SEAL

Assistant Env. Eng. 30/5

Booklet Serial No.

2500037

Booklet Series

A

05/EFC/M-2025-06(A)

Question Booklet

ENVIRONMENTAL ENGINEERING

PAPER – II

Candidate's Roll Number

Time Allowed : 2 Hours

Maximum Marks : 300

Read the following instructions carefully before you begin to answer the questions.

IMPORTANT INSTRUCTIONS

1. This Question Booklet contains **100** questions in all.
2. **All** questions carry equal marks.
3. An Answer Sheet has been supplied inside the question booklet to mark the answers. **You must write your Roll Number and encode it and write other particulars in the space provided in the Answer Sheet, failing which your Answer Sheet will not be evaluated.**
4. **Immediately after commencement of the examination, you should check up your Question Booklet and attached answer sheet and ensure that the Question Booklet Series is printed on the top left-hand corner of the Booklet and the series encoded in answer sheet are same. Also please check that the Booklet contains 16 printed pages including two pages (Page Nos. 15 and 16) for Rough Work and no page or question is missing or unprinted or torn or repeated or question booklet and answer sheet have different series. If you find any defect in this Booklet and attached answer sheet, get it replaced immediately by a complete Booklet with OMR sheet of the same series.**
5. You must write your Roll Number in the space provided on the top of this page. Do not write anything else on the Question Booklet.
6. Questions and their responses are printed in English version in this Booklet. Each question comprises of **four** responses – (A), (B), (C) and (D). You are to select ONLY ONE correct response and mark it in your Answer Sheet. In case you feel that there are more than one correct response, mark the response which you consider the best. In any case choose ONLY ONE response for each question.
7. In the Answer Sheet, there are **four** circles – (A), (B), (C) and (D) against each question. To answer the questions, you are to mark with **Black/Blue ink ballpoint pen ONLY ONE circle** of your choice for each question. Select only one response for each question and mark it in your Answer Sheet. If you mark more than one circle for one question, the answer will be treated as wrong. **Use Black/Blue ink ballpoint pen only to mark the answer in the Answer Sheet. Any erasure or change is not allowed.**
8. For each question for which a wrong answer/more than one answer has been given by the candidates, **one third (1/3)** of the marks assigned to that question will be deducted as penalty.
9. You should not remove or tear off any sheet from the Question Booklet. You are not allowed to take this Question Booklet and the Answer Sheet out of the Examination Hall during the examination. **After the examination has concluded, you must hand over your Answer Sheet to the Invigilator.** Thereafter, you are permitted to take away the Question Booklet with you.
10. Failure to comply with any of the above instructions will render you liable to such action or penalty as the Commission may decide at their discretion.
11. Candidates must assure before leaving the Examination Hall that their Answer Sheets will be kept in Self Adhesive LDPE Bag and completely packed/sealed in their presence.

SEAL

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1. The unit of concentration commonly used in environmental chemistry for very low pollutant levels is:

(A) Molarity

(B) mg/L

(C) ppm

(D) mol/kg

2. The radioactive decay that results in the emission of a helium nucleus is called:

(A) Alpha decay

(B) Beta decay

(C) Gamma decay

(D) Positron emission

3. What is the major buffer system in natural freshwater?

(A) NH_4^+/NH_3

(B) H_2CO_3/HCO_3

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

(D) Cl^-/HCl

4. The pH of a buffer solution is determined by:

(A) Total acid concentration

(B) pKa and the ratio of base to acid

(C) Temperature only

(D) Ionic strength only

5. Which component of soil organic matter is most resistant to decomposition?

(A) Cellulose

(B) Lignin

(C) Starch

(D) Protein

6. Which gas is most abundant in the Earth's atmosphere by volume?

(A) Oxygen

(B) Nitrogen

(C) Carbon dioxide

(D) Argon

7. The hydroxyl radical (OH) in the atmosphere primarily helps in:

(A) Absorbing UV radiation

(B) Decomposition of oxygen

(C) Removal of pollutants by oxidation

(D) Formation of acid rain

8. What is the primary purpose of adding alum in water treatment?

(A) Disinfection

(B) Coagulation

(C) pH adjustment

(D) Softening

9. Base saturation is a measure of:

(A) Soil acidity

(B) Exchangeable bases

(C) Organic matter content

(D) Soil porosity

10. Cation exchange capacity in soils is mainly due to:

(A) Organic matter

(B) Sand particles

(C) Water content

(D) Soil texture

11. Which of the following reactions is exothermic?

(A) Photosynthesis

(B) Evaporation

(C) Combustion of methane

(D) Boiling of water

12. The formation of photochemical smog requires

(A) High humidity

(B) NO_x and VOCs in presence of sunlight

(C) Low temperatures

(D) Sulfur dioxide only

13. Microbial diversity is best studied using:

(A) Culture-based methods

(B) Microscopy

(C) Molecular techniques

(D) Physical separation

14. The primary microbes in activated sludge are:

(A) Algae

(B) Viruses

(C) Protozoa and bacteria

(D) Fungi

15. The microorganism involved in sulfur oxidation is:

(A) Thiobacillus

(B) Nitrosomonas

(C) Rhizobium

(D) Lactobacillus

16. Which microorganism is used in root nodulation of leguminous plants?

(A) Pseudomonas

(B) Rhizobium

(C) Bacillus

(D) Streptococcus

17. Which of the following is a purine base?

(A) Uracil

(B) Thymine

(C) Adenine

(D) Cytosine

18. The energy storage polysaccharide in bacteria is:

(A) Starch

(B) Glycogen

(C) Cellulose

(D) Chitin

19. Michaelis-Menten constant (Km) is a measure of:

(A) Enzyme inhibition

(B) Substrate affinity

(C) Catalytic rate

(D) ATP production

20. Enzyme activity is affected by:

(A) pH

(B) Temperature

(C) Substrate concentration

(D) All of these

21. The terminal electron acceptor in aerobic respiration is:

(A) Oxygen

(B) Nitrate

(C) Sulfate

(D) Carbon dioxide

22. Anabolism refers to:

(A) Breakdown of molecules

(B) Energy release

(C) Biosynthesis of molecules

(D) No energy change

23. Which organelle is involved in ATP production in eukaryotes?

(A) Chloroplast

(B) Nucleus

(C) Mitochondria

(D) Golgi body

24. Endospores are mainly produced by:

(A) Escherichia coli

(B) Bacillus

(C) Rhizobium

(D) Lactobacillus

25. Which step of metabolism yields the most ATP?

(A) Glycolysis

(B) TCA Cycle

(C) Electron Transport Chain

(D) Fermentation

26. Which of the following is a property of water that contributes to its role as a universal solvent?

(A) Low boiling point

(B) Polarity

(C) High viscosity

(D) Low surface tension

27. Which of the following is a major threat to global freshwater resources?

(A) Aquifer recharge

(B) Desalination

(C) Water pollution

(D) Cloud seeding

28. What is the approximate percentage of freshwater available in liquid form on Earth's surface?

(A) 2.5%

(B) 0.3%

(C) 10%

(D) 5%

29. The unit hydrograph is applicable only to:

(A) Perennial rivers

(B) Urban watersheds

(C) Isolated storms

(D) Snow -fed rivers

30. The term 'stage' in river hydrology refers to :

(A) Flow rate

(B) Water depth

(C) Reservoir level

(D) Rainfall

31. What does the S-curve hydrograph help to determine?

(A) Infiltration

(B) Reservoir capacity

(C) Flow direction

(D) Runoff from continuous rain

32. Channel routing methods are primarily used for:

(A) Estimating rainfall

(B) Evaporation losses

(C) Flow prediction downstream

(D) None of these

33. Which geological formation is best suited to store groundwater?

(A) Shale

(B) Sandstone

(C) Basalt

(D) Granite

34. The zone between land surface and the water table is called:

(A) Phreatic zone

