ENVIRONMENTAL ENGINEERING-II
TWO MARK QUESTIONS AND ANSWERS

1. Explain the term sullage.
   Sullage is a clear term used to indicate the wastewater from bath rooms, washing places and wash basins etc. It does not create smell since organic matter in it is either absent or it of negligible amount.

2. How water carriage system to be classified?
   - Separate system
   - Combined system
   - Partially separate system.

3. What are the methods available for calculating population growth?
   - Arithmetical increase
   - Geometrical increase
   - Incremental increase method
   - Decreased rate of growth method
   - Graphical comparison method
   - Growth composition analysis
   - Ratio and correlation method
   - Zoning method or master plan method.
   - Graphical extension method

4. What are the materials used for sewers constructions?
   - Asbestos cement sewer
   - Plain or reinforced cement concrete sewer
   - Vitrified clay sewer
   - Brick sewer
   - Cast iron sewer
   - Steel sewer
   - Plastic sewer

5. Write about joints of sewers.
   - Bell and spigot joint
   - Collar joints
   - Simplex joints
   - Flexible or bituminous joints
   - Mechanical joints

6. What are the forces acting on the sewers?
   - Internal pressure
   - Temperature
   - Forces due to external loads
     - Back fill loads
     - Super-impose loads
   - Flexural Stresses.

7. Write about the elements of pumping station?
   - Grit channel
8. What are the types of pumps?
   i. Centrifugal pumps
   ii. Reciprocating pumps
   iii. Propeller or axial flow pump
   iv. Air pressure pumps.

9. Define Biochemical Oxygen Demand (BOD)
   The BOD may define as oxygen required for micro-organism to carry out biological decomposition of dissolved solids or organic matter in the waste water under aerobic conditions at standard temperature.

10. What are the sources of sanitary sewage?
    ➢ Water supplied to the public for domestic purposes by the local authority.
    ➢ Water supplied to the various industries for various industrial process by the local authority.
    ➢ Water drawn from wells by individual houses for their domestic purpose.
    ➢ Water supplied by the local authority to various public places such as school, cine field, hotels, and railways station. Tec.
    ➢ Water drawn from wells, lakes, canals etc. By industries for their purposes
    ➢ Infiltration of ground water in to showers thorough leaky joints.
    ➢ Unauthorized ensure of rainwater in sewer in line.

11. What are the physical characteristics of wastewater & mention their sources.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Source</th>
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<tbody>
<tr>
<td>Physical characteristic</td>
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<tr>
<td>i) Color</td>
<td>Domestic and industrial wastages, natural decay of organic materials.</td>
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<td>ii) odour</td>
<td>Decomposing wastewater: industrial wastages</td>
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<td>iii) Solids</td>
<td>Domestic water supply:</td>
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<td>iv) Temperature</td>
<td>Domestic and industrial wastages, soil erosion, inflow infiltration,</td>
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<td>Domestic and industrial wastages.</td>
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12. **What are the Chemical characteristics of wastewater & mention their sources.**

<table>
<thead>
<tr>
<th>Chemical characteristic</th>
<th>Domestic and commercial, industrial wastes</th>
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<tr>
<td>a. Organic</td>
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<td>i) carbo hydrates</td>
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<td>ii) Fats oils and the greases</td>
<td>Domestic, commercial and industrial wasstage</td>
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<td>iii) Pesticides</td>
<td>Agricultural wastages</td>
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<td>iv) Phenols</td>
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<td>v) Proteins</td>
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<td>vi) Surfactant</td>
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<td>ii) Chloride</td>
<td>Domestic water supply</td>
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<td>iii) Heavy metal</td>
<td>Ground water infiltration.</td>
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<td>iv) Oxygen</td>
<td>Domestic supply</td>
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<td>v)pH</td>
<td>Domestic wastes</td>
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<td>vi) Phosphorus</td>
<td>Ground water infiltration,</td>
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<td>vii)sulphur</td>
<td>Water softeners, Industrials wastes, domestic and industrial wastes.</td>
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<td>viii) Toxic compounds</td>
<td>Domestic wastes</td>
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<td>Natural run off</td>
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<td>Domestic and industrial wastes.</td>
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13. **What are the Biological characteristics of wastewater & mention their sources.**
Biological characteristic

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<tr>
<td>i)</td>
<td>Animals</td>
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<td>iii)</td>
<td>Protozoa</td>
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<td>iv)</td>
<td>Viruses</td>
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14. **What are the advantages of water carriage system?**

1. **Epidemic aspect:** There are no chances of outbreak or epidemic because flies and other insects do not have direct assessed.

