

Question Bank
Operator Water Treatment- Thermal Power Generation

For QP: PSS/Q1006 Perform Operation of Water treatment plant
 PSS/N2001 Use Basic health and safety practices at work place
 PSS/N1336 Work effectively with others

Questions Theory :

1. What is your role as an operator?
2. For what purposes water is required in a power plant?
3. What are different forms of water and how they exists in nature?
4. What is water cycle describe the precipitation process in water cycle.
5. Mention of types of impurities present in water , can we get pure water from nature?
6. What are the types of organic impurities present in water?
7. Why water treatment is required?
8. Write different types of water used in a power plant?
9. Which bacteria's found in drinking water sample , in what form it is measured?
10. What are some possible causes of bacterial contamination in raw water sources?
11. What are hazards of drinking water having excess fluoride?
12. What is turbidity and why can it cause problems with drinking water?
13. What is the ideal range of pH for drinking water at the treatment plant and why?
14. What is a floc, define the process of floc formation.?
15. Why is alkalinity important in the coagulation/flocculation process, which chemical is added to increase alkalinity.?
16. How is coagulation/flocculation take place in the water treatment process?
17. What are some of the chemicals involved in coagulation and flocculation and what is their purpose?
18. What is use of coagulant aid in pre treatment?

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19. Why disinfection is necessary in water treatment ?
20. Name two disinfectants used in water treatment?
21. Describe briefly how to do a jar test?
22. When Jar test is required to be carried out?
23. How does particle size affect sedimentation?
24. Why is it important to remove sludge periodically from the clarifier , what will happen if not removed?
25. What are different types of clarifier?
26. Why flow measurement of water before treatment is necessary?
27. Define process involved in clarifiers?
28. When is sedimentation not required in a water treatment process?
29. List some of the types of common filters with a brief description of each?
30. What is meant by backwashing and why is it done?
31. Describe the process of back wash of gravity filter?
32. What is the purpose of the aeration process and how it is done?
33. Write sequence of chemical addition in a clarifier and why it is important?
34. What is meant by chlorine demand , how it is determined?
35. Besides disinfection, what are some of the other roles of chlorination?
36. Describe what is head loss in a gravity filter and how it effect the filtration process?
37. How can you as an operator determine the head loss across a filter?
38. Why and when would a facility use pre-treatment before the filtration process?
39. What actions are required for collection of a water sample.?

40. What differences are there between sampling from a tap and sampling from a river?
41. What are the main reasons for maintaining plant records?

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42. What are the required entries on daily operating sheets?
43. What information is recorded in a maintenance log book?
44. What is meant by a confined space? What are the general procedures when working in one of these?
45. List the safety equipment that should be found in a water treatment plant?
46. List 6 general safety rules around the water treatment plant?
47. What actions are required for issue a work permit ?
48. Which chemical is used in chlorine absorption system and what concentration will be suitable?
49. How chlorine leak is detected?
50. Which gas is filled in breathing apparatus (BA Sets) cylinders what should be minimum pressure?
51. What is purpose filtration?
52. What are advantage of using ultrafiltration?
53. What is dual media filter and how it is back washed?
54. What is difference between gravity and pressure filters ?
55. Describe the Bacteriological Quality of drinking water?
56. Describe the Chemical Quality of drinking water?
57. How water containing lead is Harmful for drinking?
58. Monitoring requirements for drinking water?
59. Write the role of Activated carbon filter in DM plant process?
60. Write two process for production of DM water?

61. List at least four cations and four anions present in water?
62. What is ion exchange process ?
63. What is role of weak base anion resin in DM plant?
64. How you will remove silica fouling of resin?

