

Q1. What does physical characterization of waste water include?

- (a) Colour
- (b) Odour
- (c) Temperature
- (d) All of these

Q2. Which bacteria required oxygen for survival?

- (a) Anaerobic bacteria
- (b) Aerobic bacteria
- (c) Facultative bacteria
- (d) Pathogenic bacteria

Q3. A waste water sample of 2 ml is made upto 300 ml is BOD with distilled water Initial DO of the sample is  $8\text{mg}/\ell$  and after 5 days it is  $28\text{mg}/\ell$ . What is its BOD?

- (a)  $894\text{ mg}/\ell$
- (b)  $900\text{ mg}/\ell$
- (c)  $300\text{ mg}/\ell$
- (d)  $1200\text{ mg}/\ell$

Q4. The two mains gases obtained from anaerobic decomposition are -

- (a) Ammonia and  $\text{CO}_2$
- (b)  $\text{CO}_2$  and  $\text{CH}_4$
- (c)  $\text{CH}_4$  and Hydrogen sulphide
- (d) Ammonia and  $\text{CO}_4$

Q5. The dissolved oxygen in stream is maximum at –

- (a) Noon
- (b) Morning
- (c) Midnight
- (d) Same throughout the day

Q6. The amount of oxygen available in the effluent in any form to the total amount of oxygen required in 1<sup>st</sup> stage of BOD is

- (a) Theoretical oxygen demand
- (b) Total organic carbon
- (c) Relative stability
- (d) Relative BOD

Q7. Unit of deoxygenation constant is

- (a) Per day
- (b) Per hour
- (c) ppm
- (d)  $\text{mg}/\text{L}$

Q8. The bacteria which can survive without oxygen is called

- (a) Anaerobic bacteria
- (b) Pathogenic bacteria

- (c) Aerobic bacteria
- (d) Non-pathogenic bacteria

Q9. What does Chemical Oxygen Demand (COD) indicate?

- (a) Biodegradability of the waste water
- (b) Potential for recycling the wastewater
- (c) Age of the sewage
- (d) Strength of a sewage

Q10. The correct relationship between theoretical oxygen demand (TOD), biochemical oxygen demand (BOD) and, chemical oxygen demand (COD) is given by

- (a)  $TOD > BOD > COD$
- (b)  $TOD > COD > BOD$
- (c)  $COD > BOD > TOD$
- (d)  $BOD > COD > TOD$

Q11. The ratio of 5<sup>th</sup> day BOD of the industry in kg/day and BOD contributed by each person in kg/day is termed as .....

- (a) relative stability
- (b) population equivalent
- (c) total organic carbon
- (d) oxygen equivalent

Q12. What is the effect of ambient temperature of the ultimate Biological Oxygen Demand of BOD of a waste?

- (a) Decreases with the temperature
- (b) Remains unaffected by the temperature
- (c) Increases exponentially with the temperature
- (d) Increases with the temperature

Q13. In which one of the following tests is the organic matter in the waste water used as food by micro-organisms?

- (a) BOD
- (b) Most probable number
- (c) COD
- (d) chlorine demand

Q14. Which of the following process take place during biochemical treatment of sewage effluents?

- (a) Sulphonification
- (b) Oxidation
- (c) Chlorination
- (d) Redox

Q15. Facultative bacteria are those which:

- (a) Can survive with or without free oxygen
- (b) Flourish and thrive in the absence of free oxygen

- (c) Require oxygen for their survival
- (d) None of the above

Q16. Presence of nitrogen in a waste water sample is due to the decomposition of

- (a) Carbohydrates
- (b) Proteins
- (c) Fats
- (d) Vitamins

Q17. Standard B. O. D. is measured at

- (a) 20°C – 1 day
- (b) 25°C – 3 day
- (c) 20° C – 5 day
- (d) 30° C – 5 day

Q18. The ratio of 5 day BOD to ultimate BOD is about

- (a) 1/4
- (b) 1/2
- (c) 1/3
- (d) 2/3

Q19. Pollution potential of domestic sewage generated in a town and its industrial sewage can be compared with reference to?

