COMBINED TECHNICAL SERVICES EXAMINATION

(NON-INTERVIEW POST)

COMPUTER BASED TEST

DATE OF EXAM: 04.08.2025 FN

PAPER – II – ENVIRONMENTAL AND CHEMICAL ENGINEERING

(P.G. DEGREE STANDARD) (CODE: 393)

1. The Occupational Health Services convention was held during the year

(A) 1975 (B) 1985

(C) 1995 (D) 1997

(E) Answer not known

2. Choose the right matches among type :

1.	PLIBEL	–	Identification of Ergonomic Hazards
2.	DMQ	–	Fire safety and rescue
3.	QEC	–	Work place risk assessment
4.	RULA	–	Emergence management

(A) 1 and 3 are correct

(B) 1 and 2 are correct

(C) 2 and 3 are correct

(D) 3 and 4 are correct

(E) Answer not known

3. The probability of adverse effects on human health resulting from some defined condition of exposure to a particular environmental agent or combination of agents is known as :

(A) Risk (B) Hazard

(C) Vulnerable (D) Threat

(E) Answer not known

4. The toxicants that damage kidney (nephrotoxics) are

(A) Lead, Chromium, Cadmium

(B) Chromium, Arsenic, Mercury

(C) Cadmium, Arsenic, Chromium

(D) Mercury, Cadmium, Lead

(E) Answer not known

5. Choose the characteristics of disasters from the following

1. Usually occurs because of one of the danger sources
2. Seriously and substantially impact the most vulnerable groups
3. Results in serious imbalance in community functions
4. Results in significant losses in human lives, materials and environment

(A) 2, 3 and 4

(B) 1, 2 and 3

(C) 1, 2, 3 and 4

(D) 2 and 4

(E) Answer not known

6. Cognitive ergonomics tool is formulated around the concepts of

(A) By ignoring fundamental principles of human actions

(B) Human abnormal behaviour analysis

(C) Mental work and cognitive tool

(D) Problems of design

(E) Answer not known

7. Types of Hazards in workplace are

1. Mechanical, vibrational and noise
2. Heat and temperature
3. Flammability
4. Pressure Hazard

(A) 1, 2, 3 and 4
(B) 1, 2, and 3
(C) 3 and 4
(D) 2 alone
(E) Answer not known

8. Major Hazardous risk associated with pesticide manufacturing industries are

(A) Toxic chemical and flammable material
(B) Highly reactive (or) corrossive and extreme condition of temperature
(C) Large mechanical equipment pressure of collision
(D) Toxic chemical and highly reactive (or) corrosive
(E) Answer not known

9. Assertion [A] : The bill and Melinda Gates foundation has pledged $200 million for medical aid to developing countries to help fight AIDS, TB and malaria as the establishment of emergency preparedness.

Reason [R] : As a antiretroviral therapy and antibodies to combat mother to child transmission or breast breeding had proven results in AIDS control

(A) Both [A] and [R] are false

(B) [A] is true but [R] is false

(C) [A] is false but [R] is true

(D) Both [A] and [R] are true

(E) Answer not known

10. Choose the right matches among gloves type

1. Type 1 glove – 650 rms voltage
2. Type 2 glove – 1300 rms voltage
3. Type 3 glove – 3300 rms voltage
4. Type 4 glove – 6600 rms voltage

(A) 1 and 3 are correct

(B) 1 and 2 are correct

(C) 2 and 3 are correct

(D) 3 and 4 are correct

(E) Answer not known

11. Which of the following statements are true about emergency evacuation?

(i) A precise estimate of the evacuation route is of primary importance to the evacuation planners.

(ii) Wardrop's system optimal (so) flow is best suited to decide evacuation route

(iii) Hope and Tardos introduced a first polynomial time algorithm for evacuation

(A) (i) only
(B) (i) and (iii) only
(C) (i) and (ii) only
(D) (ii) and (iii) only
(E) Answer not known

12. The provision of facilities to maintain the health and well-being of individuals at the work place is known as :

(A) Safety
(B) Protection
(C) Welfare
(D) Near miss
(E) Answer not known

13. The process of characterizing the relationship between the dose of an agent received and the incidence of an adverse health effect is known as:

(A) Exposure assessment
(B) Risk characterization
(C) Dose response assessment
(D) Hazard identification
(E) Answer not known

14. Which of the following statements are correct about Electrical Equipment Safety?

(i) Rubber gloves must be worn when electrician working near 'live' wires carrying 440 volts or more

(ii) All portable electric tools and equipment at office and laboratory equipment shall be inspected at regular intervals by an electrician

(iii) Two experienced men are necessary when working with 440 volts or more

(A) (i) only
(B) (i) and (iii) only
(C) (i) and (ii) only
(D) (ii) and (iii) only
(E) Answer not known

15. Which of the following is a major pollutant from E-waste?

(A) Aluminum
(B) Copper
(C) (PBB) – Polybrominated biphenyl
(D) Zinc
(E) Answer not known

16. Select the correct benefits of EIA

a. Environmental condition for better design

b. It helps to reduce the project cost

c. Insures appropriate mitigation measures to be taken

d. To understand extensive ecological and socio-economic indicators.

(A) b, d

(B) a, b and c

(C) c, d

(D) b, c and d

(E) Answer not known

17. Environmental clearance notification is given by

(A) Ministry of Human Resources Development

(B) Ministry of Environment and Forest

(C) Ministry of Health

(D) Ministry of Commerce

(E) Answer not known

18. Which action involves the impact linkages between the natural and social environment?

(A) Impact Prediction and Assessment

(B) Cumulative Impacts

(C) Direct Impacts

(D) Alternate Impacts

(E) Answer not known

19. Assertion [A] : Expert committees for environmental assessment are constituted to ensure multidisciplinary inputs for development projects.

Reason [R] : These committees cover sectors such as mining, industrial, thermal power, river valley, infrastructure and nuclear power projects.

(A) Both [A] and [R] are true and [R] is the correct explanation of [A]

(B) Both [A] and [R] are true, but [R] is not the correct explanation of [A]

(C) [A] is true, but [R] is false

(D) [A] is false, but [R] is true

(E) Answer not known

20. Assertion [A] : The Coastal Regulation Zone (CRZ) notification, 1991, aims to promote large-scale industrial development along coastal areas.

Reason [R] : The CRZ notification is intended to ensure the conservation and proper management of coastal ecosystems through regulated activities.

