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**PD-39**

**Total No. of Pages : 14**

**Ph.D. Entrance Examination-2025**  
**Environmental Science & Engg.**  
**Sub. Code: 58749**

**Day and Date : Wednesday, 10-09-2025**

**Total Marks : 100**

**Time : 10.00 a.m. to 12.00 noon**

**Instructions:**

1. All questions are compulsory.
2. Each question carries 2 marks.
3. Answers should be marked in the given OMR answer sheet by darkening the appropriate option.
4. Use black ball point pen only for marking the circle. Do not make any stray mark on the OMR Answer Sheet.
5. Follow the instructions given on OMR Sheet.
6. Rough work shall be done on the sheet provided at the end of question paper.
7. Only non programmable calculators are allowed.

1. In the context of Environmental Impact ssessment (EIA), the term baseline data refers to:
  - a) The threshold limit values of pollutants
  - b) The data collected after project commissioning
  - c) The current status of environmental parameters before project implementation
  - d) The projected future impacts of the project
2. The dispersion of air pollutants from a point source is mast strongly influenced by:
  - a) Wind speed and atmospheric stability
  - b) Soil moisture and land use
  - c) Concentration of greenhouse gases
  - d) Altitude of nearby buildings

3. The phenomenon of temperature inversion in the lower atmosphere leads to:
  - a) Enhanced vertical mixing of pollutants
  - b) Dispersion of pollutants away from the ground
  - c) Trapping of pollutants near the ground surface
  - d) Higher precipitation and pollutant washout
4. In conventional water treatment plants, alum  $(\text{Al})(\text{SO}_4)_3 \cdot 18\text{H}_2\text{O}$  is used as a coagulant. The primary function of coagulation is to:
  - a) Kill pathogenic microorganisms
  - b) Reduce turbidity by destabilizing colloidal particles
  - c) Remove hardness by precipitation
  - d) Neutralize acidic water by increasing PH
5. The primary function of a trickling filter in wastewater treatment is to:
  - a) Remove suspended solids through sedimentation
  - b) Achieve biological oxidation of organic matter using attached growth microorganisms
  - c) Disinfect wastewater before discharge
  - d) Reduce heavy metal concentration by chemical precipitation
6. In the activated sludge process, the purpose of returning a portion of settled sludge from the secondary clarifier to the aeration tank is to:
  - a) Increase dissolved oxygen in the tank
  - b) Maintain a desired concentration of microorganisms (MLSS)
  - c) Reduce the sludge volume in the clarifier
  - d) Neutralize pH variations in wastewater

7. In an Engineered Sanitary Landfill, the primary purpose of the bottom liner system (clay + geomembrane) is to:
  - a) Increase the stability of landfill slopes
  - b) Prevent leachate contamination of groundwater
  - c) Enhance decomposition rate of organic matter
  - d) Provide drainage for methane gas collection
8. The term Urban Heat Island (UHI) refers to:
  - a) The increase in sea surface temperature due to climate change
  - b) The localized warming of urban areas compared to surrounding rural areas
  - c) The warming effect caused by volcanic eruptions
  - d) The long-term warming trend of the Earth's atmosphere
9. In remote sensing, the term spectral resolution refers to:
  - a) The ability of a sensor to detect small objects on the ground
  - b) The number and width of wavelength bands a sensor can record
  - c) The frequency with which a satellite revisits the same location
  - d) The total area covered by a single image
10. Global and national issues of environment,
  - a) Protection of wetlands
  - b) Reduction of greenhouse gas emissions through legally binding targets
  - c) Conservation of biodiversity hotspots
  - d) Promotion of afforestation in developing countries only
11. In the design of a municipal wastewater treatment plant, the primary sedimentation tank is typically designed for a detention period of:
  - a) 15-20 minutes
  - b) 1.5-2.5 hours
  - c) 5-8 hours
  - d) 10-12 hours