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65. What is organic fouling and where it takes place?
66. Write function of deaerator how it is carried out ?
67. What is criteria for DM water quality?
68. Why preventive actions required for ion exchangers?
69. What safety is needed during sampling from clarifier?
70. What is turbidity, how it is measured ?
71. Why water sample preservation is required?
72. What tests are required to be performed in mixed bed outlet water?
73. What actions needed for bacteriological sampling?
74. What inspection you will take up on clarifier and at what frequency?
75. What inspection you will take up on clarifier and at what frequency?
76. What preventive actions required for filters?
77. What preventive actions required for Chemical solution preparation tanks?
78. What preventive actions required for chemical dosing system?
79. When to replace ion exchange resins?
80. When to replace filter media of pressure filter ?
81. Why resin sampling from ion exchangers is required ?
82. What preventive action is required for clarifier?
83. What preventive action you will take for alum solution preparation tank ?

84. When it is required to replace the filter media?
85. What preventive actions needed for Activated carbon filter?
86. How to remove resin fines from cation exchanger?
87. What to take sample from ion exchange resin vessel?
88. How to detect fouling of anion resin?

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- 89.* What are the safety requirement for acid/ alkali unloading?
- 90.* How to prepare the lime solution for dosing into clarifier?
- 91.* What are the prerequisite for operation of clarifier?
- 92.* How degasser is started?
- 93.* How mixed bed is regenerated?
- 94.* What are water quality requirement at clarifier outlet?
- 95.* What are water quality requirement at cation exchanger outlet?
- 96.* What are the pH requirement for DM plant effluent disposal ?
- 97.* What are records and why they are important?
- 98.* What are the contents of Daily plant log book?
- 99.* What are the reasons for keeping instruments calibration records?
- 100.* What are reports for whom reports are prepared in a power plant?
- 101.* What are the essentials of a report?
- 102.* Write steps involved in regeneration of cation exchanger
- 103.* Write steps involved in regeneration of Strong base anion exchanger
- 104.* Write steps involved in regeneration of weak base anion exchanger
- 105.* Write steps involved in regeneration of mixed bed exchanger?

- 106.* Write steps involved in regeneration of activated carbon filter.
- 107.* What is an emergency situation in water treatment plant?
- 108.* What are the main objectives of an emergency plan ?
- 109.* What type of emergency situations can take place in water treatment plant?
- 110.* What is the first action needed in case of emergency situation?
- 111.* Why safety is necessary in water treatment plant?

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- 112.* What safety equipment(s) you will use while unloading acid from acid tanker?
- 113.* Mention four safety hazards in water treatment plant?
- 114.* What action you will take if caustic soda is spilled on your co-worker?
- 115.* What environmental laws are applicable for water treatment plant?
- 116.* What are the limiting parameter for water treatment plant effluent disposal ?
- 117.* What actions are required to be taken under water cess rules?
- 118.* Under which acts air and water discharge consents are required?
- 119.* What are the action required under Chemical accidents (emergency planning, preparedness & response) Rules?
- 120.* Why it is important to wear safety helmet in plant area ?

Question For Viva :

- 1.* How you will check chlorine leak?
- 2.* Which chemical is used for regeneration of Cation exchanger?
- 3.* What are mock drills and why they are important?
- 4.* How composite sample of water is collected?

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5. What is DM water why its quality is important in power plant?
6. Name three instruments which are used in pressure filters?
7. What is a free residual chlorine, what action to be taken if it is not exists?
8. Name different coagulants used in pre treatment plant process?
9. What is Jar test and why it is performed ?
10. What is difference between Aeration at PT plant and Degassing at DM plant.
11. What is the first action needed in case of emergency situation?
12. What are different function of strong base anion and weak base anion exchange resins?
13. What is the difference between sand filter and dual media filter at PT plant.
14. Write different types of water used in a power plant?
15. What is disinfection of water ?

Question for on Job Training :

1. How sand filter is backwashed ?
2. How turbidity of water is measured , what is the Unit of measurement?
3. If DM plant effluent is alkaline what action you will take before disposal ?
4. What is mock drill ?
5. Which extinguisher you will use for electrical fire ?

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6. What will be your first action if chlorine leak takes place ?
7. What action you will take if Pressure difference across ACF is increased beyond 1 kg/cm² ?
8. What is criteria for exhaustion of Anion exchanger ?
9. What action you will take before entering into DM storage tank ?
10. How you will know that anion resin fouling has taken place ?

