selection of topic, review of literature, interpretation of findings, data collection

23. When a research problem is related to heterogeneous population, the most suitable sampling method is:
(A) Cluster Sampling
(B) Stratified Sampling
(C) Convenient Sampling
(D) Lottery Method

24. A researcher wants to study the long-term effects of a new teaching method on student performance over several years. Which research design would be most appropriate?
(A) Cross-sectional design
(B) Case study design
(C) Longitudinal design
(D) Survey design

25. From the list given below identify those which are called non-probability sampling procedures:
(i) Simple random sampling
(ii) Dimensional sampling
(iii) Snowball sampling
(iv) Cluster sampling
(v) Quota sampling
(vi) Stratified sampling
Choose the correct option
(A) (i), (ii) and (iii)
(B) (ii), (iv) and (v)
(C) (i), (iii) and (v)
(D) (ii). (iii) and (v)

26. Among the following types of sampling techniques, which one is also known as 'Judgmental' sampling?

(A) Quota sampling
(B) Convenience Sampling
(C) Cluster Sampling
(D) Purposive Sampling

27. The primary objective of an experimental research design is to:

(A) Explore an unknown topic.
(B) Establish cause-and-effect relationships.
(C) Describe a population or situation.
(D) Examine the relationship between variables without manipulation.

28. "Students from the pure mathematics background can crack a bank recruitment test"—Which type of hypothesis is this?

(A) Relational Hypothesis
(B) Descriptive hypothesis
(C) Two tailed Hypothesis
(D) Null Hypothesis

29. Parametric tests make assumptions on:

(A) The population size
(B) The underlying distribution
(C) The sample size
(D) The mean sample

30. If the researcher has a nominal data, which non parametric test will he/she can use:

(A) T-test
(B) Z-test
(C) Chi square test
(D) All the above

31. If a researcher needs to verify whether there is a significant difference between the means of two groups to test a hypothesis, which statistical method would he/she employ?

(A) Chi-square test
(B) Correlation coefficient
(C) Sign-test
(D) Student's t-test

32. Chi-square is used to analyse:

(A) Scores
(B) Ranks
(C) Frequencies
(D) None of these

33. On which of the following does the critical value for a chi-square statistic rely?

(A) The degrees of freedom
(B) The sum of the frequencies
(C) The row totals
(D) The number of variables

34. Calculated value of chi-square is always.....

(A) Positive
(B) Negative
(C) Zero
(D) None of these

35. Which of the following best describes the purpose of using ANOVA in research?

(A) ANOVA is used to compare the means of two groups.
(B) ANOVA is use to compare the means of more than two groups.
(C) ANOVA is used to determine the correlation between two variables.
(D) ANOVA is used to determine the interaction effect between dependent variables.

36. What do ANOVA calculate?

(A) T-Ratio
(B) Chi-square
(C) Z-Ratio
(D) F-Ratio

37. What is the primary goal of factor analysis?

(A) To predict a dependent variable from multiple independent variables.
(B) To reduce a large number of variables into a smaller set of underlying factors.
(C) To determine the causal relationship between variables.
(D) To calculate the correlation between two variables.

38. Which assumption is required for factor analysis?

(A) Extreme collinearity exists among variables.
(B) Variables have a skewed distribution.
(C) A linear relationship exists among variables.
(D) There are many outliers in the data.

39. When using Principal Component Analysis (a common method for factor analysis), what does the first principal component capture?
(A) The minimum variance.
(B) The mean deviation.
(C) The maximum variance.
(D) The average variance.

40. Which statistical measure is used to assess the sampling adequacy for conducting factor analysis?
(A) Kaiser-Meyer-Olkin (KMO) measure.
(B) Bartlett's test of sphericity.
(C) Eigenvalue.
(D) All of the above.

41. The process by which we estimate the value of dependent variable on the basis of one or more independent variable is called:
(A) Correlation
(B) Regression
(C) Residual
(D) Slope

42. The major characteristic of correlation analysis is to seek out
(A) Differences among variables
(B) Variations among variables
(C) Association among variables
(D) Regression among variables

43. A correlation coefficient (r) of –1.0 indicates a:
(A) Perfect positive correlation
(B) Weak positive correlation
(C) No correlation
(D) Perfect negative correlation

44. The statistical tool that studies the degree of association between two variables is called:
(A) Regression
(B) Standard error
(C) Index numbers
(D) Correlation

45. Which type of correlation analysis is appropriate for examining the relationship between variables with non-linear relationships?
(A) Pearson's correlation
(B) Spearman's rank correlation
(C) Both Pearson's and Spearman's
(D) Neither Pearson's nor Spearman's

46. What is the primary goal of cluster analysis?
(A) Classifying data into predefined groups.
(B) Predicting a continuous value.
(C) Grouping similar data points together based on their characteristics.
(D) Reducing the number of variables in a dataset.

47. The primary purpose of conjoint analysis is to:
(A) Identify which customer segments are most profitable.
(B) Determine the price elasticity of demand for an existing product.
(C) Quantify the value that consumers place on different features of a product or service.
(D) Predict sales volume for a new product with absolute certainty.