2. **Pollution aspect:** The liquid waste is directly conveyed through the sewers and there fore there no changes of he waste water being soaked in the ground thus contaminating the soil. The waste water does not percolate down to join the ground water. There are no chances of pollution of water of wells individual houses in any.

3. **Labour aspect:** The labour required for operation and maintained in extremely small. In fact, the following of the system is practically automatic, except for the operation of certain pumps etc. therefore, there is no labour problem in the individual houses.

15. **What is meant by separate system?**

The separate system provides two separate systems of sewers- the one intended for the conveynance of foul sewage only, such as faecal matter, domestic wastewater, the washings and draining of places such as slaughter houses, laundries and wastewater from manufacturing processes; and the other for the rain water, including the surface washing from certain streets, overflow from public baths and foundations.

16. **What are the advantages of separate system?**

- The cost of installation is low.
- The load on the treatment units will be lowered, since only the foul sewage carried by the separate sewers need to be treated.
- Sewers of smaller section can be easily ventilated than those of larger section.
- The night flow will be comparatively small this may facilitate operations at the outfall works.
- Rain water can be discharged in to streams or rivers without any treatment.

17. **What is meant by combined system?**

The combined system provides only one sewer to carry both the foul sewage as well as the rain water.

18. **What are the disadvantages of partially combined system?**

- During the dry weather, when there is no rain water, the velocity of flow will be low. Thus self cleansing velocity may not be achieved.
- The storm water increases the load on treatment units.
- The storm water also increases the cost of pumping.

19. **What are the factors governing the choice of combined system?**

- Space consideration
 Integrated development
 Even rainfall pattern
 Conversion of existing storm water drains
 Pumping requirements.

20. **Define dry weather flow.**
   The dry weather flow is the flow through the sewers that would normally be available during non-rainfall periods. It consists mainly of (i) Domestic sewage (ii) Industrial wastewater.

21. **What are the factors affecting dry weather flow?**
    Rate of water supply
    Population growth
    Type of area served
    Infiltration of ground water

22. **Define time of concentration.**
   It is defined as the longest time, without unreasonable delay, that will be required for a drop of water to flow from the farther point of the drainage area to the point of concentration (i.e., the point at which maximum runoff is estimated). It is the time required for the flood discharge to reach to the maximum limit.

23. **Define the term self cleansing velocity.**
   It is defined as that velocity at which the solid particles will remain in suspension, without settling at the bottom of the sewer.

24. **What are the factors to be considered while selecting a particular material of a sewer?**
    Hydraulic efficiency
    Resistance to abrasion
    Resistance to corrosion
    Strength
    Durability
    Cost
    Weight
    Imperviousness.

25. **What is meant by an outfall sewer?**
   It is a sewer that receives the sewage from the collecting systems and conduits it to a point of final discharge or to a disposal plant.

26. **Draw the different shapes of sewers commonly used.**

27. **What are the various steps involved in the layout and construction of sewer lines?**
    Setting out
    Alignment and gradient
    Excavation of trenches, timbering and dewatering
    Laying and jointing
    Testing
    backfilling
28. What are the tests to be conducted on sewer lines?
   - Test for straightness and obstruction
   - Water test
   - Smoke test
   - Air test

29. What are the types of pipe appurtenances?
   - Inlets
   - Catch basins
   - Clean outs
   - Manholes
   - Drop manholes
   - Lamp holes
   - Flushing tanks
   - Grease and oil traps
   - Inverted siphons
   - Storm regulators

30. What is the necessity of lifting wastewater?
   - The sewage from localized low lying pockets in a city has to be pumped, so as to throw it up in to the city’s sewer pipes flowing under gravity and running at higher elevations.
   - When the area is flat, the laying of sewers at their designed gradients may involve deeper excavations in the forward direction of flow. In such circumstances, it may be advisable to lift the sewage at suitable intervals, and then to lay sewers at reasonable depth below the surface.
   - For disposing of the sewage of the basements of large commercial buildings, sewage may have to be pumped, as the street sewer may be higher than the level of the basement floor.