- (a) their BOD value
- (b) population equivalent
- (c) the relative density
- (d) their volume

Q20. In an industrial area, the industrial sewage has a 5-day BOD of 800 kg per day at 20 degree Celsius. If the average population equivalent per capita per day is 80 g of 5-day BOD at 20 degree Celsius, then the equivalent population (persons) will be:

- (a) 10000
- (b) 15000
- (c) 20000
- (d) 25000

Q21. The Bangalore method of composting of solid waste is:

- (a) Facultative
- (b) anaerobic and aerobic
- (c) aerobic
- (d) anaerobic

Q22. Reusable wastewater from residential, commercial and industrial bathroom sinks, bath tub shower drains and clothes washing equipment drains, is known as

- (a) Blue water
- (b) Black water
- (c) Brown water
- (d) Grey water

Q23. The disposal of screen is done by –

- (a) sedimentation
- (b) incineration
- (c) filtration
- (d) flocculation

Q24. The Indore method of composting takes..... months to complete the process.

- (a) one and a half
- (b) four
- (c) three
- (d) two

Q25. The colour of stale and septic sewage is.....

- (a) grey
- (b) yellow
- (c) light brown
- (d) black or dark brown

Q26. The aerobic method of mechanical composting practiced in India is called:

- (a) Bhopal method
- (b) Indore method
- (c) Nagpur method
- (d) Bangalore method

Q27. Biomedical waste is disposed off through.

- (a) a landfill
- (b) composting
- (c) incineration
- (d) a landfill and incineration

Q28. The process of mixing the sewage with large volume of water to keep in aerobic condition is known as:

- (a) Current
- (b) Oxidation
- (c) Dilution
- (d) Sedimentation

Q29. The most efficient method to conserve energy in the form of oil and gases is.....

- (a) combusting
- (b) Fluidized – bed incineration
- (c) incineration with heat recovery
- (d) pyrolysis

Q30. Discharge from washing places is termed as

- (a) Sewage
- (b) Garbage
- (c) Rubbish
- (d) Sullage

Q31. Which of the following solid waste disposal method is ecologically acceptable: -

- (a) Incineration
- (b) Composting
- (c) Sanitary land fill
- (d) All of the above

Q32. Disposal of sewage in large cities, is done in:

- (a) Irrigation
- (b) Dilution
- (c) Oxidation
- (d) Putrifaction

Q33. The characteristics of fresh and septic sewage respectively are : -

- (a) Acidic and alkaline
- (b) Alkaline and acidic
- (c) Both acidic
- (d) Both alkaline

Q34. When waste water is disposed off into a running stream, four zones are formed. In which of the following zones will the minimum level of dissolved oxygen be found?

- (a) Zone of degradation
- (b) Zone of active decomposition
- (c) Zone of recovery
- (d) Zone of clear water

Q35. Sewage sickness is a phenomenon related to –

- (a) Septic sewage disposal
- (b) Stoppage of free circulation of air due to clogging of soil pores
- (c) spoiling of vegetables due to application of sewage waste
- (d) Malaria caused by sewage

Q36. IAQ means -

- (a) Indoor Air Quality
- (b) Interior Airconditioning Quality
- (c) Indoor Air Quantity
- (d) Interior Architectural Quality

Q37. As per Environmental protection Act, 1986, the noise level in the industrial area during day should not be more than:

- (a) 75 dB

- (b) 65 dB
- (c) 45 dB
- (d) 55 dB

Q38. The plume behavior which occurs in the super adiabatic condition with light to moderate wind speed in the presence of large scale thermal eddies are known as.....

- (a) coning plume
- (b) neutral plume
- (c) looping plume
- (d) fanning plume

Q39. The rain is called as acid rain, when its pH is less than \_\_\_\_\_

- (a) 3
- (b) 4.5
- (c) 7
- (d) 8.5

Q40. Which of the following is responsible for the depletion of ozone layer in the upper atmosphere?

