1. If the total hardness and alkalinity of a sample of water are 300 mg/l and 100 mg/l ($CaC0_3$ scale) respectively, then its carbonate and non-carbonate hardness (in units of mg/l) will be respectively.

(a) 100 and 200
(b) 400 and 300
(c) 100 and 400
(d) 400 and zero

2. Electrical conductivity (EC) of water and total dissolved solids (TDS) are interrelated. The value of EC will

(a) Decrease with increase in TDS
(b) Increase with increase in TDS
(c) Decrease initially and then increase with increase in TDS
(d) Increase initially and then decrease with increase in TDS

3. Match List-I (Parameters) with List-II (Permissible concentration in drinking water) and select the correct answer.

List - I	List –II
A. Hardness	1. 0.1 mg / l
B. Nitrate concentration	2. 0.5 mg/l
C. Iron concentration	3. 200 mg / l
D. Fluoride concentration	4. 45 mg / l

Codes :
a. A – 3, B – 4, C – 2, D – 1
b. A – 3, B – 4, C – 2, D – 1
c. A – 3, B – 4, C – 2, D – 1
d. A – 3, B – 4, C – 2, D – 1

4. Which of the following is/are the characteristic(s) of coliform organism?

1. Bacillus 2. Gram-negative
3. Ferments lactose. 4. Spore-forming.
Select the correct answer using the codes given below:
(a) 1 alone
(b) 1, 2 and 4
(c) 1, 2 and 3
(d) 2, 3 and 4

5. Match List-I (Impurities) with List-II (Effects) and select the correct answer :

List – I	List – II
A. Dissolved sulphates and chlorides of Ca and Mg	1. Hardness & corrosion
B. Dissolved bicarbonates of Ca and Mg	2. Bacterial infection
C. Dissolved fluorides of Na	3. Alkalinity & softness
D. Dissolved organic matter	4. Impairment of dental health

Codes :
a. A – 2, B – 3, C – 4, D – 1
b. A – 1, B – 4, C – 3, D – 2
c. A – 2, B – 4, C – 3, D – 1
d. A – 1, B – 3, C – 4, D – 2

6. Match List-I (Water quality) with List-II (Method of determination) and select the correct answer:

List – I	List – II
A. Hardness	1. Winkler's method
B. Chlorine	2. EDTA method
C. D. O	3. Orthotolidine test
D. Chloride	4. Mohr method

Codes :
a. A – 2, B – 3, C – 1, D – 4
b. A – 2, B – 4, C – 1, D – 3
c. A – 1, B – 3, C – 2, D – 4
d. A – 1, B – 4, C – 2, D – 3

7. Match List-I (Water quality) with List-II (Method of determination) and select the correct answer:

List – I	List – II
A. Protozoa	1. Methaemoglobinemia
B. Bacteria	2. Poliomyelitis
C. Presence of nitrate > 45 mg / l	3. Dysentery
D. Virus	4. Typhoid fever

Codes :
a. A – 3, B – 2, C – 1, D – 4
b. A – 1, B – 4, C – 3, D – 2
c. A – 3, B – 2, C – 1, D – 2
d. A – 1, B – 4, C – 3, D – 4

8. Match List-I (Water / Waste water parameter) with List-II (Test) and select the correct answer using the codes:

List – I	List – II
A. Potability of water	1. Mohr's method
B. Chloride	2. Orthotolidine method
C. Residual chlorine	3. EDTA. method
D. Hardness of water	4. MF technique

Codes :
a. A – 4, B – 3, C – 2, D – 1
b. A – 2, B – 1, C – 4, D – 3
c. A – 2, B – 3, C – 4, D – 1
d. A – 4, B – 1, C – 2, D – 3

9. Match List-I (Type of impuirty) with List-II (Effect) and select the correct answer using the codes:

List – I	List – II
A. Carbonates and bicarbonates of Ca and Mg	1. Permanent hardness
B. Carbonates and bicarbonates of sodium	2. Temporary hardness
C. Sulphates and chlorides of Ca and Mg	3. Alkalinity and softness
D. Oxides of iron and manganese	4. Colour and taste

Codes :
a. A – 1, B – 3, C – 2, D – 4
b. A – 2, B – 4, C – 1, D – 3
c. A – 1, B – 4, C – 2, D – 3
d. A – 2, B – 3, C – 1, D – 4

10. What is the equivalent calcium carbonate concentration of 110 mg/l of $CaCl_2$?

(a) 50 mg/l
(d) 58.5 mg/l
(c) 100 mg/l
(d) 117 mg/l

11. Which of the following cations impart(s) pseudo-hardness to water?

(a) Calcium only
(b) Magnesium only
(c) Calcium and magnesium
(d) Sodium

12. Match List-I (Equipment) with List-II (Parameter) and select the correct answer using the code given below the lists:

List – I	List – II
A. Tintometer	1. Temperature
B. Nephelometer	2. Colour
C. Imhoff one	3. Turbidity
D. Muffle fumace	4. Settleable solids
	5. Volatile solids

Codes :
a. A – 4, B – 3, C – 1, D – 5
b. A – 2, B – 5, C – 4, D – 3
c. A – 4, B – 5, C – 1, D – 3
d. A – 2, B – 3, C – 4, D – 5

13. After which of the following water treatment units, the turbidity is maximum?

(a) Chlorination
(b) Primary sedimentation
(c) Flocculation basin
(d) Secondary sedimentation

14. In context of water polluted with sewage, what does BOD signify?

(a) Biological oxygen demand
(b) Bacteriological oxygen demand
(c) Biochemical oxygen demand
(d) Biology of degradation

15. What is the most common cause of acidity in water?

(a) Carbon monoxide
(b) (b) Nitrogen
(c) Hydrogen
(d) Carbon dioxide

16. Match List-I (Parameter) with List-II (Impact) and select the correct answer using the code given below the lists:

List – I	List – II
A. Excess sulphates	1. Greater soap consumption
B. Lack of iodide	2. Laxative effect
C. Excess hardness	3. Goitre
D. Excess dissolved oxygen	4. Corrosion of pipes

Codes :
a. A – 2, B – 1, C – 3, D – 4
b. A – 4, B – 3, C – 1, D – 2
c. A – 2, B – 3, C – 1, D – 4
d. A – 4, B – 1, C – 3, D – 2

17. Match List-I (Pathogen) with List-II (Epidemic) and select the correct answer using the code given below the lists:

List – I	List – II
A. Bacteria	1. Gastroenteritis
B. Virus	2. Cholera
C. Protozoa	3. Worms
D. Protozoa	4. Polio

Codes :
a. A – 2, B – 4, C – 1, D – 3
b. A – 3, B – 1, C – 4, D – 2
c. A – 2, B – 1, C – 4, D – 3
d. A – 3, B – 4, C – 1, D – 2

18. **Which one of the following tests of water/ wastewater employs Erichrome Black T as an indicator?**
    a. Hardness
    b. COD
    c. Residual chlorine
    d. DO

19. **Match List-I (Parameter) with List II (Units) and select the correct answer using the codes given below the lists:**

List – I	List – II
A. Turbidity	1. TON
B. Pathogen	2. TCU
C. Odour	3. JTU
D. Colour	4. MPN

Codes :
a. A – 2, B – 1, C – 4, D – 3
b. A – 3, B – 1, C – 4, D – 2
c. A – 2, B – 4, C – 1, D – 3
d. A – 3, B – 4, C – 1, D – 2

20. **The maximum safe permissible limit of sulphates in domestic water supply is**
    (a) 100 mg/l (b) 200 mg/l
    (c) 500 mg/l (d) 600 mg/l