PART – A
TWO MARK QUESTIONS & ANSWERS

1. What are the types of settling?
   1. Discrete settling
   2. Flocculent settling
   3. Hindered or zone settling
   4. Compression

2. Write the principle of sedimentation.
   The organic matter present in sewage is having a specific gravity greater than that of water (i.e., 1). In still sewage, these particles will, therefore, tend to settle down by gravity. Hence as soon as the turbulence is retarded by offering storage to sewage, these impurities tend to settle down at the bottom of the tank offering such storage. This is the principle behind sedimentation.

3. What is chemical precipitation?
When chemicals are added to throw dissolved impurities out of solution, the operation is called precipitation.

4. What is meant by discrete particles?
   A particle that does not alter its shape, size and weight while settling or rising in wastewater, is known as discrete particle.

5. What are the types of settling tank?
   **Classification based on nature of working**
   - fill and draw type.
   - Continuous flow type
   **Classification based on its location**
   - Preliminary settling tank
   - Primary settling tank
   - Secondary settling tank.
   **Classification based on shape**
   - Rectangular settling tank
   - Circular settling tank
   - Hopper bottom settling tank

6. Write about circular settling tanks?
   In a circular settling tank, the wastewater enters at the center and flows radially outwards to the periphery. In such tank, the scraper shoes are mounted on rotating frame and sludge is collected in sludge sumps located at the center.

7. Define Biochemical Oxygen Demand (BOD)
   The BOD may define as oxygen required for micro-organism to carry out biological decomposition of dissolved solids or organic matter in the waste water under aerobic conditions at standard temperature.

8. What are the various units involved in preliminary treatment?
   i. Screenings, for removal of floating matter.
   ii. Grit chamber or detritus tank, for removal of sand and grit.
   iii. Comminuters for grinding or chopping large size suspended solids.
   iv. Floatation units and skimming tanks for the removal of soils and grease.
   v. Flow measuring units, such Parshall flume
   vi. Pumping

9. What is meant by Flocculate Settling?
   This type of settling refers to whether dilute suspension particle that flocculate during sedimentation process. Due to flocculation particles increase in mass on settle at a faster rate.

10. What is meant by Zone Settling?
    This type of settling refers to flocculent suspension of intermediates concentration. Inter particle forces hold the particles together and hence the mass of the particles subside has a whole

11. What is meant by Compression Settling?
    This refers to flocculent suspension of so high concentration the particles actually come in contact with each other, resulting in the formation of structure, further settling can occur only by compression of structure, brought about due to weight of particle which are constantly added to the structure.
12. What are the types of settling tanks?

- Fill and draw type settling tank
- Continuous flow type tank
- Vertical flow settling tank:
  - Circular settling tanks
  - Rectangular sedimentation tank

13. Write short notes on septic tank.

Septic tank may be defined as sedimentation tank with a longer detention period of 12 to 36 hours and with extra provisions for digestion of the settled sludge. Since the digestion of the settled sludge is carried out by anaerobic decomposition process the septic tank unit is generally classified under the units which work on the principle of decomposition. Moreover due to anaerobic decomposition settled sludge foul gases evolved in the tank and as search the septic tank completely cover the tank provided with high vent shaft for escape cases.