(A) Both [A] and [R] are true and [R] is the correct explanation of [A]

(B) Both [A] and [R] are true, but [R] is not the correct explanation of [A]

(C) [A] is true, but [R] is false

(D) [A] is false, but [R] is true

(E) Answer not known

21. What is the primary purpose of project screening in the EIA process?

(A) To finalize the budget for environmental mitigation measures

(B) To identify whether a proposed project requires EIA

(C) To approve the project location

(D) To determine the post-construction environmental audit requirements

(E) Answer not known

22. Among the following, identify the criteria which is responsible to satisfy the objective of National Environment Policy such as conservation of critical Environmental resources

(A) Time and costs

(B) Projects for economic and social development

(C) Conservation of invaluable natural and manmade heritage

(D) Academic and Research Community

(E) Answer not known

23. The Environment Protection Act, 1986 requires _____ and is to be submitted to State Pollution Control Board.

(A) To disclose their discharge level

(B) Prohibition to discharge of pollutings matter

(C) Environmental Audit

(D) Community reserves

(E) Answer not known

24. Which substance was added to the list of controlled substances in the Kigali Amendment to the Montreal protocol?

(A) Carbon dioxide

(B) Hydro fluoro Carbons (HFCs)

(C) Methane

(D) Nitrogen

(E) Answer not known

25. What is the first stage of the environmental clearance process for site-specific projects like mining, river valley, ports and harbours?

(A) Environmental clearance

(B) Final Approval from the State Government

(C) Site Clearance

(D) Construction permit

(E) Answer not known

26. Assertion [A] : The Environment Protection Act, 1986 integrates various environmental laws, providing a unified approach to environmental protection and pollution control.

Reason [R] : The Act was enacted in response to the Bhopal Gas Tragedy to fill gaps in existing environmental regulations.

(A) Both [A] and [R] are true and [R] is the correct explanation of [A]

(B) Both [A] and [R] are true, but [R] is not the correct explanation of [A]

(C) [A] is true, but [R] is false

(D) [A] is false, but [R] is true

(E) Answer not known

27. Assertion [A] : The Air (Prevention and Control of Pollution) Act, 1981 aims to Prevent, Control and abate air pollution in India.

Reason [R] : The Act was primarily enacted to regulate forest conservation and wildlife protection.

(A) Both [A] and [R] are true and [R] is the correct explanation of [A]

(B) Both [A] and [R] are true, but [R] is not the correct explanation of [A]

(C) [A] is true, but [R] is false

(D) [A] is false, but [R] is true

(E) Answer not known

28. Assertion [A] : The 24-hour average NO_2 concentration standard under the NAAQS is the same for industrial and ecologically sensitive areas.

Reason [R] : NO_2 has similar harmful effects in all areas, irrespective of ecological sensitivity.

(A) Both [A] and [R] are true and [R] is the correct explanation of [A]

(B) Both [A] and [R] are true, but [R] is not the correct explanation of [A]

(C) [A] is true, but [R] is false

(D) [A] is false, but [R] is true

(E) Answer not known

29. According to the Water Act, 1974, which of the following is not a power granted to the Central Pollution Control Board (CPCB)?

(A) To plan nation wide programs for the prevention and control of water pollution

(B) To advise the Central Government on matters related to water pollution

(C) To levy and collect water cess from industries

(D) To coordinate activities of State Pollution Control Boards

(E) Answer not known

30. Assertion [A] : The 24-hour PM2.5 standard allows exceedance only up to three times a year.

Reason [R] : PM2.5 particles can penetrate deep into the lungs and cause severe health issues, so strict limits are necessary.

(A) Both [A] and [R] are true and [R] is the correct explanation of [A]

(B) Both [A] and [R] are true, but [R] is not the correct explanation of [A]

(C) [A] is true, but [R] is false

(D) [A] is false, but [R] is true

(E) Answer not known

31. Assertion [A] : The Water Cess Act, 1977 was last amended in 2003 to improve compliance and administration.

Reason [R] : The amendment removed the requirements for industries to maintain water consumption records.

(A) Both [A] and [R] are true and [R] is the correct explanation of [A]

(B) Both [A] and [R] are true, but [R] is not the correct explanation of [A]

(C) [A] is true, but [R] is false

(D) [A] is false, but [R] is true

(E) Answer not known

32. For which of the following violating the provision of the Water Act will impose penaling?

(i) Failure to provide information about discharging effluents.

(ii) For prohibiting discharge of any polluting matter into stream.

(iii) Discharging coloured effluent to environment.

(iv) For prohibiting discharge of solid wastes.

(A) (i) and (ii)
(B) (iii) and (iv)
(C) (ii), (iii) and (iv)
(D) (i), (ii) and (iv)
(E) Answer not known

33. The notification amended to obtain environmental clearance for development projects come under

(A) Disposal of fly ash notification
(B) Coastal Regulation notification
(C) Doon valley notification
(D) Environmental Impact Assessment notification
(E) Answer not known

34. Assertion [A] : Producers have the obligation of Extended Producer Responsibility (EPR) to meet recycling or refurbishing targets for batteries they introduce into the market.

Reason [R] : EPR ensures producers are responsible for the entire lifecycle of the batteries, including end-of-life management.

(A) Both [A] and [R] are true and [R] is the correct explanation of [A]

(B) Both [A] and [R] are true, but [R] is not the correct explanation of [A]

(C) [A] is true, but [R] is false

(D) [A] is false, but [R] is true

(E) Answer not known

35. Assertion [A] : Local bodies are responsible for the collection, treatment and disposal of Solid Waste Management Rules, 2016.

Reason [R] : The rules assign the task of monitoring and authorizing waste management process to local bodies.

(A) Both [A] and [R] are true and [R] is the correct explanation of [A]

(B) Both [A] and [R] are true, but [R] is not the correct explanation of [A]

(C) [A] is true, but [R] is false

(D) [A] is false, but [R] is true

(E) Answer not known

36. As per Solid Waste Management Rules, 2016, which of the following is not included in the definition of solid waste?

(A) Street Sweepings
(B) E-Waste
(C) Horticulture Waste
(D) Market Waste
(E) Answer not known

37. Which of the following items was included in the ban under the Plastic Waste Management (Amendment) Rules, 2021 from 01.07.2022?

(A) Plastic carry bags below 120 microns
(B) Ear buds with plastic sticks
(C) PVC banners above 100 microns
(D) Non-woven plastic bags above 60 GSM
(E) Answer not known

38. What is a key objective of the E-Waste (Management) Rules, 2022?

(A) Promote open dumping of e-waste
(B) Ban all forms of electronics manufacturing
(C) Promote Circular Economy through Extended producer Responsibility
(D) Limit the role of producers in post-consumer waste management
(E) Answer not known

39. Which of the following is an essential element of (Integrated Solid Waste Management) ISWM for achieving sustainability?