- (a) Carbon dioxide
- (b) Chlorofluorocarbons
- (c) Hydrogen peroxide
- (d) Oxides of nitrogen

Q41. The path taken by the continuous discharge of gaseous effluents emitted from chimney is commonly known as.....

- (a) Lapse rate
- (b) Inversion
- (c) Plume
- (d) None of these

Q42. Which of the following are primary air pollutants?

- (a) Sulphur dioxide and Nitrogen oxides
- (b) Ozone and Carbon monoxide
- (c) Sulphur dioxide and ozone
- (d) Nitrogen oxide and ozone

Q43. Pollutant Standards Index (PSI) value in between 101 – 199 denotes the air quality as.....

- (a) Good
- (b) Moderate
- (c) Unhealthy
- (d) Hazardous

Q44. Acid rains are caused by the following pollutants: -

- (a) SO<sub>2</sub> and O<sub>3</sub>
- (b) SO<sub>2</sub> and NO<sub>x</sub>

- (c)  $\text{NO}_x$  and  $\text{O}_3$
- (d) CO and  $\text{SO}_2$

Q45. Greenhouse effect of  $\text{CO}_2$  is\_\_\_\_\_:

- (a) permitting the outside solar radiation to reach the ground but preventing terrestrial radiation from the ground into the space
- (b) Permitting the solar radiation of short length and reradiated terrestrial heat of long wave length
- (c) reflecting the heat rays into the space thereby keeping the temperature of earth unaffected
- (d) Causing absorption of heat troposphere and thereby decreasing the temperature of earth with increase in  $\text{CO}_2$  concentration

Q46. Ringelmann's Scale is used to

- (a) Measure CO
- (b) measure  $\text{SO}_2$
- (c) Grade density of smoke
- (d) Grade automobile exhaust gas

Q47. What is the major pollutant present in photochemical smog?

- (a) Nitrogen oxide
- (b) Carbon dioxide
- (c) Hydrocarbon
- (d) Sulphur dioxide

Q48. Secondary pollutant is:

- (a) Sulphur dioxide
- (b) Ozone
- (c) Carbon dioxide
- (d) Hydrogen sulphide

Q49. Point area from which the seismic waves develop is -

- (a) Epicentre
- (b) Focus
- (c) Focal depth
- (d) None of these

Q50. Which of the following is a non-renewable resource?

- (a) Coal
- (b) Water
- (c) Sunlight
- (d) None of the above

S1. Ans.(d)

Sol. The physical characteristics of waste water is following.

- (i) Colour
- (ii) Odour

- (iii) Temperature
- (iv) Suspended solids
- (v) Turbidity

S2. Ans.(b)

Sol. Aerobic bacteria can not survive without oxygen hence aerobic bacteria required oxygen for survival.

S3. Ans.(b)

Sol. Given, volume of diluted sample = 300 ml.

Initial volume of test sample = 2 ml.

Initial dissolved oxygen ( $DO_i$ ) = 8 mg/l

Final dissolved oxygen ( $DO_f$ ) = 2 mg/l.

$$BOD = (DO_i - DO_f) \times \text{Dilution factor}$$

$$\text{Dilution factor} = \frac{\text{volume of diluted sample}}{\text{Initial volume of test sample}}$$

$$= \frac{300}{2}$$

$$= 150$$

$$BOD = (8-2) \times 150$$

$$= 900 \text{ mg/l.}$$

S4. Ans.(b)

Sol. Gases evolved from anaerobic decomposition are Methane ( $CH_4$ ) and carbon di-oxide ( $CO_2$ ).

S5. Ans.(a)

Sol. The dissolved oxygen in stream is maximum at noon.