14. What are the methods available to dispose the effluent generated from septic tank?

- Soil absorption system
- Biological filters
- Upflow anaerobic filters

15. Define screen.

A screen is a device with openings generally of uniform size for the removal of floating matter. The screening elements may consist of parallel bars, rods, gratings or wire mesh or perforated plates

16. What is a proportional flow weir?

A proportional flow weir is a combination of a weir and an orifice. It consists of a rectangular plate with an opening with curved sides for flow to pass through. Such an arrangement maintains a nearly constant velocity in the grit channels by varying the cross sectional area of flow through the weir so that the depth is proportional to the flow.

17. How to dispose screenings.

The material separated by screens is called screenings. Screenings are disposed of by burning called incineration, buried in trenches called composting, dumping them in low lying areas, dumping in sea and dumping on land.

18. What is meant by primary and secondary treatment of sewage?

Primary treatment consists in removing large suspended organic solids. Eg: settling basins.

Secondary treatment involves further treatment of the effluent coming from primary sedimentation tank. This is accomplished through biological decomposition of organic matter, which can be carried out either under aerobic or anaerobic conditions. Eg: Activated sludge process, Oxidation ponds, aerated lagoons, Septic tank etc.

19. What is the purpose of using grit chamber?

Grit chambers or grit channels or grit basins, are intended to remove the inorganic particles such as sand, gravel, grit, egg shells, bones etc of size 2 mm or larger to prevent damage to the pumps, and to prevent their accumulation in sludge digesters.
20. **Write the function of detritus tank.**

Detritus tanks are nothing but grit chambers designed to flow with a smaller flow velocity of about 0.09 m/sec and longer detention periods of about 3 to 4 minutes so as to separate out not only the larger grit but also to separate out the very fine sand particles.

21. **Define relative stability.**

It is defined as the ratio of oxygen available in the effluent to the total oxygen required to satisfy its first stage BOD demand. It is expressed as percentage of the total oxygen required and can be expressed by the equation:

\[
S = 100 \left[ 1 - (0.794)^{t_{20}} \right]
\]

22. **What is meant by population equivalent?**

Population equivalent indicates the strength of the industrial wastewaters for estimating the treatment required at the municipal sewage treatment plant, and also helps in assessing realistic charges for this treatment to be charged from the industries instead of charging them by the volume of sewage.

1. **Write short notes on trickling filter.**

   It is also called as percolating filters or sprinkling filters, consists of tanks of coarser filtering media, over which the sewage is allowed to sprinkle or trickle down, by means of spray nozzles. The percolating sewage is collected at the bottom of the tank through a well designed under-drainage system. The purification of sewage is brought about by the aerobic bacteria.

2. **What are the types of trickling filters?**

   - Conventional trickling filter or standard rate or low rate trickling filter
   - High rate filters

3. **Write the advantages of trickling filter.**

   - They can remove about 75% of BOD and about 80% of suspended solids.
   - Working of trickling filter is simple and does not require any skilled supervision.
   - They are self cleaning.
   - Rate of filter loading is high, as such requiring lesser land areas and smaller quantities of filter media for their installations.
   - Moisture content of sludge, obtained from trickling filters, is as high as 99% or so.

4. **Write the disadvantages of trickling filter.**

   - Cost of construction of trickling filters is high.
   - These filters cannot treat raw sewage, and primary sedimentation is a must.

   - These filters pose a number of operational troubles such as fly nuisance, odour nuisance, ponding trouble etc.
5. Write the purpose of under drainage system in trickling filter.
   The purpose of under-drainage system is two fold
   1. To carry away the liquid effluent and sloughed biological solids
   2. To distribute air through the bed.

6. List the components of sewerage system?
   The components of sewerage system are,
   a. House sewers.
   b. Lateral sewers. Branch sewers.
   c. Main sewers.
   d. Outfall sewers.
   e. Man holes.

7. Give some qualities of the good sewer pipes
   • Resistance to corrosion
   • Resistance to abrasion
   • Strength and durability
   • Light weight
   • Economy and cost

8. What are the tests conducted in sewer pipes after laying?
   • Test for leakage (water test)
   • Test for straightness of alignment and obstruction

9. Define sewer appurtenances
   • Sewer appurtenances are those structures which are constructed at suitable interval along a sewerage system and help in its efficient operation and maintenance.

