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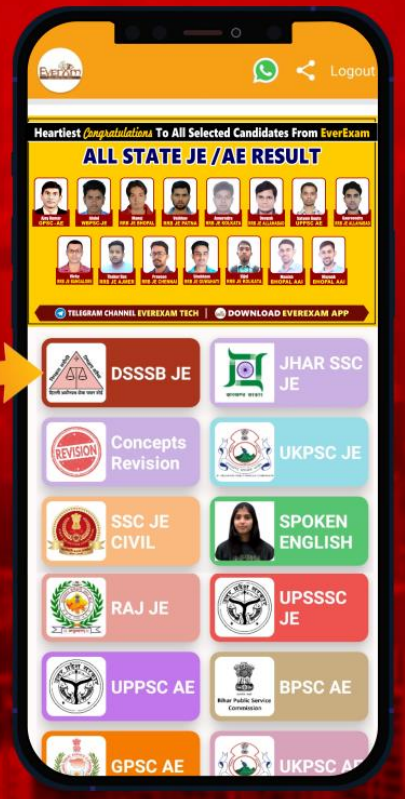

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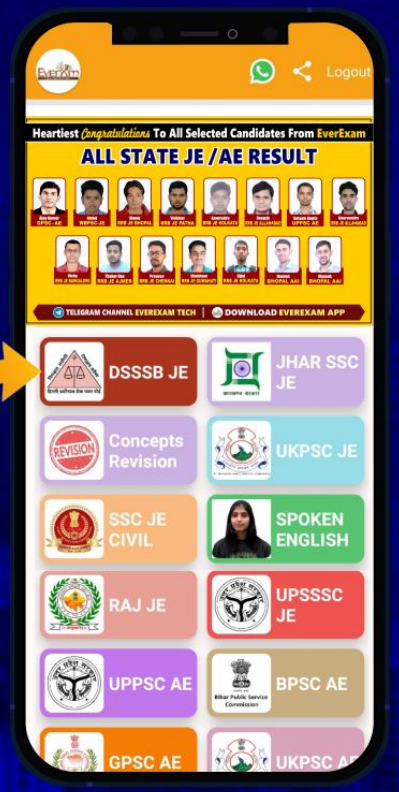

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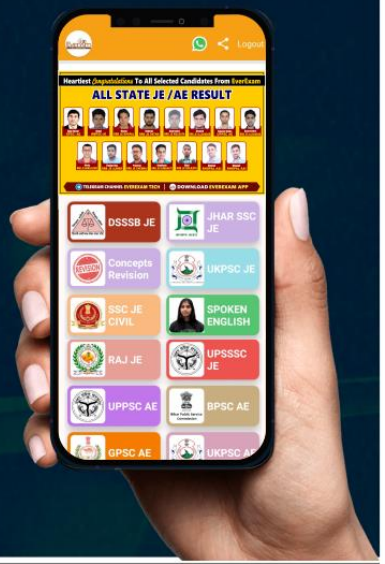

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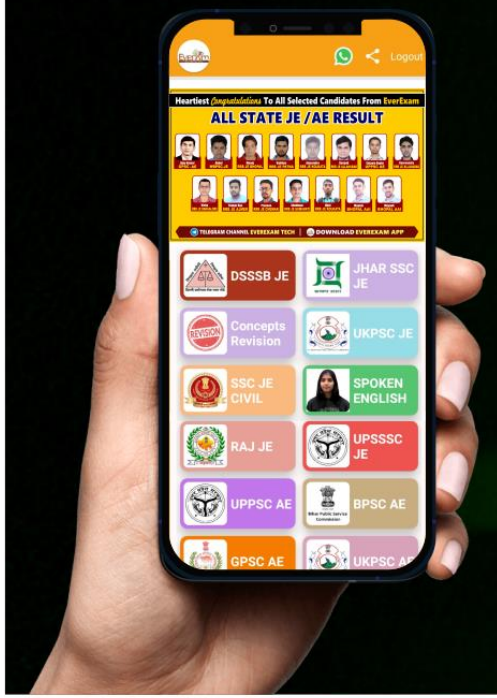

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Q : 1) On which of the following factors, does the population growth in a town normally depends?