(A) Emphasis on disposal and incineration

(B) Focus on resource recovery and minimizing waste generation

(C) Focus only on waste collection

(D) Ignoring recycling and focusing only on treatment

(E) Answer not known

40. Why does waste generation tend to be higher in urban areas than in rural areas?

(A) Urban areas use more natural fertilizers

(B) Urban lifestyles involve more consumption and packaging

(C) Rural areas generate more hazardous waste

(D) Urban areas have fewer people

(E) Answer not known

41. Among the following choose the best/correct methods with correct options (both) used to removing submicron particulates of size 0.5 μm to 1 μm from polluted air

(1) venturi scrubber

(2) spray tower

(3) fabric filters

(4) gravitational settling chambers

(A) (1) and (3)

(B) (2) and (3)

(C) (2) and (4)

(D) (1) and (4)

(E) Answer not known

42. Organic solvent vapours are adsorbed from the gaseous pollutants using which of the following?

(A) Iron oxide
(B) Alkaline allumina
(C) Bauxite
(D) Activated carbon
(E) Answer not known

43. Acceptable indoor noise level for Radio and TV studios is

(A) 30-35 dB (A)
(B) 40-45 dB (A)
(C) 25-30 dB (A)
(D) 25-35 dB (A)
(E) Answer not known

44. The maximum permissible standards of sulphur di oxide for residential area in the New Revised National Ambient Air Qualities Standards in India is

(A) 30 $\mu g / m^3$
(B) 120 $\mu g / m^3$
(C) 50 $\mu g / m^3$
(D) 60 $\mu g / m^3$
(E) Answer not known

45. Which of the following involves forcing or pumping in fresh air, and causing the vitiated air to be exhausted out either by itself or through an exhaust fan placed at the outlet?

(A) Vaccum system
(B) Plenum system
(C) Air conditioning system
(D) Air cooler system
(E) Answer not known

46. How much is the noise standard for passenger cars as per Environment (Protection) Rules 1986 in $dB(A)$?

(A) 82
(B) 85
(C) 89
(D) 75
(E) Answer not known

47. Which of the following is responsible for changing oligotrophic water into intensity protective eutrophic water in fresh and marine eco systems?

(A) Calcium and phosphate nutrient species
(B) Potassium and phosphorus nutrient species
(C) Nitrogen and phosphorus nutrient species
(D) Chloride and sodium nutrient species
(E) Answer not known

48. The Montreal protocol is aimed to phase out the production of

(A) SO_2
(B) NO_2
(C) VOC_S
(D) CFC_S
(E) Answer not known

49. The cleaning capability of cyclonic scrubber wet collectors is about

(A) 2500 litres of gas/per minute
(B) 2000 litres of gas/per minute
(C) 1500 litres of gas/per minute
(D) 2250 litres of gas/per minute
(E) Answer not known

50. A organic carcinogenic compound present in cigarette smoke is

(A) Carbondioxide
(B) Sulphurdioxide
(C) Benzo (a) pyrene
(D) Benzy azo Nitrine
(E) Answer not known

51. Choose the right answer among type of sources in connection with Air Pollution.

(1) Solid waste disposal is area source
(2) Power plants are point source
(3) Onsite incineration is point source
(4) Railyard locomotives is area source

(A) (1) and (3) are correct
(B) (2) and (3) are correct
(C) (2) and (4) are correct
(D) (3) and (4) are correct
(E) Answer not known

52. Petrol engine receive _____ than Diesel engine.

(A) High fuel content mixture
(B) Low fuel content mixture
(C) Moderate fuel content mixture
(D) Equal fuel content mixture
(E) Answer not known

53. Fluidised bed combustion (FBC) is one of the modified and New type of combustion chamber because

(i) It increase the coal combustion and decrease the heat transfer.

(ii) It reduce the coal combustion as well as decrease the heat transfer.

(iii) It increase the coal combustion efficiency

(iv) It increase the efficiency of coal combustion as well as heat transfer

(A) (iv) only
(B) (ii) only
(C) (iii) and (ii)
(D) (i) only
(E) Answer not known

54. 'London Smog' occurred in

(A) December 1952
(B) November 1952
(C) December 1954
(D) October 1952
(E) Answer not known

55. Exposure to NO_2 even in a small concentration but longer period leads to

(A) Lungs problem
(B) Liver problem
(C) Kidneys problem
(D) Heart problem
(E) Answer not known

56. Which of the following models is primarily used for evaluating the impact of air quality management practices for multiple pollutants at multiple scales?

(A) CAMX
(B) CMAQ
(C) UAM
(D) CALGRID
(E) Answer not known

57. What does the dispersion model describe?

(A) The rate of pollutant emission overtime
(B) How pollutants or particles spread in the environment
(C) The temperature changes in a given area
(D) The chemical reaction rate of pollutants
(E) Answer not known

58. Which of the following field tests is typically used in transient simulations?

(A) grain size analysis
(B) slug test
(C) isotope tracing
(D) soil classification
(E) Answer not known

59. Assertion [A] : Bubble aeration is a process where gas transfer occurs across the gas water interface of gas bubbles, which is commonly used in activated sludge systems.

Reasons [R] : According to Bewtra (1962), Oxygen transfer from bubbles occurs in three phases : formation of the bubble at the capillary opening, bubble.

(A) Both [A] and [R] are correct and the [R] is the correct explanation for the [A]

(B) Both [A] and [R] are correct, but the [R] is not the correct explanation for [A]

(C) [A] is correct, but the [R] is incorrect

(D) [A] is incorrect, but the [R] is correct

(E) Answer not known

60. In the Oxygen sag curve model of a stream receiving organic waste, the lowest point of dissolved oxygen typically occurs in

(A) zone of degradation

(B) zone of active decomposition

(C) zone of recovery

(D) zone of clean water

(E) Answer not known

61. The greater the number and diversity of confirming observations, the more probable it is that the conceptualization embodied in the model is not flawed such a model is said to be

(A) Weak

(B) Robust

(C) Adequate

(D) Frail

(E) Answer not known

62. Standard deviation of sampling distribution of mean is

(Notations are as usual)

(A) σ/n

(B) $\sigma/\sqrt{n}$

(C) σ/n^2

(D) $\sqrt{\sigma / n}$

(E) Answer not known

63. In stratified sampling, the population is divided into

(A) Groups with equal sizes

(B) Homogenous sub groups

(C) Randomly selected groups

(D) Heterogeneous clusters

(E) Answer not known

64. What does the theory of testing of hypothesis employ to make decisions?

(A) Large population data

(B) Sample theory and statistical techniques

(C) Experimental design only

(D) Visual data representation

(E) Answer not known

65. In which of the following situations a test of significance is NOT typically applied?

(A) Testing if a machine fills exactly 500 ml of milk

(B) Comparing the productivity of two manufacturing processes

(C) Calculating mean rainfall for the last 10 years

(D) Checking if students IQ scores meet a standard

(E) Answer not known

66. A study claims that forest fires in Uttarakhand have increased by 13% which of the following represents the most appropriate null and alternative hypothesis?

(A) H_o : Increase in less than 13%, Ha : Increase is 13%

(B) H_o : Increase exactly 13%, Ha : Increase is not 13%

(C) H_o : Increase is more than 13%, Ha :Increase is 13%

(D) H_o : No increase, Ha :Increase is exactly 13%

(E) Answer not known

67. The analysis in which the model is used to inspect the system and gain insight into how the system works. This analysis is

(A) Exploratory analysis

(B) Case analysis

(C) Model validation analysis

(D) Problem definition

(E) Answer not known

68. Assertion (A) : In modelling, a variable is a value that changes freely in time and space.

Reason (R) : A State variable represents a State or compartment in the model.

(A) Both [A] and [R] is true and [R] is the correct explanation of [A]

(B) Both [A] and [R] is true but [R] is not the correct explanation of [A]

(C) [A] is true, but [R] is false

(D) [A] is false but [R] is true

(E) Answer not known

69. Which of the following error/errors arise during the computer representation of the algorithm that operationalises the model?