10. Mention the classification of manholes.
    • Shallow manholes
    • Normal manholes
    • Deep manholes

11. What is meant by catch basins?
    Catch basins are nothing but street inlets provided with additional small setting basins for avoiding the entry of the particles like grit, sand, debris in to the sewer pipes

12. Define inverted siphons
    Inverted siphon is defined as the sewer section constructed lower than the adjacent sewer section and it runs full under gravity with pressure greater than the atmosphere
13. What are the various methods of ventilation for sewers?
   • Use of ventilating columns
   • Use of ventilating manhole covers
   • Proper design of sewers
   • Use of mechanical devices

14. What are the operational troubles in trickling filter?
   • Fly nuisance
   • Odour nuisance
   • Ponding troubles

15. What are the different types of sewage treatment?
   • Contact beds
   • Intermittent sand filters
   • Trickling filters
   • Miscellaneous type of filters

16. Define hydraulic loading rate.
   The quantity of sewage applied per unit of surface area of the filter per day is called hydraulic loading rate and it is expressed in million litres per day.

17. What is meant by organic loading rate?
   The mass of BOD per unit volume of the filtering media per day is called organic loading rate. It is expressed in kg of BOD per hectare metre of the filter media per day.

18. What is an Oxidation ditch?
   The oxidation ditch, which is essentially an extended – aeration activated sludge process and it consists of an endless ditch for the aeration tank and a rotor for aeration mechanism. There is normally no primary tank used in oxidation ditch process.

19. What is a Stabilization pond?
   A Stabilization pond (or Lagoon) is an open, flow-through earthen basin of controlled shape, specially designed and constructed to treat sewage and biodegradable industrial wastes.

20. Give the NRC formula for fixing the volume of trickling filter.
   \[ E = \frac{100}{(1+0.0044\sqrt{u})} \]  
   \[ \text{Where, } E = \text{Efficiency of the filter and its secondary clarifier, in terms of } \% \text{ of applied BOD removed.} \]
   \[ u = \text{Organic loading, in Kg/ha-m/day} \]
21. What is the reason behind recirculation of treated sewage?

- Recirculation allows continuous dosing of the filters, irrespective of the fluctuations in flow.
- It equalizes and reduces loading, thereby increasing the efficiency of the filter.
- It provides longer contact of the applied sewage with the bacterial film on the contact media, thereby seeding it with bacteria, and accelerating the biological oxidation process.

22. What is meant by recirculation ratio?

The ratio of the volume of sewage recirculated (R) to the volume of raw sewage (I) is called recirculation ratio.

23. What is mean cell residence time?

It may be defined as the average time for which the mass of suspended solids (or the biological solids) remain under aeration. It is also called as Sludge age.

24. Define sludge volume index

Sludge volume index is defined as the volume occupied in ml by 1 gm of solids in the mixed liquor after settling for 30 minutes and is determined experimentally.

25. What is F/M ratio?

It is the ratio of the BOD load applied to the system in kg or gm is represented as food (F) to the total microbial suspended solids in the mixed liquor of the aeration tank is represented by M.

26. What is meant by MLSS?

The total microbial mass in the aeration system (M) is computed by multiplying the average concentration of solids in the mixed liquor of the aeration tank, called Mixed Liquor Suspended Solids.

27. Discuss the advantages and disadvantages of oxidation pond.

**Advantages**

- It is very cheap
- The capital cost is 10 – 30% of that of conventional plant.
- Their maintenance cost very low
- No skilled supervision is required at any stage of construction or operation

**Disadvantages**

- The nuisance due to mosquito breeding and bad odours.
- To avoid mosquito breeding the banks of the pond should be kept clear of any grasses and bushes.
To avoid bad odours, the pond should be located far away from residential areas.

1. **What is sewage farming?**

   When the waste water is spread on the surface of land, waste water evaporates while other part percolates in the ground leaving behind suspended solids which are partly acted upon by bacteria and partly oxidized by exposure to atmospheric actions. The sewage adds to the fertilizing value of the land, and crops can be raised on such land. This is called sewage farming.