S6. Ans.(c)

$$\text{Sol. } \text{Relative stability } (S_r) = \frac{\text{Amount of oxygen available in effluent}}{\text{Total amount of oxygen required in 1st stage BOD}}$$

S7. Ans.(a)

Sol. (i) Deoxygenation constant is given by-

$$K_{DT^{\circ}C} = K_{D_{20^{\circ}C}} (1.047)^{(T-20)} \quad (\text{Unit} \rightarrow \text{per day})$$

Where

$K_{DT^{\circ}C}$  = Deoxygenation constant at temperature  $T^{\circ}C$

$K_{D_{20^{\circ}C}}$  = Deoxygenation constant at temperature  $20^{\circ}C$

(ii) Reoxygenation constant is given by

$$K_{RT^{\circ}C} = K_{R_{20^{\circ}C}} (1.016)^{(T-20)}$$

Where  $K_{RT^{\circ}C}$  = Reoxygenation constant at temperature  $T^{\circ}C$



$K_{R_{20^{\circ}C}}$  = Reoxygenation constant at temperature  $20^{\circ}C$

S8. Ans.(a)

Sol. Anaerobic bacteria can survive without oxygen while facultative bacteria can survive with or without oxygen.

S9. Ans.(a)

Sol. Chemical oxygen demand indication the amount of oxygen required to carry out the decomposition of both biodegradable or non-biodegradable organic matter present in the system.

S10. Ans.(b)

Sol. The correct relationship between TOD, COD and BOD is-

$$\boxed{TOD > COD > BOD}$$

S11. Ans.(b)

Sol. The number of individual releasing the BOD at the rate of average standard BOD of domestic sewage equivalent to that releases by industry is referred as population equivalent.

$$\boxed{\text{Population equivalent} = \frac{\text{Industrial BOD}}{\text{Average BOD of domestic sewage}}}$$

S12. Ans.(b)

Sol. The ultimate biological oxygen demand of BOD of a waste remains unaffected by the temperature.

S13. Ans.(a)

Sol. In BOD test, the organic matter in the waste water used as food by micro-organisms.

S14. Ans.(b)

Sol. Oxidation takes place during biochemical treatment of sewage effluents.

S15. Ans.(a)

Sol. Facultative bacteria are those who can survive with or without free oxygen.

S16. Ans.(b)

Sol. Presence of nitrogen in the waste water sample is due to the decomposition of proteins.

S17. Ans.(c)

Sol. The amount of oxygen required for the decomposition of bio-degradable organic matter present in the system is referred as bio-chemical oxygen demand (BOD). BOD during 5 days at  $20^{\circ}C$  is taken as standard BOD.

S18. Ans.(d)

Sol. The 5day BOD is approximately  $\frac{2}{3}$  or 68% of ultimate BOD.

S19. Ans.(b)

$$\text{Sol. } \boxed{\text{Population equivalent} = \frac{\text{Industrial BOD}}{\text{Average BOD of domestic sewage}}}$$

S20. Ans.(a)

Sol. Given,

5-day BOD at 20°C of industrial sewage = 800 kg =  $8 \times 10^5$  gm

5-day DOD at 20°C of per capita per day = 80 gm.

Population equivalent =?

$$\begin{aligned} \text{Population equivalent} &= \frac{\text{Industrial BOD}}{\text{Average BOD of domestic sewage}} \\ &= \frac{8 \times 10^5}{80} \\ &= 10000 \end{aligned}$$

S21. Ans.(d)

Sol. The Bangalore method of composting of solid waste is anaerobic.

S22. Ans.(d)

Sol. Reusable wastewater from residential, commercial and industrial bathroom sinks, bath tub shower drains and clothes washing equipment drains, is known as grey water.

S23. Ans.(b)

Sol. The disposal of screen is done by incineration. In this method waste is disposed by subjecting to the action of heat.

S24. Ans.(b)

Sol. The Indore method of composting of solid waste is aerobic process and it takes four months to complete the process.