12. A baghouse filter used in air pollution control is most efficient for removing
  - a) Gaseous pollutants such as  $\text{SO}_2$  and  $\text{NO}_x$
  - b) Fine particulate matter ( $\text{PM}_{2.5}$  and  $\text{PM}_{10}$ )
  - c) Heavy metals in wastewater
  - d) Carbon monoxide from exhaust gases
13. A cyclone separator used for air pollution control works on the principle of:
  - a) Electrostatic charging of particles
  - b) Centrifugal force separating particles from gas stream
  - c) Adsorption of pollutants onto activated carbon
  - d) Condensation of vapors by cooling
14. In the design of a composting facility for solid waste, the optimum Carbon-to-Nitrogen (C:N) ratio of the feed material should be around:
  - a) 5:1
  - b) 15:1
  - c) 25-30:1
  - d) 60:1
15. The Basel Convention (1989) deals with;
  - a) Prevention of biodiversity loss in tropical forests
  - b) Transboundary movement and disposal of hazardous wastes
  - c) Protection of wetlands of international importance
  - d) Control of greenhouse gas emissions
16. In ecological pyramids, the pyramid of energy is always upright because:
  - a) Energy increases at higher trophic levels
  - b) Energy is constant across levels
  - c) Energy decreases due to loss at each trophic level
  - d) Energy recycling is perfect

17. Acid rain results primarily from:
- a) CO<sub>2</sub> and water vapor
  - b) Methane and ozone
  - c) Sulfur dioxide (SO<sub>2</sub>) and nitrogen oxides (NO<sub>x</sub>)
  - d) Chlorofluorocarbons (CFCs)
18. The main reason eutrophication is harmful to aquatic ecosystems is:
- a) Increased water temperature
  - b) Depletion of dissolved oxygen due to algal bloom decomposition
  - c) Direct toxicity of algae to fish
  - d) Reduction in mineral nutrients
19. Which of the following indicators is widely used in environmental impact assessments (EIA)?
- a) Gross Domestic Product (GDP)
  - b) Biological Oxygen Demand (BOD)
  - c) Human Development Index (HDI)
  - d) Net Primary Productivity (NPP)
20. According to the IPCC reports, the largest contributor to global greenhouse gas emissions is:
- a) Transportation.
  - b) Agriculture
  - c) Energy supply (fossil fuel combustion)
  - d) Industrial processes

21. The most significant pollutant responsible for photochemical smog is:
  - a) Carbon dioxide ( $\text{CO}_2$ )
  - b) Ozone ( $\text{O}_3$ )
  - c) Nitrogen oxides ( $\text{NO}_x$ )
  - d) Sulfur dioxide ( $\text{SO}_2$ )
22. The Air Quality Index (AQI) is primarily designed to indicate:
  - a) The amount of greenhouse gases in the atmosphere
  - b) The overall quality of air with respect to human health
  - c) The chemical composition of pollutants
  - d) The visibility reduction due to smog
23. The most effective device for controlling very fine particulate matter ( $<2.5 \mu\text{m}$ ) is
  - a) Gravitational settling chamber
  - b) Cyclone separator
  - c) Electrostatic precipitator
  - d) Wet scrubber
24. The "London Smog of 1952 was primarily caused by:
  - a) Photochemical reactions of  $\text{NO}_x$  and hydrocarbons
  - b) Sulfur dioxide and smoke from coal burning
  - c) Lead emissions from gasoline
  - d) Ozone build-up in the atmosphere
25. The Bhopal Gas Tragedy (1984), the world's worst industrial disaster, was caused by the leakage of
  - a) Ammonia ( $\text{NH}_3$ )
  - b) Sulfur dioxide ( $\text{SO}_2$ )
  - c) Methyl isocyanate (MIC)
  - d) Chlorine gas

26. The primary objective of research is:
- a) To generate income
  - b) To discover new facts and verify old ones
  - c) To write lengthy reports.
  - d) To prove one's hypothesis correct
27. Which of the following is a motivating factor for conducting research?
- a) Desire to earn money
  - b) Desire to discover truth and develop new knowledge
  - c) Avoiding competition
  - d) Writing a thesis for formality
28. The applied research objective focuses on:
- a) Development of general theories
  - b) Finding solutions to immediate practical problems
  - c) Philosophy and pure thought
  - d) Academic recognition only
- 29 Which of the following is not a valid motivation for research?
- a) Intellectual curiosity
  - b) Desire to contribute to society
  - c) Pressure from peers
  - d) Professional advancement
30. The correct sequence of the research process is:
- a) Problem identification → Data collection → Literature review → Hypothesis formulation → Analysis
  - b) Problem identification → Literature review → Hypothesis formulation → Data collection → Analysis