2. **What are the methods available for sewage disposal?**

   - Natural methods
     - a) By dilution
     - b) By land treatment
   - Artificial methods
     - a) Primary treatment
     - b) Secondary treatment
   - Combined methods
     - a) Primary treatment
     - b) Effluent disposal by natural methods

3. **What are conditions favoring dilution without treatment?**

   - Where the wastewater is quite fresh,( 2- 3 hours of its collection)
   - Where the floating matter and settle- able solids have been removed
   - Where water bodies have large volume in comparison to the volume of wastewater
   - Where the wastewater does not contain industrial having toxic substance

4. **What are the types of receiving waters for dilution?**

   - Perennial rivers and streams
   - Lakes
   - Ocean or sea
   - Estuaries
   - Creeks
5. **What are the actions involved in self-purification?**
   - Dilution
   - Dispersion due to currents
   - Sedimentation
   - Oxidation
   - Reduction
   - Temperature
   - Sunlight

6. **What are the zones of pollution in the stream?**
   - Zone action degradation
   - Zone of active decomposition
   - Zone of recovery
   - Clearer water zone

7. **What are the three principle of land treatment?**
   - Irrigation
   - Rapid infiltration
   - over land runoff

8. **Define Sewage sickness**

   After continuous application of sewage on land, the pores of the soil get clogged, preventing oxidation and causing bad smells. The land is unable to take any further load of sewage. This phenomenon of soil is known as Sewage sickness of land.

9. **What are the conditions favorable for land treatment?**
   - When natural rivers or streams are not located in the vicinity, land treatment is the only alternative.
   - When rivers run dry or have a very small flow during summer, discharging sewage into them is due of question.
   - Land treatment is favored when rain fall is low and there is an acute demand for irrigation water.

10. **Define Self purification phenomenon.**

    When sewage is discharged into water bodies, the natural forces of purification such as dilution, sedimentation, oxidation-reduction in sunlight acts upon the pollution elements and bring back the water into original condition. This automatic purification of polluted water is called self-purification.
11. What are the preventive measures taken for sewage sickness?

- Pretreatment of sewage
- Provision of extra land
- Under drainage of soil
- Proper choice of land
- Rotation of crops
- Shallow depth application.

12. Define sludge digestion

The process of stabilization of the sewage particles are called sludge digestion.

13. What are the stages in the sludge digestion process?

- Acid fermentation
- Acid regression
- Alkaline fermentation

14. What is meant by ripened sludge?

The ripened sludge is nothing but the digested sludge is collected at the bottom of the digestion tank and it is alkaline in nature.

15. What are the factors affecting sludge digestion and their control?

- Temperature
- pH value
- Mixing and stirring of raw sludge with digested sludge

16. What are the types of incinerators has primary designed?

- Multiple hearth furnace
- Fluid bed furnace and infra red furnace

17. What are the methods of aeration?

- Diffused air aeration
- Mechanical aeration
- Combined aeration

18. What is meant by sludge concentrator unit?

The sludge obtained in a sludge digestion plant contains too much of moisture and is therefore very bulky may be reduced in its moisture content by sending into sludge thicker unit (or) sludge concentrator unit.

19. Give different types of thicker unit.

- Gravity thickener
- Floating thickener
- Centrifugal thickener
20. What are the methods of disposal of septic tank effluent?
   • Soil absorption system • Biological filters • Up flow anaerobic filters

21. Define percolation rate
   Percolation rate is defined as the time in minutes required for sewage of water through that ground by one cm.

22. What are the soil absorption systems?
   • Dispersion trench • Seepage pit (or) soak pit

23. What are the methods of applying sewage effluents to farms?
   • Surface irrigation • border flooding
   • check flooding • free flooding

24. What is meant by oxygen sag curve?
   The amount of resultant oxygen deflect can be obtained by algebraically adding the de-oxygenation and re-oxygenation curves. The resultant curve so obtained is called oxygen sag curve.