S25. Ans.(d)

Sol. Sewage contains 99.9% of water and remaining 0.1% of solids particles. The colour of stale and septic sewage is black or dark brown.

S26. Ans.(b)

Sol. Indore method is the aerobic method of composting of solid waste.

S27. Ans.(a)

Sol.

S28. Ans.(c)

Sol. The process of mixing the sewage with large volume of water to keep in aerobic condition is known as dilution.

S29. Ans.(d)

Sol. Pyrolysis is the thermal process of degradation of organic material in the absence of oxygen. This is most efficient method to conserve energy in the form of oil and gases.

S30. Ans.(d)

Sol. discharge from washing places like household sinks, showers and baths is termed as sullage.

S31. Ans.(b)

Sol. composting method of disposal of solid waste is ecologically accepted method.

S32. Ans.(b)

Sol. Disposal of sewage in large cities is done by dilution. In this method sewage mixes with large volume of water to keep in aerobic condition.

S33. Ans.(b)

Sol. The characteristics of fresh and septic sewage are Alkaline and acidic respectively.

S34. Ans.(b)

Sol. There are four zones are formed when waste water is disposed off into a running stream

- (i) Zone of degradation
- (ii) Zone of active decomposition
- (iii) Zone of recovery
- (iv) Zone of clear water

In zone of active decomposition water is more dark and more turbid and dissolved oxygen may goes up to zero.

S35. Ans.(b)

Sol. Sewage sickness is a phenomenon in which stoppage of free circulation of air due to clogging of soil pores.

S36. Ans.(a)

Sol. IAQ means indoor air quality. It gives the information about quality of air around buildings and structures.

S37. Ans.(a)

Sol. as per environmental protection ACT, 1986, the noise level for different zones are following

—

Zone	Day	Night
Industrial	75dB	70dB
Commercial	65dB	55dB
Residential	55dB	45dB

Silence	50dB	40dB
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S38. Ans.(c)

Sol. Looping plume occurs in super adiabatic condition in which Environmental lapse rate is greater than adiabatic lapse rate.

S39. Ans.(b)

Sol. the rain is called as acid rain, when its pH is less than 4.5. then main cause of acid rain is Sulphur oxides ( $SO_x$ ) and Nitrogen oxides ( $NO_x$ ).

S40. Ans.(b)

Sol. Chlorofluorocarbons or ferons are the main pollutant which is responsible for the depletion of ozone layer.

S41. Ans.(c)

Sol. Plume is defined as the path taken by continuous discharge of gaseous effluents emitted from a chimney or stock.

S42. Ans.(a)

Sol. Primary pollutants-

- (i) Sulphur dioxide ( $SO_2$ )
- (ii) Nitrogen oxide ( $NO$ ) & ( $NO_2$ )
- (iii) Carbon mono oxide (CO)
- (iv) Lead (pb)
- (v) Hydrocarbon
- (vi) Radio active substance

Secondary pollutants -

- (i)  $H_2SO_4$
- (ii) Ozone ( $O_3$ )
- (iii) Formaldehydes
- (iv) Peroxyacetyl nitrate (PAN)

S43. Ans.(c)

Sol.

PSI value	Level of health concern
0-50	Good
51-100	Moderate
101-200	Unhealthy
201-300	Unhealthy
301 +	Hazardous

S44. Ans.(b)

Sol. the main cause of acid rain is Sulphur oxides ( $SO_x$ ) and Nitrogen oxides ( $NO_x$ ).

S45. Ans.(a)

Sol.

S46. Ans.(c)

Sol. Ringelmann's scale is used to grade density of smoke.

S47. Ans.(c)

Sol. unburnt hydrocarbon, carbon mono-oxide and PAN are major pollutant present in photochemical smog.

S48. Ans.(b)

S49 Ans.(b)

Sol. point area from which the seismic waves developed is focus.

S50. Ans.(a)

Sol. Non-renewable energy comes from sources that will not be replenished or will run out ex. Petrol, coal, diesel etc