48. The most common type of conjoint analysis, which presents respondents with sets of product profiles and asks them to choose the one they prefer most, is known as:
(A) Adaptive Conjoint Analysis (ACA).
(B) Choice-Based Conjoint (CBC).
(C) Full-Profile Conjoint Analysis.
(D) Self-Explicated Conjoint Analysis.

49. Which statement is an accurate representation of a "trade-off" in conjoint analysis?
(A) A decision to buy a product from one brand over another.
(B) A decision to delay a purchase until a later date.
(C) A customer choosing a larger screen over longer battery life for a phone.
(D) A customer buying a product with all the most desired features.

50. What is the primary purpose of discriminant analysis?
(A) To determine the effect of independent variables on a continuous dependent variable.
(B) To identify the underlying structure or dimensions within a set of variables.
(C) To classify cases into two or more distinct, pre-defined groups based on a set of predictor variables.
(D) To cluster data points into a specific number of groups based on their similarities.

PART–B

(Environment Studis)

51. If ocean salinity increases while temperature remains constant, the density of seawater will :

(A) Increase
(B) Decrease
(C) Remain constant
(D) First increase, then decrease

52. The process of vertical circulation of ocean water due to density differences is known as:

(A) Thermohaline circulation
(B) Upwelling
(C) Ekman transport
(D) Gyre formation

53. The Mohorovičić discontinuity separates:

(A) Crust and mantle
(B) Mantle and outer core
(C) Outer core and inner core
(D) Lithosphere and asthenosphere

54. Approximately what fraction of incident solar energy is used for photosynthesis globally?

(A) 10%
(B) 1%
(C) 0.1%
(D) 0.01%

55. Which of the following is a *non-renewable* but *recyclable* natural resource?

(A) Coal
(B) Petroleum
(C) Aluminium
(D) Natural gas

56. The "Biosphere Reserve" concept was launched under which UNESCO programme?

(A) UNEP Earth Charter
(B) Man and the Biosphere (MAB) Programme
(C) World Heritage Convention
(D) Agenda 21

57. The "polluter pays principle" is embedded in:

(A) Kyoto Protocol
(B) Stockholm Declaration
(C) Rio Declaration
(D) Basel Convention

58. The "minor but variable" constituent of air responsible for much of the greenhouse effect and weather phenomena is:

(A) CO_2
(B) O_3
(C) H_2O vapor
(D) CH_4

59. The most important oxidizing radical in the troposphere is:

(A) $O(^3P)$
(B) OH
(C) NO_2
(D) Cl

60. The photodissociation of ozone produces:

(A) $O_2 + O(^1D)$
(B) $O_3^- + O^+$
(C) $O_2^- + O$
(D) O + O + O

61. The key initiating step in the formation of photochemical smog is:

(A) Hydrocarbon oxidation
(B) NO_2 photolysis
(C) CO oxidation
(D) O_3 reaction with VOCs

62. The main oxidant responsible for nighttime atmospheric chemistry (in absence of sunlight) is :

(A) OH
(B) O_3
(C) NO_3
(D) Cl.

63. The relationship between COD and BOD for domestic wastewater is generally:

(A) COD ≈ BOD
(B) COD ≈ 2 × BOD
(C) COD ≈ 4 × BOD
(D) COD ≈ ½ × BOD

64. In COD test, what is the role of Ag_2SO_4?

(A) Catalyst for oxidation of chloride

(B) Catalyst for oxidation of aromatic compounds

(C) To remove interfering sulfates

(D) To reduce dichromate ions

65. Which of the following represents correct decreasing order of oxygen demand?

(A) COD > BODu > BOD_5

(B) BOD_5 > COD > BODu

(C) BOD_5 > BODu > COD

(D) COD = BOD_5 = BODu

66. In the Winkler DO method, the endpoint is determined by titrating with:

(A) $Na_2S_2O_3$

(B) $KMnO_4$

(C) $K_2Cr_2O_7$

(D) H_2O_2

67. The presence of nitrifying bacteria during BOD testing leads to:

(A) Overestimation of BOD

(B) Underestimation of BOD

(C) No effect

(D) Inhibition of microbial activity

68. The fraction of organic matter that remains resistant to decomposition is known as :

(A) Litter

(B) Fulvic acid

(C) Humic acid

(D) Humin

69. The process of biological nitrogen fixation requires the enzyme:

(A) Nitrite reductase

(B) Nitrate reductase

(C) Nitrogenase

(D) Glutamate synthase

70. Which form of phosphorus is directly available to plants?

(A) Organic P

(B) Polyphosphate

(C) $H_2PO_4^-$ and HPO_4^{2-}

(D) P_2O_5

71. Which element in NPK fertilizers contributes most to root development?

(A) Nitrogen
(B) Phosphorus
(C) Potassium
(D) Sulphur

72. The Liebig's Law of Minimum states that:

(A) Nutrients act synergistically
(B) The most abundant nutrient limits growth
(C) Growth is limited by the scarcest essential nutrient
(D) Nutrients are equally important

73. Arsenic acts biochemically by:

(A) Replacing phosphate in ATP synthesis
(B) Displacing calcium from bone
(C) Mimicking zinc in enzymes
(D) Replacing magnesium in chlorophyll