- c) Data collection→Problem identification→Hypothesis formulation Analysis  
→Literature review
  - d) Data collection→Literature review→Hypothesis formulation →Analysis  
→Problem identification
31. Which step in the research process ensures that the study is not duplicating past work?
- a) Hypothesis testing
  - b) Literature review
  - c) Data analysis
  - d) Sampling design
32. A research design is best defined as:
- a) The statistical test chosen
  - b) The overall plan and structure of the research
  - c) The sampling method used
  - d) The conclusion of the study
33. In hypothesis testing, the null hypothesis ( $H_0$ ) usually states that:
- a) There is no significant difference/effect
  - b) There is a significant difference
  - c) The researcher's assumption is true
  - d) Data is biased
34. The first step in the research process is usually:
- a) Data analysis
  - b) Identifying and defining the research problem
  - c) Hypothesis formulation
  - d) Report writing



35. The scope of a research problem should be:
- a) Extremely broad
  - b) Narrowed down to manageable limits
  - c) Restricted to one's personal life
  - d) Left undefined
36. Which of the following is considered plagiarism?
- a) Using another's work with proper citation
  - b) Copying text without giving credit
  - c) Paraphrasing with reference
  - d) Quoting with citation
37. Fabrication of data in research refers to:
- a) Using statistical tools incorrectly
  - b) Making up data that never existed
  - c) Reporting unexpected results
  - d) Manipulating references
38. Which of the following is an ethical responsibility of a researcher?
- a) To suppress results not matching hypothesis
  - b) To publish results honestly
  - c) To hide data from peer review
  - d) To prioritize speed over accuracy
39. Which of the following is a violation of authorship ethics?
- a) Including all contributors as co-authors
  - b) Adding a non-contributor as author
  - c) Acknowledging technical help in footnotes
  - d) Following journal authorship guidelines

40. Intellectual Property Rights (IPR) primarily deal with:
- a) Tangible physical assets
  - b) Creations of the mind such as inventions, literature, and symbols
  - c) Land ownership
  - d) Financial stocks
41. A patent provides protection for:
- a) An original literary or artistic work
  - b) A novel invention or process
  - c) Company logos and trademarks
  - d) Computer software source code
42. In research measurement refers to:
- a) Assigning numerical or symbolic values to variables according to rules
  - b) Collecting data without analysis
  - c) Writing research objectives
  - d) Interpreting data only
43. Which data collection method provides the highest response rate?
- a) Mail questionnaire
  - b) Online survey
  - c) Personal interview
  - d) Telephone interview
44. The first step in hypothesis testing is:
- a) Compute the test statistic
  - b) Formulate the null and alternative hypotheses
  - c) Choose the level of significance
  - d) Collect the sample data

45. The abstract of a research report should:
- a) Present detailed tables and figures
  - b) Summarize objectives, methods, and findings in brief
  - c) Contain only references
  - d) Be longer than the conclusion
46. The bibliography or reference section of a research report should include:
- a) Only books consulted
  - b) All sources cited in the report
  - c) Only journal articles
  - d) Only internet sources
47. Which part of a research paper includes questionnaires, raw data, and additional material?
- a) Introduction
  - b) Appendix
  - c) Abstract
  - d) Methodology
48. An experimental research design is used to:
- a) Document patterns
  - b) Establish cause-effect relationships
  - c) Provide descriptions only
  - d) Develop theories
49. Data fabrication refers to:
- a) Accidental errors
  - b) Selectively reporting
  - c) Making up data without experimentation
  - d) Wrong use of statistics

50. A high-quality literature review should:

- a) Be descriptive only
- b) Critically evaluate existing studies
- c) Include only recent papers
- d) Support only the researcher's views.



**- Rough Work -**

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