(A) Computational errors
(B) Procedural errors
(C) Propagation errors
(D) Both (A) and (B)
(E) Answer not known

70. Why is soil depth considered a critical factor in Environmental modeling?

(A) It affects air quality and pollution level
(B) It controls water flow into and through the soil
(C) It increases the soil temperature
(D) It limits the number of soil organisms
(E) Answer not known

71. Rotating biological contractor treatment system is

(A) An attached growth process
(B) A suspended growth process
(C) A combination of attached and suspended growth process
(D) Neither attached not suspended growth process
(E) Answer not known

72. In sludge processing, following treatments are to be done.

(1) Conditioning

(2) Dewatering

(3) Thickening

(4) Digestion

(5) Disposal

Choose the correct sequences to be followed

(A) (1) → (2) → (3) → (4) → (5)
(B) (2) → (1) → (3) → (4) → (5)
(C) (3) → (4) → (1) → (2) → (5)
(D) (4) → (1) → (2) → (3) → (5)
(E) Answer not known

73. Which gas consumes more alkalinity in an anaerobic digester during anaerobic digestion process?

(A) Carbon di oxide
(B) Methane
(C) Oxygen
(D) Ammonia
(E) Answer not known

74. When the recirculation ratio in a high rate trickling filter is unity, then the recirculation factor is

(A) 1
(B) > 1
(C) < 1
(D) Zero
(E) Answer not known

75. Consider the following sequence of operations in of upflow anaerobic sludge blanket reactor units for municipal sewage water treatment. Arrange the steps in the correct order

(i) Pumping → Screening → Degritting

(ii) Sludge blanket settling → Drying → Gas collection

(iii) Sludge blanket settling → Gas collection → Drying

(iv) Degritting → Pumping → Screening

Among the above four sequences which two are correct other two sequences are Incorrect

(A) (i), (ii) are correct, (iii) and (iv) are incorrect
(B) (i), (iv) are correct, (ii) and (iii) are incorrect
(C) (ii), (iii) are correct, (i) and (iv) are incorrect
(D) (i), (iii) are correct, (ii) and (iv) are incorrect
(E) Answer not known

76. Biological sludge does not settles and leaves a small amount of clear supernatant at the top is called as

(A) Sludge Bulking
(B) Sludge Filtering
(C) Sludge Thickening
(D) Sludge Digesting
(E) Answer not known

77. National Research Council has developed empirical equation for trickling performance as $VF = \frac{W}{5.08}\left[\frac{E_1}{1-E_1}\right]^2$ where W stand for

(A) Carbon di oxide
(B) Dissolved oxygen
(C) Chemical oxygen demand
(D) Biological oxygen demand
(E) Answer not known

78. Sequencing Batch Reactors processes majorly used in

(A) Fertilizer Industry
(B) Sugar Mill Industry
(C) Petroleum Industry
(D) Steel Industry
(E) Answer not known

79. Which statement best distinguishes the performance of activated sludge process from Trickly filter in Municipal waste water treatment?

(A) Activated sludge process uses less energy and produces less sludge than Tricky Filter
(B) Trickling Filter removes nutrients better due to longer biomass retention
(C) Activated sludge process handles shock loads better due to active Biomass control
(D) Tricky Filter achieves better effluent quality due to diverse biofilms
(E) Answer not known

80. Unless the sludge age in a reactor is greater than cell doubling time, the cell may get washed out of system. Thus relation between sludge age (θ_c) and growth rate (μ) of microorganism is

(A) $\mu\theta_c = 1$
(B) $\mu + \theta_c = 1$
(C) $\mu - \theta_c = 1$
(D) $\mu / \theta_c = 1$
(E) Answer not known

81. Which one of the following pollutants is showing resistant to microbial degradation?

(A) Aliphatic derivatives
(B) Carbohydrates
(C) Proteins
(D) Aromatic derivatives
(E) Answer not known

82. Among the following types of aerators used in biological wastewater treatment process, which of the following aerators is not mechanical type aerator?

(A) Fire bubble aerator
(B) Vertical axis aerator
(C) Aspirator type aerator
(D) Cage rotors and brushes
(E) Answer not known

83. In membrane process water treatment, the contaminants-suspended solids, emulsified components, bacteria and protozoa are removed by

(A) Ultrafiltration
(B) Nanofiltration
(C) Hyperfiltration
(D) Microfiltration
(E) Answer not known

84. Consider the statements about Aerated lagoons

(i) recommended for complete aerobic biological treatment of raw waste water

(ii) have simple holding basins usually 2-4 m deep

(iii) need continuous, supply of oxygen

(iv) need not involve with microorganisms

Which one of the following is correct?

(A) (i), (ii), (iii) and (iv)

(B) (i), (ii) and (iii)

(C) (iv) only

(D) (i), (ii) and (iv)

(E) Answer not known

85. The secondary settling tank serves the following functions.

(i) Clarification of liquid overflow

(ii) Thickening of the sludge underflow

(iii) Bulking of sludge by growth of filamentous microbes

Which one of the following is correct?

(A) (i) and (ii) are correct, (iii) is incorrect

(B) (i) and (iii) are correct, (ii) is incorrect

(C) (ii) and (iii) are correct, (i) is incorrect

(D) (i) is correct, (ii) and (iii) are incorrect

(E) Answer not known

86. The secondary settling Tanks in trickling filters primarily produces:

(A) Solid Effluent

(B) Sludge

(C) Clear effluent and biomass sludge

(D) Concentrated substrate solids

(E) Answer not known

87. Assertion [A] : Increasing the $\frac{Qr}{Q}$ ratio indefinitely in an activated sludge process always improves treatment efficiency by maintaining hyper biomass concentrations .

Reason [R] : Higher return activated sludge flow recycles more micro organisms thus increasing the biomass retention time and improving substrate degradation.

(A) Both [A] and [R] are true and [R] correctly explains [A].

(B) Both [A] and [R] are true, but [R] does not correctly explains [A].

(C) [A] is false, but [R] is true.

(D) Both [A] and [R] are false.

(E) Answer not known

88. Choose the principal approaches to process control so as to maintain high levels of treatment performance with the activated - sludge process under a wide range of operating conditions.

(1) Organics that escaped biological treatment

(2) Controlling the waste activated sludge

(3) Not maintaining dissolved oxygen levels in aeration tanks

(4) Regulating the amount of return activated sludge

(A) (2) and (3) are correct

(B) (1) and (4) are correct

(C) (4) and (2) are correct

(D) (3) and (1) are correct

(E) Answer not known

89. Among the below statement which one is wrong assumption?

(A) Liquid waste flow into reactor at a constant rate Q

(B) They mixed instantaneously and homogeneously with the contents of the reactor

(C) The mixed liquor is withdrawn at a rate not equal to the rate of inflow Q

(D) Influent does not contain any active microbes

(E) Answer not known

90. Aerobic suspended growth process used in mechanised plants are

(i) Activated sludge

(ii) Aerated lagoons

(iii) Waste sterilization ponds

(iv) UASB

Which one is Irrelevant?