25. What is meant by sewage sickness?
   The phenomena of soil getting clogged when the sewage is applied continuously on a piece of land is called sewage sickness

26. What are the preventive methods for sewage sickness?
   • Primary treatment of sewage • Under drainage of soil
   • Choice of land • Giving rest to land and Rotation of crops

27. Define dilution factor
   The dilution factor is defined as the ratio of the amount of river water to the amount of the sewage

28. List various natural forces of self purification
   • Physical forces • Chemical forces

29. What are the factors affecting the reduction?
   • Temperature
   • Turbulence effect of wind
   • Hydrographic
   • Available dissolved oxygen
   • Rate of re-aeration
30. What is meant by prim lake pollutant?
   The phosphorus which contains in domestic sewage as well as in the industrial waste which affect the water quality of the lake and it is called prim lake pollutant.

31. What is meant by de oxygenation curve?
   The curve which represents (or) showing the depletion of D.O with time at the given temperature.

32. How the river maintaining its clearness?
   The turbulence in the water body helps in breaking the surface of the stream and helps in rapid re aeration from the atmosphere. Thus it helps in maintaining aerobic conditions in the stream and keeping it clear.

33. Name the biological zone in lakes
   - Euphonic zone
   - Littoral zone
   - Benthic zone

34. What is meant by re-oxygenation?
   In order to counter balance the consumption of D.O due to the de-oxygenation, atmosphere supplies oxygen to the water and the process is called the re-oxygenation.

35. What is meant by zone of recovery?
   The zone in which the river water tries to recover from its degraded conditions to its former appearance is called zone of recovery.

36. What is meant by sludge banks?
   When the solid waste are thrown into the sea water, chemical react with the dissolved matter of sea water and resulting in some precipitation of solid waste giving a milky appearance to sea water forming the sludge banks.

37. What is meant by Eutrophication of lakes?
   Eutrophication is a natural process under which lakes get infested with algae and silt up gradually to become shallower and more productive through the entry and cycling of nutrients like carbon, nitrogen and phosphorus.

38. What is meant by Elutriation of sludge?
   It is the process of washing the sludge water, to remove the organic and fatty acids from it.
TWO MARK QUESTIONS & ANSWERS

1. How will you define plumbing?

Plumbing, in general, refers to the system as well as the material fixtures and the apparatus used inside a building for supplying water, removing the used water with other liquid and water-borne wastes as also the connected ventilating system. It also includes the system of storm water or roof drainage and exterior system components connecting to a source, such as a public or a private water system or a point of disposal of waste or used water, a public sewer system or an individual disposal system, namely, a domestic septic tank with arrangement for disposal of its effluent.

2. What are the parts of plumbing system and write its functions?

The plumbing systems include:

- Water supply and distributing pipes from a public water system or a private water system or a private water supply system from a bore well or other source.
- Plumbing fixtures for the use in water supply as well as the collection and disposal of used waters.
- Sanitary drainage system to carry the wastes from the plumbing fixtures to the public or private disposal system.
- Anti-siphonage system which carry only the air for the purpose of ventilation and preventing the failure of the water seals in traps thereby preventing the entry of foul air from the public or private drainage system into the building.
- Storm water drainage system to collect and carry rain water or water not used by occupants of the building to a public storm water drain or to a local garden or a pond.

3. What are the requirements of good plumbing fixtures?

- Made of smooth and non-absorbent material.
- Located in well ventilated enclosures.
- Free from concealed fouling spaces.
- Easily accessible for the intended use.
- Able to withstand adequate pressure.
- Connected to a drainage system with water seal traps.
- Tested for leaks, defects, etc, and rectified promptly, where necessary; and
- Heating and storage water cisterns are to be proofed against contamination and explosions through overheating.
4. What are the requirements of good plumbing pipes?

The plumbing pipes are to be:

- Made of durable material, connected by suitable and satisfactory joints of good workmanship to give satisfactory service during its reasonable life expectancy.
- Located in places avoiding dead spaces which are not easily cleared.
- Easily accessible for inspection, working and repairs.
- Made rodent proof; and tested for leaks, defects, etc, and promptly rectified, where necessary.