Fill in the Blanks :

1. Rain water is the ----- form of water available on earth.
2. Water available in nature is not suitable for direct use in power plant without -----
3. Decomposition products of plants and animals cause ----- impurities in water.
4. When water is cooled below ----- Centigrade it will freeze and become Ice.
5. Oxygen and ----- are the generally dissolved gases in water.
6. River water contain dissolved, -----, inorganic and organic impurities in it.
7. Water ----- impurities when it comes in contact with ground, soil or rocks.
8. Evaporation of water takes place at all -----.

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9. The ----- describes the continuous movement of water on, above and below the surface of the Earth.
10. Precipitation of water from atmosphere is in form of rain and -----
11. ----- is colourless , odourless and tasteless liquid.
12. The term ----- describes the physical, chemical and microbiological characteristics of water.
13. Radiological Impurity of water is measured in terms of ----- & ----- emitters
14. Heavy metals such as ----- can have harmful effects on human health .
15. Total hardness, which is the sum of ----- and ----- hardness
16. Coliforms are used as an indicator of micro organisms present in water it is measured in terms of numbers of ----- present in 100 ml of water.
17. -----is the amount of dissolved oxygen required for the biochemical decomposition of organic compounds
18. ----- causes scaling in boilers and cooling water systems by depositing on heat exchanging surfaces.
19. ----- indicates the total quantity of inorganic and organic substances dissolved in water.
20. Total alkalinity is the alkalinity (pH 4.5 using methyl orange Indicator) present in water is known as -----.

21. The smallest particle of matter or a compound that possesses the same composition and characteristics as the rest of the substance is called -----.
22. The weight of all solids present per unit volume of water is called ----- . The total weight concerns both dissolved and suspended organic and inorganic matter.
23. Turbidity is a measured by -----and expressed in terms of -----.
24. Anything that has weight , occupies space and exists in three forms Solid, Liquid and Gas is called -----
25. Process of killing micro-organisms by addition of chlorine in water is called -----

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26. When two or more chemical elements chemically combined together ----- is formed .
27. Water (H_2O), is a compound formed by hydrogen and -----atoms.
28. Ions which have +ve charge on it are called -----.
29. A process in which small particles of suspended matter present in water are combined by chemical means into larger particles to effect more rapid settling or better filtration is called -----
30. A process in which air is intimately mixed with water to remove undesirable gases is called -----

KEY TO Multiple Choice Questions :

1. Hardness in water is caused by salts of
 - a) Calcium
 - b) Magnesium
 - c) Iron
 - d) Both a and b

2. pH value of water indicates
 - a) Acidity
 - b) Alkalinity
 - c) Both acidity and Alkalinity
 - d) None

3. Addition of small doses of chlorine gas into filtered water is known as
 - a) Coagulation
 - b) Sedimentation
 - c) Filtration
 - d) Chlorination

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4. Water is passed through filter beds of sand and gravel to remove smaller particles of dust, it is called
 - a) Coagulation
 - b) Sedimentation
 - c) Filtration
 - d) Chlorination

5. Screens are used in pretreatment of water to
 - a) force water to the treatment plant
 - b) increase the water pressure
 - c) filter large particles in the water
 - d) filter bacteria and other harmful organisms

6. Which of the following is a coagulant ,
 - a) Aluminium sulphate
 - b) Aluminium
 - c) Aluminium carbonate
 - d) Lime

7. A water having pH equal to 7
 - a) Acidic
 - b) Alkaline
 - c) Neutral
 - d) None of these

8. In a filtration plant, Filters have layers of
 - a) Sand and clay.
 - b) Clay and Silt gravel.
 - c) Sand and gravel.
 - d) Sand and Silt.