(A) (ii)

(B) (iv)

(C) (iii)

(D) (i)

(E) Answer not known

91. Microorganisms are NOT categorized in which of the following ways?

(A) By Phylum

(B) By Carbon Source

(C) By Electron Acceptor type

(D) By Phyto Chemical

(E) Answer not known

92. Reactor design in wastewater treatment typically requires knowledge from all of the following fields except:

(A) Thermodynamics

(B) Fluid Mechanics

(C) Microeconomics

(D) Heat and Mass transfer

(E) Answer not known

93. Which of the following is a key characteristic of a batch reactor in biological wastewater treatment?

(A) Continuous inflow and outflow of wastewater

(B) Constant biomass concentration due to sludge recycling

(C) No inflow or outflow during the reaction phase

(D) Biomass grows on attached media surfaces only

(E) Answer not known

94. In an Aerated lagoon the top layer often has high pH and Oxygen levels, volatilisation from the surface can cause odour problems due to which of the following?

(A) In organic acids

(B) Organic acid

(C) Heavy metals

(D) Microbial load

(E) Answer not known

95. Arrange the following microbial growth phases in the correct sequential order:

(a) Exponential growth phase

(b) Endogenous growth phase

(c) Retarded growth phase

(A) (c) → (a) → (b)

(B) (a) → (b) → (c)

(C) (b) → (a) → (c)

(D) (c) → (b) → (a)

(E) Answer not known

96. American architect "Paul Soleri" proposed a new concept of "Ecological Architecture" in the year

(A) 1950 (B) 1956

(C) 1960 (D) 1966

(E) Answer not known

97. LEED : Leadership in Energy and Environmental Design was developed in United States of America in the year

(A) 1996 (B) 1997

(C) 1998 (D) 1999

(E) Answer not known

98. The U.S. Environmental Protection Agency (EPA) impact analysis estimated annual costs for existing source to be _____ million.

(A) $ 20.83 (B) $ 19.12

(C) $ 21.73 (D) None of the above

(E) Answer not known

99. The "Nature Conservancy" was born of an older organisation called Ecologist Union on

(A) June, 5th 1960 (B) October, 10th 2010

(C) September, 11th 1950 (D) None of the above

(E) Answer not known

100. Green buildings are designed to reduce the overall impact on

(A) Land Resources
(B) Water Potential
(C) Human health and natural environment
(D) Economic trade
(E) Answer not known

101. Emission trading, asset out in article 17 of the

(A) Montreal protocol
(B) Kyoto protocol
(C) Earth sumit 1972
(D) None of the above
(E) Answer not known

102. USGBC stands for

(A) U.S. Government Bank Council
(B) United Nations Governing Committee
(C) U.S. Green Building Council
(D) U.S. Governing Building Committee
(E) Answer not known

103. Which of the following is used green building certification in India?

(A) IGBC
(B) GBI
(C) GBCI
(D) ICGB
(E) Answer not known

104. In the context of environmental auditing, "non-conformance" refers to

(A) A legal violation

(B) A financial loss

(C) A marketing failure

(D) A deviation from established environmental policies or standards

(E) Answer not known

105. ISO : International Organisation for Standardization (ISO) commitment was enable for Life Cycle Assessment (LCA) in the year _____ enforcing guidelines.

(A) 1960

(B) 1970

(C) 1994

(D) 1999

(E) Answer not known

106. Which country was introduced ecolabelling first in the year 1978?

(A) Germany

(B) USA

(C) UK

(D) Japan

(E) Answer not known

107. The scheme of eco-labelling was introduced by the ministry of environment and forests in the year

(A) 1991

(B) 1996

(C) 1992

(D) 1990

(E) Answer not known

108. _____ is a voluntary International Standard for Environmental Management Systems (EMS).

(A) ISO 14001

(B) ISO 11002

(C) ISO 12202

(D) ISO 2020

(E) Answer not known

109. Which of the following is not true when it comes to "Ecolabelling"?

(A) It identifies overall environmental preference of a product

(B) It is a self-styled environmental symbol

(C) It is awarded by impartial third party to products

(D) It refers to provision of information to consumers about relative environmental quality of a product

(E) Answer not known

110. ISO 26000 is the recognised standard for

(A) Corporate Social Responsibility (CSR)

(B) Council for Scientific Research

(C) Common Science Research Board

(D) Committee on Social Response

(E) Answer not known

111. Which of the following country has been invited to open talks on joining OECD?

(A) India

(B) Israel

(C) Brazil

(D) China

(E) Answer not known

112. Which SDG emphasizes healthy lives and promoting well-being for all ages?

(A) Quality education

(B) Good health and well being

(C) Gender equality

(D) Life on land

(E) Answer not known

113. What project helped to mainstream the concept of competencies in education policy circles?

(A) UNESCO Global Schools Project

(B) United Nations SDG Taskforce

(C) OECD'S Definition and Selection of Competencies(DESECO)

(D) International Baccalaureate initiative

(E) Answer not known

114. Match the following type:

Match the International Convention Treaty with their respective agenda.

	Convention/Treaty		Cause/Agenda
(a)	Montreal protocol	1.	Persistent organic pollutant
(b)	Stockholm convention	2.	Sustainable development
(c)	Kyoto protocol	3.	Ozone layer
(d)	Rio-declaration	4.	Green house gas emission

	(a)	(b)	(c)	(d)
(A)	3	1	4	2
(B)	2	3	4	1
(C)	3	4	2	1
(D)	2	1	4	3

(E) Answer not known

115. According to environmental protection agency, the clean air Act, 1970 helped to reduce emissions of which one of the following remains a more difficult to control.

(A) NOx

(B) Pd

(C) SO_2

(D) CO

(E) Answer not known

116. Assertion [A] : The most significant pollutant emitted by bagasse-fired boilers is particulate matter

Reason [R] : Auxilliary fuels (fuel oil or Natural gas) may be used during startup of the boiler when the moisture content of the bagasse is too high.

(A) [A] is false but [R] is true

(B) Both [A] and [R] are true; and [R] is the correct explanation of [A]

(C) [A] is false, [R] is true

(D) Both [A] and [R] are true, but [R] is not the correct explanation of [A]

(E) Answer not known

117. On the use of paper mill wastewater for irrigation, it is observed that percolates from the field had no colour and no lignin. Which of the following (in the soil) could be attributed to the aforesaid observation?

(A) Base exchange capacity
(B) Acid exchange capacity
(C) Presence of monovalent salts
(D) Presence of magnesium ions
(E) Answer not known

118. Identify the fungus involved in degradation of chlorinated lignin derivatives of paper industry.

(A) White rot fungus
(B) Red rot fungus
(C) Grey mould
(D) Blue mould
(E) Answer not known

119. Which type of treatment is necessary for the petrochemical industry waste water before it is subjected to biological treatment?