5. Why a good plumbing system is necessary?

The plumbing systems are:

- Required for minimum amount of water for proper performance and cleaning.
- To avoid cross-connections between the protected water supply system and the waste water system.
- To be well ventilated with no danger of siphonage, aspiration or forcing of traps seal under conditions of ordinary use.
- To be well designed, executed, operated and maintained according to national standards and statutory provisions of the local administrative authority concerned.

6. What is meant by house drainage?

The arrangement provided in a house or building, for collecting and conveying wastewater through drain pipes, by gravity, to join either a public sewer or a domestic septic tank is termed as house drainage or building drainage.

7. What is the necessity of providing house drainage?

- To maintain healthy conditions in the building
- To dispose off wastewater as early and quickly as possible.
- To avoid the entry of foul gases from the sewer
- To collect and remove waste matters
- To facilitate quick removal of human excreta.

8. Define the terms: soil pipe, waste pipe, vent pipe, anti-siphonage pipe.

Soil pipe: It is a pipe through which human excreta flows.
Waste pipe: It is a pipe which carries only liquid waste and does not carry human excreta.

Vent pipe: It is a pipe which is provided for the purpose of the ventilation to facilitate the exit of foul gases.

Anti-siphonage pipe: It is a pipe which is installed in the house drainage to preserve the water seal of traps.

9. What is meant by traps?
A trap is a depressed or bent fitting, provided in a drainage system, always remains full of water, thus maintaining a water seal. It is a device to prevent the passage of air, odours and vermin through it from sewers escaping through a plumbing fixture into the building.

10. What are the requirements of a good trap?
The essentials of a good trap are:
   a) An efficient ‘water seal’,
   b) To be self-cleansing,
   c) Should not retard the flow of water unduly,
   d) Should retain a minimum amount of water consistent with its purpose.

11. What are the causes of breaking of seal?
The water seal may break due to following reasons:
   ➢ Faulty joints
   ➢ Creation of vacuum pressure
   ➢ Crack in the bottom of the seal
   ➢ Increase in the pressure of sewer gases
   ➢ When it is not used for a long period.

12. How the breaking of seal can be avoided?
The breaking of water seal can be prevented by,
   ➢ Connecting the portion between the soil pipe and trap by a vent pipe
   ➢ Use of anti-siphonage pipe in the building

13. Write the characteristics of traps.
   ➢ It should be a non-absorbent material.
It should be free from inside projections or contractions, so that flow is not obstructed.
It should be self cleansing
Its internal and external surfaces should have smooth finish so that dirt does not stick to it.
It should possess adequate water seal at all times.

14. What are the classifications of traps?

Classification according to the shape:
- P - Trap
- Q – Trap
- S – Trap

Classification according to the use:
- Floor trap
- Gully trap
- Intercepting trap

15. Why intercepting traps are provided?
This trap is provided at the junction of house drain with the public sewer. It is provided to prevent the entry of sewer gases from public sewer line in to house drain.

16. What is the purpose of providing grease traps?
It is provided to separate oily and greasy matter from the wastewater. If oily matter is not separated, it will stick to the building drainage system resulting formation of scum and obstruct the reaeration.

17. What are the types of sanitary fittings commonly used in buildings?
- Wash basins
- Sinks
- Bath tubs
- Water closets
- Urinals
- Flushing cisterns
18. **What are the requirements of a water closet?**
   - It should be convenient in use by persons of all age—both old as well as children.
   - Urine should not splash outside the pan.
   - The pan should be of durable material.
   - Faecal material should not be too plainly visible before flushing.
   - The trap should be such that water does not splash when the excreta falls in water.

19. **What are the systems of plumbing for drainage of buildings?**
   There are four principal systems of plumbing for drainage of buildings:
   - Single stack system
   - One pipe system
   - Partially ventilated single stack system
   - Two pipe system.

20. **What is the main purpose of providing anti-siphonage pipe?**
   It is a pipe provided to preserve the water seal of traps. It maintains proper ventilation and does not allow the water seal to get broken due to siphonic action.