1. **Birth and depth rates**
2. **Migrations**
3. **Probabilistic growth**
4. **Logistic growth**

Select the correct answer using the codes given below:

A : 1 and 4

B : 1 and 2

C : 1, 2 and 3

D : 2 and 3

Q : 2) For water supply to a medium town, what is the daily variation factor?

A : 1.5

B : 2.5

C : 3

D : 3.5

Q : 3) Which one of the following factors has the maximum effect on figure of per capita demand of water supply of a given town?

A : Method of charging of the consumption

B : Quality of water

C : System of supply intermittent or continuous

D : Industrial demand

Q : 4) In which one of the following industries, the water requirement in kilo litres per unit of production is very high?

A : Paper industry

B : Steel industry

C : Sugar industry

D : Fertilizer industry

Q : 5) Which one of the following would contain water with the maximum amount of turbidity?

A : Lakes

B : Oceans

C : Rivers

D : Wells

Q : 6) If the methyl orange alkalinity of water equals or exceeds total hardness, all of the hardness is

A : Non-carbonate hardness

B : Carbonate hardness

C : Pseudo hardness

D : Negative non-carbonate hardness

Q : 7) Which of the following cations impart(s) pseudo-hardness to water?

A : Calcium only

B : Magnesium only

C : Calcium and magnesium

D : Sodium

Q : 8) The concentration of hardness producing cations may be estimated using which one the following?

A : Conductivity meter

B : pH meter

C : Spectrophotometer

D : Flame photometer

Q : 9) A 12.5 ml sample of treated wastewater requires 187.5 ml of odour free distilled water to reduce the odour to a level that is just perceptible. What is the threshold odour number (TON) for the wastewater sample?

A : 0.07

B : 1.07

C : 15

D : 16

Q : 10) The most common constituents of alkalinity in natural water are measured by titrating the water sample with 0.02 N H_2SO_4 using

A : Eriochrome black T and Ferroin indicators

B : Ferroin and phenolphthalein indicators

C :Phenolphthalein and Methyl orange indicators

D : Methyl orange and Eriochrome black T indicators

Q : 11) The concentration of chloride ions in a water sample is estimated by titration with

A : Sodium thiosulphate reagent using ferroin as an indicator

B : Ferrous ammonium sulphate reagent using soluble starch as an indicator

C : Silver nitrate reagent using potassium chromate as an indicator

D : Silver nitrative reagent using potassium dichromate as an indicator

Q : 12) Which one of the following compounds of nitrogen, when in excessive amounts in water, contributes to the illness known as infant methemoglobinemia?

A : Ammoniacal nitrogen

B : Albuminoid nitrogen

C : Nitrite

D : Nitrate

Q : 13) The cleaning of slow sand filter is done by

A : Reversing the direction of flow of water

B : Passing air through the filter

C : Passing a solution of alum and lime through the filter

D : Scraping off top layers of sand and admitting water

Q : 14) What is the correct sequence of formation of the following compounds during chlorination of water in which ammonia is present?

1. NCl_3
2. NH_2Cl
3. $NHCl_2$

Select the correct answer using the codes given below:

A : 1, 2, 3

B : 2, 3, 1

C : 3, 1, 2

D : 2, 1, 3

Q : 15) Zero hardness of water is achieved by

A : Using lime soda process

B : Excess lime treatment

C : Ion exchange method

D : Using excess alum dosage

Q : 16) Which of the following treatment(s) will be indicated for a rural water supply from a deep groundwater source?

1. **Sedimentation**
2. **Aum dosage**
3. **Potassium permanganate dosing**
4. **Bleaching powder application**

Select the correct answer using the codes given below:

A : 1, 2 and 3

B : 1, 2 and 4

C : 3 and 4

D : 4 alone

Q : 17) In a water treatment plant, dissolved iron and manganese can be removed from the water by

A : Aeration

B : Aeration and coagulation

C : Aeration and flocculation

D : Aeration and sedimentation

Q : 18) For proper slow mixing in the flocculator of a water treatment plant, the temporal mean velocity gradient G needs to be of the order of

A : 5 to $20s^{-1}$

B : 20 to $80s^{-1}$

C : 100 to $200s^{-1}$

D : 250 to $350s^{-1}$

Q : 19) Air-binding in rapid sand filters is encountered when

A : There is excessive negative head

B : The water is subjected to prolonged aeration

C : The raw water contains dissolved gases

D : The filter bed comprises largely of coarse sand

Q : 20) Which one of the following filters will produce water of higher bacteriological quality?