(A) Flotation
(B) Flocculation
(C) Filtration
(D) Oxidation
(E) Answer not known

120. Assertion [A] : Mechanical collectors and wet scrubbers are commonly used to control particulate emission in bagasse -fired boilers.

Reason [R] : Bagasse fly ash is abrasive primarily due to its high content of silica and Alumina.

(A) [A] is true but [R] is false

(B) Both [A] and [R] are true; and [R] is the correct explanation of [A]

(C) [A] is false, [R] is true

(D) Both [A] and [R] are true, but [R] is not the correct explanation of [A]

(E) Answer not known

121. The source of mercury in the Minamata bay was traced by a

(A) Chemical plant

(B) Pulp and paper plant

(C) Paint industry

(D) Leather industry

(E) Answer not known

122. Which of the following are incorrectly matched?

(1) Odour and Taste – Chemical pollutants

(2) Total Dissolved solids – Physical pollutants

(3) Arsenic pollution – Herbicides and Pesticides

(4) Chromium – Electroplating

(A) (1) and (2)

(B) (1) and (4)

(C) (2) and (3)

(D) (2) and (4)

(E) Answer not known

123. Which of the followings are the raw materials used for the manufacture of the Pesticide BHC?

(A) Benzene and Chlorine
(B) Benzene and Hexane
(C) Benzene and Ethanol
(D) Benzene and Methanol
(E) Answer not known

124. Cement is made by heating limestone with clay at _____ °C in a kiln.

(A) 1600°C
(B) 1450°C
(C) 1200°C
(D) 850°C
(E) Answer not known

125. In sugar production, the mixture of crystals and syrup is called as

(A) Massecuite
(B) Solution
(C) Molasses
(D) Bagasse
(E) Answer not known

126. Flue Gas Desulfurization (FGD) units in coal-based thermal power plants are primarily designed to

(A) Remove particulate matter
(B) Reduce SO_2 emissions
(C) Capture CO_2 emissions
(D) neutralize acidic rain water
(E) Answer not known

127. According to CPCB norms in India, which of the following best describes the treated effluent discharge limits for large pulp and paper mills?

(A) BOD<100 mg/L, pH 4-10
(B) BOD<30 mg/L, TSS<50 mg/L, pH 6.5-8.5
(C) TDS<500 mg/L, BOD<60 mg/L
(D) COD<500 mg/L, pH 5-9
(E) Answer not known

128. _____ types of plastic are recyclable.

(A) 1, 2, 4, 5
(B) 2, 3, 5, 6
(C) 1, 3, 5, 7
(D) 1, 2, 4, 6
(E) Answer not known

129. Inertial separators are primarily used for

(A) Collection of medium size and coarse particles
(B) Collection of fine particles
(C) Collection or respirable particles
(D) Collection of toxic gases
(E) Answer not known

130. Which of the following statements are true about the areas where cleaner production measures can be taken in

(i) Change of input materials

(ii) Technology change

(iii) Onsite reuse and recycling

(iv) Good operating practices

(A) Only (i)

(B) Only (iv)

(C) Only (i) and (ii)

(D) (i), (ii), (iii) and (iv)

(E) Answer not known

131. In IWWM, the concept of water reclamation and reuse primarily aims to

(A) Increase fresh water withdrawals

(B) Minimize wastewater generation

(C) Conserve water resources by treating wastewater for safe reuse in agriculture industry or ground water recharge

(D) Eliminate the need for treatment

(E) Answer not known

132. What do Volatile Suspended Solids (VSS) primarily represent in waste water analysis?

(A) Inorganic mineral particles

(B) Organic matter that can be turned off at high temperature

(C) Dissolved solids

(D) Heavy metals

(E) Answer not known

133. Which of the following Indian Organization involved in the production of blue-green algae coated granulated compost from the solid waste?

(A) Indian Agricultural Research Institute (IARI)

(B) Indian Council for Medicinal Research (ICMR)

(C) Botanical Survey of India (BSI)

(D) Indian Institute of Science (IISC)

(E) Answer not known

134. What is the name of the device for continuously measuring waste water flow at or near ground surface?

(A) Venturi meter

(B) Turbine flow meter

(C) Vortex flow meter

(D) Parshall flame

(E) Answer not known

135. While discharging the treated waste water into receiving water, it must be ensured that atleast _____ ppm of Dissolved Oxygen is present in it.

(A) 4
(B) 6
(C) 10
(D) 2
(E) Answer not known

136. Which of the following statements are true about the method of treatment of an industrial waste depends on various factors such as

(i) Nature of industrial waste

(ii) BOD and COD of the effluent

(iii) Total solids present

(A) (i) only
(B) (ii) only
(C) (i) and (ii) only
(D) (i), (ii) and (iii)
(E) Answer not known

137. Which wastes containing suspended matter in solid form, but little polluting matter in solution?

(A) Coal washeries
(B) Tanneries
(C) Electroplating
(D) Dairies
(E) Answer not known

138. Smoke particles are generally less that _____ μm.

(A) 0.5
(B) 1.0
(C) 0.75
(D) 0.25
(E) Answer not known

139. A prominent method of natural disposal is

(A) Dilution
(B) Mechanical straining
(C) Sewage forming
(D) Self purification
(E) Answer not known

140. What does COD in waste water stand for?

(A) Carbon Oxygen Demand
(B) Combined Oxygen Demand
(C) Chemical Oxygen Demand
(D) Chemical Oxygen Degree
(E) Answer not known

141. The micro organism in wastewater is removed by

(A) Heating process
(B) Hydrogenation process
(C) Natural process
(D) Oxidation process
(E) Answer not known

142. Choose the correct usage of microelectrodes to determine

(1) Cyanide

(2) Oxygen

(3) Redox potential

(4) Radio active elements

(A) (1) and (4) are correct
(B) (3) and (1) are correct
(C) (2) and (3) are correct
(D) (3) and (4) are correct
(E) Answer not known

143. The over all reduction half reaction for decomposition of Biomass to methane is

$$CO_2 + 8H_3O^+ + 8e^- \rightarrow CH_4 + 10H_2O \quad PE^\circ(w) = -4.13$$

Suggest under which condition this reaction occurs in water Bodies

(A) Anaerobic decomposition
(B) Aerobic decomposition in the presence of sulphate
(C) Aerobic decomposition in the presence of Nitrate
(D) Aerobic decomposition with oxygen as primary oxidising agent
(E) Answer not known

144. How the ECOSAN concept is most beneficial in Agricultural field

(A) By the complete recovery of toxic metals from powered water sources

(B) By the complete recovery of all nutrients from faces, urine and gray water

(C) By the complete removal of toxic chemicals from waste water

(D) By the complete recovery from microbial contaminants from waste water

(E) Answer not known

145. In acidic conditions, the protonated metal oxide surface, electro statically attract

(A) Cations

(B) Anions

(C) Amphoteric ions

(D) Organic compounds

(E) Answer not known

146. Which of the following gas doesn't absorb infrared radiations?

(A) O_2

(B) H_2O

(C) CO_2

(D) CH_4

(E) Answer not known

147. Among the following water contaminants which one leads to skeletal fluorosis and hypocalcification?

(A) Chloride

(B) Fluoride

(C) Phosphate

(D) Calcium

(E) Answer not known

148. In hydrocarbon analysis the flame ionization detector response is roughly proportional to the number of

(A) C – atoms
(B) O – atoms
(C) H – atoms
(D) N – atoms
(E) Answer not known

149. The indicator cannot be shared in solution because it

(A) Undergoes change in colour
(B) Undergoes reduction reaction
(C) Evaporates quickly
(D) Decomposes overtime
(E) Answer not known