74. Cadmium binds in the human body to:

(A) Haemoglobin
(B) Myoglobin
(C) Metallothionein
(D) Albumin

75. Lead primarily affects which body system?

(A) Cardiovascular
(B) Nervous
(C) Endocrine
(D) Immune

76. Carbamate insecticides differ from organophosphates because:

(A) They act irreversibly
(B) They are less biodegradable
(C) They reversibly inhibit acetylcholinesterase
(D) They bioaccumulate in fat

77. The main mechanism of carcinogenic action of polycyclic aromatic hydrocarbons (PAHs) is:

(A) Direct DNA alkylation

(B) Metabolic activation to reactive epoxides

(C) Protein denaturation

(D) ROS scavenging

78. The ratio of energy used for respiration to gross primary production is known as:

(A) Photosynthetic efficiency (B) Respiratory quotient

(C) Assimilation ratio (D) R/G ratio

79. The ecosystem that shows the highest total productivity on Earth is:

(A) Coral reef (B) Open ocean

(C) Tropical rainforest (D) Estuary

80. Which of the following relationships is correct?

(A) NPP = GPP + R (B) NPP = GPP − R

(C) GPP = NPP − R (D) NPP = GPP × R

81. In an aquatic ecosystem, the biomass pyramid is often inverted because:

(A) Phytoplankton reproduce slowly

(B) Decomposers are more abundant

(C) Phytoplankton have low biomass but high productivity

(D) Consumers feed on detritus

82. The ecological efficiency between two trophic levels is given by:

(A) (Energy at lower / Energy at higher) × 100

(B) (Energy at higher / Energy at lower) × 100

(C) (NPP / GPP) × 100

(D) (Respiration / Assimilation) × 100

83. Shannon–Weiner Index measures:

(A) Species richness only

(B) Species dominance

(C) Species diversity considering both richness & evenness

(D) Genetic diversity

84. The first organisms to colonize bare rock are usually:

(A) Fungi (B) Algae

(C) Lichens (D) Mosses

85. When N = K in logistic growth, the rate of population growth is:

(A) Maximum (B) Zero

(C) Half of maximum (D) Unpredictable

86. In commensalism, the interaction is symbolized as:

(A) (+, +) (B) (−, −)

(C) (+, 0) (D) (+, −)

87. The "Hangul" or Kashmir stag (Cervus elaphus hanglu) is mainly confined to :

(A) Dachigam National Park (B) Corbett National Park

(C) Kanha National Park (D) Hemis National Park

88. The "Project Tiger" was launched in :

(A) 1970 (B) 1972

(C) 1973 (D) 1980

89. A "lahar" is :

(A) A volcanic gas

(B) A type of lava flow

(C) Volcanic mudflow of water and ash

(D) Ash plume in stratosphere

90. The deepest earthquakes occur at:

(A) Divergent plate boundaries (B) Transform faults

(C) Subduction zones (D) Mid-ocean ridges

91. Which of the following satellite systems is used in India for real-time flood monitoring?

(A) INSAT-3D and CARTOSAT (B) GSAT only

(C) IRNSS only (D) EDUSAT

92. NDVI (Normalized Difference Vegetation Index) is most sensitive to changes in:

(A) Leaf water content (B) Chlorophyll concentration

(C) Soil color (D) Atmospheric humidity

93. In anaerobic digestion for biogas production, methane is primarily formed during the stage of:

(A) Hydrolysis (B) Acidogenesis

(C) Acetogenesis (D) Methanogenesis

94. The most accurate and continuous method for monitoring ambient SO_2 concentrations is:

(A) West and Gaeke colorimetric method

(B) Conductometric method

(C) Flame photometry

(D) Ultraviolet fluorescence method

95. The most accurate indicator of recent organic pollution in a water body is:

(A) Chemical Oxygen Demand (COD)

(B) Total Suspended Solids (TSS)

(C) Biochemical Oxygen Demand (BOD_5)

(D) Dissolved Oxygen (DO)

96. Which of the following is considered an effective in-situ method for soil pollution control?

(A) Landfilling

(B) Phytoremediation using hyperaccumulator plants

(C) Soil washing with acids

(D) Incineration of soil

97. The permissible noise level in residential areas during daytime in India according to CPCB standards is:

(A) 50 dB(A)

(B) 55 dB(A)

(C) 65 dB(A)

(D) 75 dB(A)

98. Which of the following is a major consequence of chronic low-level thermal pollution?

(A) Acidification of water

(B) Altered metabolic rates and oxygen demand of aquatic organisms

(C) Heavy metal accumulation

(D) Increased sedimentation

99. Strategic Environmental Assessment (SEA) differs from EIA because it:

(A) Is applied at policy, plan, or program level rather than project level

(B) Only measures air pollution

(C) Does not require public participation

(D) Focuses exclusively on water quality

100. A solar pond stores thermal energy primarily due to:

(A) Evaporation of surface water

(B) Salt gradient suppressing convection

(C) Photovoltaic conversion

(D) Geothermal heating

ROUCH WORK

ROUCH WORK