A : Slow sand filter

B : Rapid sand filter

C : Pressure filter

D : Dual media filter

Q : 21) The amount of bleaching powder containing 20% available chlorine needed to chlorinate an rural water supply covering a population of 10000 at 50 lpcd at the rate of 2 ppm is

A : 1 kg

B : 5 kg

C : 0.2 kg

D : 20 kg

Q : 22) The purpose of re-carbonation after lime-soda process of water softening is the

A : Removal of excess soda from water

B : Removal of non-carbonate hardness

C : Recovery of lime

D : Conversion of precipitates to soluble form

Q : 23) If the specific gravity of a suspended particle is increased from 2 to 3, the settling velocity will

A : Not change

B : Get doubled

C : Get increased by 1.5 times

D : Get increased by 2.25 times

Q : 24) Chlorides from water are removed by

A : Lime soda process

B : Reverse osmosis

C : Cation exchange process

D : Chemical coagulation

Q : 25) In which treatment unit is "Schmutzdecke" formed?

A : Sedimentation tank

B : Rapid sand filter

C : Coagulation tank

D : Slow sand filter

Q : 26) After which of the following water treatment units, the turbidity is maximum?

A : Chlorination

B : Primary sedimentation

C : Flocculation basin

D : Secondary sedimentation

Q : 27) What is the predominating coagulation mechanism for raw water having high turbidity and high alkalinity?

A : Lonic layer compression

B : Adsorption and charge neutralization

C : Sweep coagulation

D : inter particle bridging

Q : 28) In a water treatment, the optimum time of flocculation is usually given as 30 minutes. In case the time of flocculation is increased beyond this value, then the flocs will

A : Become heavy and settle down in flocculation itself

B : Entrap air and will float in the sedimentation tank

C : Break up ad defeat the purpose of flocculation

D : Stick to the paddles

Q : 29) If the length dimension of a square filter bed increases to two times (While the rate of filtration remains unchanged), the amount of water filtered would become

A : 4 times

B : 2 times

C : 1 time

D : 16 times

Q : 30) The design overflow rate of a sedimentation tank is chosen considering

A : Flow rate through the tank

B : Diameter of the particle intended to be removed

C : Volume of the sedimentation tank

D : Detention time in the tank

Q : 31) The purpose of re-carbonation after water softening by the lime-soda process is the

A : Removal of excess soda from the water

B : Removal of non-carbonate hardness in the water

C : Recovery of lime from the water

D : Conversion of precipitates to soluble forms in the water

Q : 32) Which one of the following pairs is not correctly matched?

(a) Check valve	To check water flow in all directions
(b) Sluice valve	To control flow of water through pipe lines
(c) Air valve	To release the accumulated air
(d) Scour valve	To remove silt in a pipe line

Q : 33) Service connection consists of

A : Ferrule, stopcock and gooseneck

B : Ferrule, check valve and gooseneck

C : Stopcock, meter and sluice valve

D : Sluice valve, check valve and meter

Q : 34) In a pipe network of municipal water supply, a parallel pipe is sometime installed over a portion of the pipe mainly for

A : Reducing water hammer pressure

B : Decreasing the pumping power need

C : Increasing the head available at the node

D : Increasing the discharge

Q : 35) For a waste, the 5-day BOD at 20^oC is found to be 200 mg/l. For the same waste, 5-day BOD at 30^oC will be

A : Less than 200 mg/l

B : More than 200 mg/l

C : 200 mg/l

D : Zero, as the bacteria cannot withstand such a high temperature

Q : 36) The ultimate BOD value of a waste

A : Increases with temperature

B : Decreases with temperature

C : Remains the same at all temperatures

D : Doubles with every $10^{o}C$ rise in temperature

Q : 37) 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

Q : 38) The correct statement of comparison of ultimate BOD, COD, theoretical oxygen demand (ThOD) and 5-day BOD (BOD_5) is

A : $BOD_u > COD > ThOD > BOD_5$

B : COD $> ThOD > BOD_u > BOD_5$

C : $ThOD > COD > BOD_u > BOD_5$

D : COD $> BOD_u > BOD_5 >$ Thod

Q : 39) Which one of the following pairs is not correctly matched?