9. Filtration is carried out for removal of impurities in water containing
 - a) Dissolved Impurities of water
 - b) Insoluble Impurities of water
 - c) Gaseous Impurities of water
 - d) Biological Impurities of water

10. The instrument which measures turbidity is called
 - a) Anemometer

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- b) Conductivity meter
 - c) pH meter
 - d) Turbidity meter
11. Unit of measurement of turbidity used generally is
- a) Nephleometric turbididty unit (NTU)
 - b) Formazin Nephelometric Units (FTU)
 - c) Jackson Turbidity Unit (JTU)
 - d) None of the above
12. Water borne disease is caused by
- a) Biological impurities of water
 - b) Chemical impurities of water
 - c) Bacteriological Impurities of water
 - d) All the above
13. The specific conductivity of water is measured to know the extent of
- a) Organic matter
 - b) Inorganic matter
 - c) Dissolved salts
 - d) None of the above
14. Higher values of PH indicates
- a) Stronger acids
 - b) Stronger alkalis
 - c) Stronger contamination
 - d) None
15. A water having PH less than 7 is
- a) Acidic
 - b) Alkaline
 - c) Neutral
 - d) None of these
16. Water may be considered fit for drinking if it hardness is less than
- a) 50 mg/l
 - b) 100 mg/l
 - c) 150 mg/l
 - d) All the above
17. Dental diseases in children may be caused due to water supplies, which are deficient in
- a) Sodium
 - b) Iron
 - c) Fluorides

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d) None of these

18. The permissible pH value for drinking water may range between
- a) 5.5- 7.5
 - b) 6.5- 8.5
 - c) 7.5-9.5
 - d) None of the above

Key to question Bank : Fill in the blanks questions

1. Rain water is the PUREST form of water available on earth.
2. Water available in nature is not suitable for direct use in power plant without TREATMENT
3. Decomposition products of plants and animals cause ORGANIC impurities in water.
4. When water is cooled below ZERO Centigrade it will freeze and become Ice.
5. Oxygen and –CARBON DI OXIDE are the generally dissolved gases in water.
6. River water contain dissolved, SUSPENDED, inorganic and organic impurities in it.
7. Water -DISSOLVES-- impurities when it comes in contact with ground, soil or rocks.
8. Evaporation of water takes place at all -TEMPERATURE-.
9. The –WATER CYCLE--- describes the continuous movement of water on, above and below the surface of the Earth.
10. Precipitation of water from atmosphere is in form of rain and -SNOW-

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11. -WATER----- is colourless , odourless and tasteless liquid.
12. The term –WATER QUALITY- describes the physical, chemical and microbiological characteristics of water.
13. Radiological Impurity of water is measured in terms of ALFA & -BETA emitters
14. Heavy metals such as --LEAD- can have harmful effects on human health .
15. Total hardness, which is the sum of --CALSIUM- and -MAGNESIUM- hardness
16. Coliforms are used as an indicator of micro organisms present in water it is measured in terms of numbers of E-COLI--- present in 100 ml of water.
17. --BOD-----is the amount of dissolved oxygen required for the biochemical decomposition of organic compounds
18. –HARDNESS (Calcium & Magnesium) causes scaling in boilers and cooling water systems by depositing on heat exchanging surfaces.
19. –TDS(Total Dissolved Solids)- indicates the total quantity of inorganic and organic substances dissolved in water.
20. Total alkalinity is the alkalinity (pH 4.5 using methyl orange Indicator) present in water is known as M-ALKALINITY-.

21. The smallest particle of matter or a compound that possesses the same composition and characteristics as the rest of the substance is called -MOLECULE--.

22. The weight of all solids present per unit volume of water is called TDS-. The total weight concerns both dissolved and suspended organic and inorganic matter.

23. Turbidity is a measured by –TURBIDITY METER-----and expressed in terms of --- NTU--.

24. Anything that has weight , occupies space and exists in three forms Solid, Liquid and Gas is called -MATTER-

25. Process of killing micro-organisms by addition of chlorine in water is called - DISINFECTION-

26. When two or more chemical elements chemically combined together -COMPOUND-- is formed .

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27. Water (H_2O), is a compound formed by hydrogen and --OXYGEN-atoms.
28. Ions which have +ve charge on it are called ---CATIONS---
29. A process in which small particles of suspended matter present in water are combined by chemical means into larger particles to effect more rapid settling or better filtration is called --COAGULATION & FLOCCULATION--
30. A process in which air is intimately mixed with water to remove undesirable gases is called DEGASING