(B) Vadose zone

(C) Saturated zone

(D) Capillary fringe

35. The coefficient of transmissivity has units of:

(A) m

(B) m/s

(C) m^2/day

(D) m/day

36. A hydraulic jump is an example of:

(A) Gradually varied flow

(B) Critical flow

(C) Energy loss

(D) Uniform flow

37. What is used to measure discharge in a pipe?

(A) Venturimeter

(B) Manometer

(C) Barometer

(D) Thermometer

38. Which parameter indicates organic pollution in water?

(A) DO

(B) BOD

(C) TDS

(D) pH

39. Which phenomenon causes oxygen depletion in rivers downstream of a pollution source?

(A) Eutrophication

(B) Sedimentation

(C) Oxygen sag

(D) Thermal stratification

40. Which method is used for disinfection in water treatment?

(A) Aeration

(B) Filtration

(C) Chlorination

(D) Coagulation

41. Which is a point source of pollution?

(A) Urban runoff

(B) Industrial discharge pipe

(C) Agricultural field

(D) Highway runoff

42. Grit chambers are used in which stage of wastewater treatment?

(A) Primary

(B) Preliminary

(C) Tertiary

(D) Secondary

43. The most common biological treatment process is :

(A) Filtration

(B) Sedimentation

(C) Activated sludge process

(D) Chlorination

44. Which process is used for phosphorus removal in tertiary treatment?

(A) Nitrification

(B) Denitrification

(C) Chemical precipitation

(D) Aeration

45. What is the typical end use of treated sludge in sewage farming?

(A) Road construction

(B) Animal feed

(C) Fertilizer

(D) Fuel

46. What is Zero Liquid Discharge (ZLD)?

(A) No solid waste is discharged

(B) All water is treated and reused

(C) Water is only partially treated

(D) Discharge to ocean

47. Which industry produces wastewater with high COD and BOD?

(A) Textile

(B) Steel

(C) Cement

(D) Glass

48. Thermal stratification leads to:

(A) Algal bloom

(B) Layered temperature zones

(C) Increased turbidity

(D) High DO

49. Which method removes dissolved salts from seawater?

(A) Sedimentation

(B) Filtration

(C) Desalination

(D) Coagulation

50. Which appurtenance regulates sewage flow?

(A) Vent

(B) Drop manhole

(C) Sluice gate

(D) Grit chamber

51. What is the primary source of indoor air pollution in rural households?

(A) CO_2 from cooking

(B) CO from biomass burning

(C) NO_2 from heaters

(D) O_3 from fans

52. Which pollutant is a secondary pollutant?

(A) SO_2

(B) NO_2

(C) O_3

(D) CO

53. Which particulate control device uses electric fields?

(A) Cyclone separator

(B) Gravitational chamber

(C) Electrostatic precipitator

(D) Bag filter

54. Which law governs diffusion in gases?

(A) Boyle's Law

(B) Fick's Law

(C) Charle's Law

(D) Dalton's Law

55. What is the primary health impact of PM2.5?

(A) Skin irritation

(B) Respiratory issues

(C) Vision loss

(D) Liver damage

56. The unit of sound pressure level is:

(A) Hz

(B) dB

(C) W/m^2

(D) Pa

57. Which method is used for controlling SO_2 in exhaust gases?

(A) Adsorption

(B) Condensation

(C) Absorption

(D) Filtration

58. Which gas is not a criteria pollutant?

(A) O_3

(B) CO

(C) NH_3

(D) NO_2

59. What is the purpose of a wind rose diagram?

(A) Temperature prediction

(B) Air pressure analysis

(C) Wind direction frequency

(D) Humidity mapping

60. Fick's law is related to:

(A) Mass transfer

(B) Energy conservation

(C) Heat transfer

(D) Momentum

61. Which pollutant is associated with acid rain?

(A) O_3

(B) SO_2

(C) CO

(D) PM2.5

62. Which pollutant is typically measured using a chemiluminescence analyzer?

(A) CO

(B) NO_x

(C) SO_2

(D) O_3

63. Combustion control method is best suited for which pollutant?

(A) Dust

(B) SO_x

(C) NO_x

(D) VOCs

64. What is the correct order of the waste hierarchy?

(A) Recycle > Reduce > Reuse

(B) Reduce > Reuse > Recycle

(C) Reuse > Recycle > Reduce

(D) Recycle > Reuse > Reduce

65. Which Indian regulation governs solid waste management?

(A) EIA Notification, 2006

(B) SWM Rules, 2016

(C) EPA Act, 1986

(D) Water Act, 1974

66. What is the most common method of MSW disposal in India?

(A) Incineration

(B) Composting

(C) Open dumping

(D) Landfilling

67. Which waste is regulated under BMW Rules, 2016?

(A) E-waste

(B) Plastic waste

(C) Biomedical waste

(D) Hazardous waste

68. Which method is used for leachate treatment?

(A) Filtration

(B) Activated carbon

(C) Biological treatment

(D) All of the above

69. Incineration is most suitable for :

(A) Wet waste

(B) Hazardous waste

(C) E-waste

(D) Biomedical waste

70. Which technique is used for hazardous waste immobilization?