150. Which of the following methods is involved in the green synthesis of (PET) polyethylene Terephthalate are:

(1) Closed looped recycling
(2) Open looped recycling
(3) Methanolysis
(4) Transesterification

(A) (1), (3) and (4) are correct
(B) (3), and (4) are correct
(C) (2), and (3) are correct
(D) (2), (3) and (4) are correct
(E) Answer not known

151. Match the gases in column A with their approximate percentage in the Earth's is atmosphere in column B

	Column A (Gas)		Column B (Approximate % by volume)
(a)	Nitrogen (N_2)	1.	21%
(b)	Oxygen (O_2)	2.	0.93%
(c)	Argon (Ar)	3.	78%
(d)	Carbon Dioxide (CO_2)	4.	0.04%

	(a)	(b)	(c)	(d)
(A)	3	1	2	4
(B)	1	2	3	4
(C)	4	3	1	2
(D)	2	4	1	3

(E) Answer not known

152. If sulfur is returned to the atmosphere from the oceans the production of ————————is an important pathway.

(A) $(CH_3)_2S$ (B) NH_4HS

(C) $CaSO_4$ (D) Na_2SO_3

(E) Answer not known

153. Which of the following is the most important among biogenic hydrocarbons?

(a) Ethylene

(b) Methane

(c) Both (a) and (b)

(d) Neither (a) nor (b)

(A) (b) (B) (c)

(C) (d) (D) (a)

(E) Answer not known

154. As the wind blows, soil particles are dislodged and begin to roll on the soil surface in a process called

(A) Soil mining (B) Soil flying

(C) Soil washing (D) Saltation

(E) Answer not known

155. The biodegradation process of surface soil is inhibited due to the presence of

(A) Carbon - rich Nitrogen poor nutrients

(B) Nitrogen - rich and phosphorus poor nutrients

(C) Chloride - rich and sodium poor nutrients

(D) Nitrogen - rich and carbon poor nutrients

(E) Answer not known

156. Which of the following waste is also known as "end - of life" (EOL)?

(A) Biomedical waste
(B) Radioactive waste
(C) e- waste
(D) Plastic waste
(E) Answer not known

157. Who is the pioneering legislation for e-waste management?

(A) The SWISS EE – 1996
(B) The SWISS OREE – 1995
(C) The SWISS ORDEE – 1998
(D) The SWISS ORRDE – 1990
(E) Answer not known

158. Arrange the layers of secure landfills in chronological order

(i) A thick polythene liner
(ii) Absorbent cushion layer
(iii) Clay layer
(iv) Gravel layer

(A) (i), (ii), (iii), (iv)
(B) (iv), (ii), (i), (iii)
(C) (iii), (iv), (i), (ii)
(D) (ii), (iii), (iv), (i)
(E) Answer not known

159. Deleberately dismantiling buildings the salvage materials for reuse is known as

(A) Recycling
(B) Waste segregation
(C) Deconstruction
(D) Source reduction
(E) Answer not known

160. The hazardous and other wastes (management and Transboundary movement) rules were published by the Government of India in the ministry of Environment, forest and climate change in

(A) January 25, 2000
(B) March 20, 2003
(C) May 15, 2009
(D) July 24, 2015
(E) Answer not known

161. The only state which is successfully running waste-to-electricity plants through anaerobic digestion in India is

(A) Gujarat
(B) Sikkim
(C) Tamil Nadu
(D) Assam
(E) Answer not known

162. Metal present in printed circuit board and cables acts as catalyst for dioxin formation.

(A) Mercury
(B) Fluoride
(C) Copper
(D) Magnesium
(E) Answer not known

163. Among the following polymers, which one is thermoplastics in nature

(A) Aliphatic polyester
(B) Epoxy polymers
(C) Carboxymethyl cellulose
(D) Polystyrene
(E) Answer not known

164. Which one of the following polymer does not undergo hydrolysis and hydrobio degradability?

(A) Polyesters
(B) Polyamides
(C) Polyurethanes
(D) Polypropylene
(E) Answer not known

165. Select the correct prime objective of solid waste management from the given statements:

(i) Solid waste mount to environmental threat.
(ii) To trim down the disposal of solid waste along with salvaging material.
(iii) Energy from solid wastes.
(iv) To reduce pollution load in ground level.

(A) (i), (ii), (iii), (iv)
(B) (i), (ii), (iii)
(C) (ii), (iii)
(D) (i), (ii), (iv)
(E) Answer not known

166. During the recycling of paper waste ———— used as bleaching agent.

(A) HCl or H_2SO_4
(B) CO_2
(C) NaOH
(D) H_2O_2 or chlorine oxide
(E) Answer not known

167. In rehabilitation excavating and re-disposing waste is more controlled and environmentally sound manner called

(A) Leachate management
(B) Slope stabilization
(C) Phased approach
(D) Landfill mining
(E) Answer not known

168. Which of the following are resilient and almost impossible to compact?

(A) Plastics
(B) Tires
(C) Chemicals
(D) E-waste
(E) Answer not known

169. Applying specifically engineered and micro organisms that are designed to break down contaminant is called

(A) In situ bioremediation
(B) Ex situ bioremediation
(C) Biostimulation
(D) Bioaugmentation
(E) Answer not known

170. The process by which a water body becomes overly enriched with nutrients leading to excessive growth of algae and other plant life called

(A) Oligotrophication
(B) Eutrophication
(C) Subtrophication
(D) Zerotrophication
(E) Answer not known

171. Difference in the level of oxygen is the expression of the capacity to consume oxygen by the sewage, which is expressed in

(A) PPM – Parts Per Million
(B) RPM – Revolution Per Minute
(C) MPL – Moles Per Liter
(D) GPL – Grams Per Liter
(E) Answer not known

172. When the wastes generated at traffic congested locations will be collected?

(A) During early morning
(B) During night hours
(C) First part of the day
(D) Second part of the day
(E) Answer not known

173. Which of the statements given below are correct?

(i) Density separation of solid wastes can be accomplished by air classifiers.

(ii) Iron recovery from solid wastes can be done by magnetic separators.

(iii) Aluminium separation can be done by eddy current separators.