A : BOD / COD = 0 : Waste-water is toxic

B : BOD / COD $\leq$ 0.2 : Acclimatization of seed is necessary

C : BOD / COD $\leq$ 0.6 : Waste-water is non-biodegradable

D : BOD / COD = 0 ; Waste-water is devoid of organic matter

Q : 40) Which of the following chemical parameters are associated with the organic content of water?

1. **Biological oxygen demand (BOD)**
2. **Chemical oxygen demand (COD)**
3. **Total organic carbon (TOC) and total oxygen demand (TOD)**

A : 1 and 2 only

B : 1 and 3 only

C : 2 and 3 only

D : 1, 2 and 3

Q : 41) A polluted stream undergoes self-purification in four distinct zones:

1. **Zone of clear water**
2. **Zone of active decomposition**
3. **Zone of degradation**
4. **Zone of recovery**

The correct sequence of these zones is

A : 3, 4, 2, 1

B : 2, 3, 4, 1

C : 2, 4, 3, 1

D : 3, 2, 4, 1

Q : 42) Self-purification of running streams may be due to

A : Sedimentation, oxidation and coagulation

B : Dilution, sedimentation and oxidation

C : Dilution, sedimentation and coagulation

D : Dilution, oxidation and coagulation

Q : 43) Sewage sickness occurs when

A : Sewage contains pathogenic organisms

B : Sewage enters the water supply system

C : Sewers get clogged due to accumulation of solids

D : Voids of soil get clogged due to continuous application of sewage on a piece of land

Q : 44) Match List-I (standards of sewage effluents for the discharge in surface water sources with List-II (Tolerance limits) and select the correct answer :

List-I	List-II
A. $BOD_{5,}\ (mg/l)$	1. 250
B. COD, (mg/l)	2. 30
C. Oil and grease, (mg/l)	3. 20
D. Total suspended solids (mg/l)	4. 10

A : 3, 4, 1, 2

B : 2, 4, 1, 3

C : 3, 1, 4, 2

D : 2, 1, 4, 3

Q : 45) In which type of lakes, does a perfect ecological equilibrium among the producers, decomposers and consumer groups of organisms exist?

A : Senescent lakes

B : Mesotrophic lakes

C : Oligotrophic lakes

D : Eutrophic lakes

Q : 46) Consider the following statements with reference to the mixing of industrial waste water with domestic waste water:

1. **The industrial waste water can be mixed with domestic water when it has higher BOD**
2. **The industrial waste water can be mixed with domestic water when the pH value of industrial waste water is highly alkaline.**

Which of the above statements is/are correct?

A : 1 only

B : 2 only

C : Both 1 and 2

D : Neither 1 nor 2

Q : 47) In transition of sewers from smaller diameter sewers to larger diameter sewers, the continuity of sewers is maintained at the

A : Bottom of the concrete bed of sewers

B : Inverts of the sewers

C : Crowns of the sewers

D : Hydraulic gradients of the sewers

Q : 48) Which one of the following would help prevent the escape of foul sewer gases from a water closet?

A : Air gap

B : Vent pipe

C : Gully trap

D : None of the above

Q : 49) A sewer is commonly designed to attain self-cleansing velocity at

A : Peak hourly rate of flow

B : Average hourly rate of flow

C : Minimum hourly rate of flow

D : Sewer running half full

Q : 50) Consider the following statements:

The basic difference between water pipes and sewer pipes is

1. **In the material used for the pipes**
2. **In the pressure of the liquid flow**
3. **In the suspended solids they carry**

Which of the statements given above is/are correct?

A : 1 and 3

B : 1 only

C : 2 and 3

D : 1, 2 and 3

Q : 51) Which one of the following statements is correct?

A combined sewer is one, which transports domestic sewage and

A : Storm water

B : Industrial water

C : Overhead flow

D : Industrial wastes and storm water

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