(A) Neutralization

(B) Encapsulation

(C) Composting

(D) Fermentation

71. What is RDF?

(A) Recyclable Dry Fuel

(B) Refuse-Derived Fuel

(C) Recovered Domestic Fuel

(D) Renewable Digestive Fuel

72. Landfill gas primarily consists of:

(A) CO_2 and O_2

(B) CH_4 and CO_2

(C) H_2S and O_2

(D) CH_4 and SO_2

73. Pyrolysis involves:

(A) Low-temperature digestion

(B) High-temperature combustion without oxygen

(C) Biological breakdown

(D) Mechanical separation

74. Which waste contains heavy metals like lead, cadmium?

(A) MSW

(B) Plastic

(C) E-waste

(D) Biomedical waste

75. A typical hazardous waste characteristic is:

(A) Biodegradability

(B) Toxicity

(C) Volatility

(D) Recyclability

76. Biomedical waste color coding for incineration is:

(A) Yellow

(B) Blue

(C) Black

(D) Red

77. Which of the following gases in the most significant contributor to the greenhouse effect?

(A) Oxygen

(B) Carbon Dioxide

(C) Nitrogen

(D) Hydrogen

78. Which of the following is a direct consequence of urban heat islands?

(A) Increased snowfall

(B) Higher urban temperatures

(C) Decrease in CO_2 levels

(D) Stronger Ocean currents

79. Which ecosystem is known for the highest biodiversity?

(A) Desert

(B) Tundra

(C) Rainforest

(D) Grassland

80. What is a major effect of increased population on the environment?

(A) Reduced carbon emissions

(B) Increased resource demand

(C) Stabilized ecosystems

(D) Decreased waste production

81. What is the main cause of biodiversity loss?

(A) Recycling

(B) Habitat destruction

(C) Solar energy use

(D) Wind energy use

82. Which energy source causes the least environmental degradation?

(A) Coal

(B) Natural gas

(C) Wind

(D) Oil

83. What does an increase in energy consumption typically lead to?

(A) Less pollution

(B) Improved biodiversity

(C) Environmental degradation

(D) Lower greenhouse gas emissions

84. Which of these is a characteristic of a healthy ecosystem?

(A) Low biodiversity

(B) High pollution levels

(C) Stable interactions among organisms

(D) Unregulated population growth

85. Which human activity is a major contributor to deforestation?

(A) Fishing

(B) Urbanization

(C) Wind farming

(D) Solar panel installation

86. Which of these gases is commonly associated with agricultural emissions?

(A) Methane

(B) Oxygen

(C) Helium

(D) Hydrogen

87. The ISO 14000 series is related to:

(A) Quality management

(B) Financial auditing

(C) Environmental management

(D) Health and safety standards

88. Environmental auditing is primarily used to:

(A) Calculate taxes

(B) Monitor compliance with environmental regulations

(C) Develop economic policies

(D) Plan urban development

89. Which of the following is NOT a step in Environmental Impact Assessment (EIA)?

(A) Screening

(B) Scoping

(C) Monitoring

(D) Profit analysis

90. Life Cycle Assessment evaluates the environmental impacts of a product:

(A) During its use only

(B) From production to disposal

(C) During transportation

(D) After consumption

91. The precautionary principle focuses on:

(A) Acting after damage occurs

(B) Preventing potential environmental harm

(C) Minimizing financial risks

(D) Maximizing profits

92. The National Green Tribunal (NGT) Act was established in:

(A) 1986

(B) 2000

(C) 2010

(D) 1999

93. One of the key objectives of National Environment Policy is to:

(A) Encourage deforestation

(B) Promote unregulated mining

(C) Ensure sustainable development

(D) Reduce renewable energy use

94. The Kyoto Protocol is an international treaty focused on:

(A) Water conservation

(B) Desertification

(C) Reducing greenhouse gas emissions

(D) Marine biodiversity

95. Which of the following is a non-renewable source of energy?

(A) Solar

(B) Wind

(C) Coal

(D) Geothermal

96. Renewable energy sources include all EXCEPT:

(A) Solar

(B) Wind

(C) Natural gas

(D) Hydropower

97. What is the main challenge of using renewable energy sources?

(A) Excess pollution

(B) Limited supply

(C) Intermittency and storage

(D) High emissions

98. Which document outlines global sustainable development goals?

(A) Kyoto Protocol

(B) Agenda 21

(C) Paris Agreement

(D) IPCC Report

99. Which of these is NOT a Sustainable Development Goal (SDG)?

(A) Zero Hunger

(B) Climate Action

(C) Economic Inequality

(D) Clean Water and Sanitation

100. A major hurdle to sustainability is:

(A) Public awareness

(B) Strong policies

(C) Resource over consumption

(D) Renewable energy usage