(A) (i) and (ii) only
(B) (ii) and (iii) only
(C) (i) and (iii) only
(D) (i), (ii) and (iii)
(E) Answer not known

174. Match the following proximate analysis with their formulas.

(a)	Moisture	1.	$\% = \left(\frac{\text{Weight of residue}}{\text{Weight of sample}}\right) \times 100$
(b)	Volatile matter	2.	$(\%) = \left(\frac{\text{Weight loss}}{\text{Weight of the sample}} \times 100\right)$
(c)	Ash	3.	(%) = 100 – (% M + % Ash + % VM)
(d)	Fixed carbon	4.	(Total weight loss – moisture)

	(a)	(b)	(c)	(d)
(A)	2	4	1	3
(B)	1	3	2	4
(C)	3	1	4	2
(D)	4	2	3	1

(E) Answer not known

175. Match the following

(a)	Garbage	1.	Lawn mowers
(b)	Rubbish	2.	Attracts flies and insects
(c)	Ashes	3.	Incinerated to flames at 1400 – 1500°F
(d)	Bulky house hold waste	4.	Cinders and clinkers

	(a)	(b)	(c)	(d)
(A)	2	3	4	1
(B)	3	4	1	2
(C)	4	1	2	3
(D)	1	2	3	4

(E) Answer not known

176. Identify the kind of waste subjected to decay with time and evolve highly offensive odour and gases which are detrimental to health

(A) Organic waste
(B) Inorganic waste
(C) Trade waste
(D) Ashes
(E) Answer not known

177. Solid wastes can be made to use for

(A) Packing
(B) Transportation
(C) Recycling
(D) Municipal earnings
(E) Answer not known

178. Rubbish consists of all non-putrescible wastes excluding

(A) Rags
(B) Paper
(C) Ashes
(D) Broken crokery
(E) Answer not known

179. Arrange the following stages of composting in chronological order.

(i) Stabilisation stage
(ii) Seiving and product grading
(iii) Maturation stage
(iv) High rate composting stage

(A) (i), (iii), (iv), (ii)
(B) (iii), (i), (iv), (ii)
(C) (iv), (i), (iii), (ii)
(D) (i), (iv), (iii), (ii)
(E) Answer not known

180. Incineration is a chemical reaction that can reduce solid waste to about

(A) 90% in volume and 75% in weight
(B) 75% in volume and 90% in weight
(C) 55% in volume and 80% in weight
(D) 80% in volume and 55% in weight
(E) Answer not known

181. Which one of the following is most destructive in killing the pathogens?

(A) Hypochlorite ion
(B) Hypochlorous acid
(C) Mono-Chloramine
(D) Di-Chloramine
(E) Answer not known

182. Which of the following best represents Carbon's ability to remove taste and Odour compounds?

(A) Solubility
(B) Adsorption capacity
(C) Chemical reactivity
(D) Ion exchange capacity
(E) Answer not known

183. The content of secondary sedimentation tank of an activated sludge process would predominantly under go ———— to give off clarified effluent

(A) Type III zone settling
(B) Type II flocculent settling
(C) Type IV compression settling
(D) Floatation settling
(E) Answer not known

184. In wastewater treatment, particles that change size, shape and specific gravity when in contact with each other can be removed by

(A) Precipitation
(B) Flocculation
(C) Settling in contiguous zone
(D) Compression or compaction
(E) Answer not known

185. Compute the hydraulic loading rate of an ion-exchange column, if the flow rate of 5000 m^3/h with the total cross-sectional area of 25 m^2

(A) 12500 m/h
(B) 12.5 m/h
(C) 200 m/h
(D) 20000 m/h
(E) Answer not known

186. The adsorption destabilization with ———— is one of the themes of coagulation theory

(A) Negatively charged, polynuclear Aluminium Species
(B) Positively charged, mononuclear Aluminium species
(C) Positively charged, polynuclear Aluminium species
(D) Negatively charged, mononuclear Aluminum species
(E) Answer not known

187. In disinfection process, bromine is added as bromine chloride gas which reacts with water to give

(A) HOBr
(B) Br_2Cl_2
(C) HBr
(D) H_2O_2
(E) Answer not known

188. In Reverse Osmosis , the pressure on the solution side that is higher than the osmotic pressure will result in increase in

(A) Flux momentum
(B) Flux density
(C) Flux volume
(D) Flux mass
(E) Answer not known

189. It is always desirable to have a large Height-To-Diameter (H:D) for a fixed-bed adsorption column, and it ranges from

(A) 1 : 3 to 1 : 5
(B) 2 : 4 to 3 : 9
(C) 6 : 1 to 9 : 3
(D) 3 : 1 to 5 : 1
(E) Answer not known

190. The saturated dissolved oxygen concentration in tap water at 20°C is about

(A) 12.48 Mg/L
(B) 6.80 Mg/L
(C) 9.17 Mg/L
(D) 14.23 Mg/L
(E) Answer not known

191. In a rectangular clarification basin, the flow is 30,300 m^3/day . The over flow rate is 24.4 $m^3/d\text{-}m^2$ and the detention time is 6h. Compute the required plan area

(A) 1242 m^2
(B) 2484 m^2
(C) 3726 m^2
(D) 4968 m^2
(E) Answer not known

192. If the effluent quality has stringent discharge limits and contains concentrated acids or bases, ———— neutralisation system should be used.

(A) Continuous
(B) Batch
(C) Fed-Batch
(D) Semi-continuous
(E) Answer not known

193. If the influent flow of wastewater is relatively constant and effluent chemistry is not very critical ———— neutralization practice will be employed

(A) Batch
(B) Semi-continuous flow
(C) Continuous flow
(D) Fed batch
(E) Answer not known

194. The solid-liquid interface for type III and IV suspensions can be observed through the plot of

(A) Time versus velocity
(B) Time versus distance settled
(C) Time versus viscosity
(D) Time versus density
(E) Answer not known

195. How the grits will get removed if the primary treatment unit does not have any grit chamber?

(A) Removed in aeration basin and secondary classifier
(B) Removed in tricking filter and secondary classifier
(C) Removed in bio filters
(D) Removed in Rotating Biological contactors
(E) Answer not known

196. The velocity of the Bar screen and opening size of the bar is

(A) < 1 m/sec and < 40 mm
(B) < 0.1 m/sec and < 4 mm
(C) 1.2 to 1.5 m /sec and 45 to 60 mm
(D) > 2 m/ sec and 50 mm
(E) Answer not known

197. In waste water treatment plant, mechanical bar screens are typically installed at an angle of ———— with the horizontal

(A) 45° to 90°
(B) 0° to 30°
(C) 100° to 180°
(D) 200° to 270°
(E) Answer not known

198. If the concentration and flow of nitrogen in the influent to a wastewater plant are 45 Mg/L and 50 L/s respectively, then the total nitrogen load is

(A) 194 kg N/d
(B) 0.194 kg N/d
(C) 96 kg N/d
(D) 0.096 kg N/d
(E) Answer not known

199. In a grit chamber, if a flume is not free-flowing and has backwater effects ———— is a function of the difference in upstream and downstream heads

(A) Discharge
(B) Velocity
(C) Pressure head
(D) Drift velocity
(E) Answer not known

200. For a horizontal flow grit chamber, the ideal settling theory assumes that the horizontal velocity is

(A) uniform over depth
(B) varying over depth
(C) uniform over length
(D) varying over length
(E) Answer not known