

**MAHARASHTRA JEEVAN PRADHIKARAN  
RESEARCH AND TRAINING CENTRE, NASHIKROAD**

**Professional Examination of Asstt.Engineer- II / Sectional Engineer  
/ Jr.Engineer  
October 2011**

**Subject :- Water Supply Sanitation Engineering (Written)**

Date :- 11/10/2011

Time :- 14.00 to 17.00

Marks :- 100

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- Note :-
- (1) Question No.1 is compulsory & solve any five Questions out of Remaining.
  - (2) Use of log table, slide rule, calculator is allowed.
  - (3) make suitable assumptions where necessary and state them clearly.
  - (4) Figures in bracket on right hand side indicate full marks.
  - (5) Marks are reserved in Each questions for clear sketches, good hand writing and neatness in general.
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**Questions No.1 :-**

- (a) Draw flow diagram of conventional type W.T.P. of 10 mld capacity giving name to each component, write down importance of each unit in the treatment process. (10)
- (b) Name the various method for estimating population while designing water supply scheme. (4)
- (c) Discuss the various factors for selection of source of water supply scheme. (6)

**Questions No.2 :-**

- (1) Design a pumping machinery for Raw water Rising main from following data given. (6)
  - (a) Discharge (Q) = 37500 lph (10.42 lps)
  - (b) Static head 31 M.
  - (c) Dia of DI K9 pipe = 150 mm
  - (d) Length of Rising Main = 2.50 km
  - (e) Assume frictional losses = 4.637 m/1000 m.
  - (f) Add 10% frictional losses for specials.
  - (g) Assume 60% efficiency of pump

- (h) Driving head = 2.00 m.
- (II) Describe the various kinds of pipes used in distribution system in Rural as well as Urban areas & Discuss merits and demerits of any three. (6)
- (III) Why is disinfection necessary for drinking water and name the various disinfectants. (4)

**Questions No.3 :-**

- (I) What are the various factors affecting the water demand and state the permissible standards for the drinking water ( physical & chemical) (8)
- (II) Name the different pipe appurtenances used in Rising Main & write Brief Note on Air valves. (4)
- (III) Discuss the rain water harvesting and merits of rain water Harvesting. (4)

**Questions No.4 :-**

- (I) Describe the following (4)
- (a) Total head of pump
- (b) Static head
- (c) Frictional Head
- (d) Velocity head
- (II) How the mild steel pipe is protected, From corrosion & Describe the method of protection. Describe the significance of corrosion on M.S. pipe. (6)
- (III) Describe the various methods of strengthing of Ground water source of any water supply scheme. (4)
- (IV) Name three water borne diseases. (2)

**Questions No.5 :-** Write short Notes (any four) (16)

- (a) Grit chamber
- (b) Orthotolidine test
- (c) Drop manhole
- (d) Water borne dieaseases
- (e) Formation of mud balls in Rapid sand filter.
- (f) Pressure relief valve

**Questions No.6 :-**

- (I) Draw typical section of Rapid gravity sand filter showing inlet, outlet, under drain arrangement, wash water arrangement, compressed air unit, filter media (Sand & gravel) (6)
- (II) Write short note on
- (a) Aqua privy
  - (b) Anaerobic decomposition of sludge (10)

**Questions No.7 :-**

- (I) Distinguish between the following (16)
- (a) Aerobic and anaerobic bacteria
  - (b) Sewage & sullage
  - (c) Self cleaning velocity & Non scoring velocity
  - (d) Oxidation ditch and sludge drying bed

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**MAHARASHTRA JEEVAN PRADHIKARAN  
RESEARCH AND TRAINING CENTRE, NASHIKROAD**

**Professional Examination of Asstt.Engineer- II / Sectional Engineer  
/ Jr.Engineer**

**October 2011      ROLL NO :-**

**Subject :- Water Supply Sanitation Engineering (Oral)**

Date :- 13/10/2011

Time :- 14.00 to 14.30

Marks :- 50

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- Note :-
- (1) All Questions are compulsory.
  - (2) Use of calculator Log table is allowed.
  - (3) Figure in brackets on right hand side indicate total marks.
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**Question No.1 :-**      Fill in the blanks      (10)

- (1) Connecting pipe (main) to be designed for .....vol. flow i.e. ....times pumping rate.
- (2) The rate of filtration in slow sand filter..... Lit/Hour/Sqm (without overloading)
- (3) When the sand strata is met then the well's wall construction is done by ..... method.
- (4) If pH value of water is 7 then the water is.....
- (5) Towns provided with piped water supply but without sewerage system, recommended per capita water supply (lpcd) is.....
- (6) More land is required for ... sand filter.
- (7) Self cleaning velocity for design peak flow is .... m/s & for present peak flow is ... m/s adopted.
- (8) The capacity of flushing tanks is usually .... of the cubic capacity of the sewer length to be flushed.
- (9) In sewerage system ventilating shafts are usually provided at .... and manhole at intervals of ... m.
- (10) Scouring depth is always calculated from.....

**Question No.2 :-** Write full form of the following

(10)

- (1) NRDWP
- (2) MPN
- (3) UIDSSMT
- (4) JTU
- (5) HGL
- (6) UFW
- (7) TCL
- (8) GRP
- (9) MDPE
- (10) BWSC

**Question No.3 :-** State True or False (T / F)

(10)

- (1) Design period of WTP is 15 years.
- (2) Chemical analysis gives the presence of bacteria in water sample.
- (3) The detention period of flash mixer is 20-100 mg/e ( 1-5 grain/gallon)
- (4) For Ductile Iron (DI) pipes (Unlined) recommended C value for new pipes is 130.
- (5) Distribution system should not be designed for residual pressure more than 22 M.
- (6) Bulk modulus of water is  $2.07 \times 10^8$  kg/cm<sup>2</sup>
- (7) The capacity of ESR can be determined by mass curve.
- (8) Drop manholes are provided at junction of two sewer line when they meet at same level.

(9) Size of air valve is equal to 1/4 to 1/6 of diameter of main pipe.

(10) Minimum residual head of standpost is 5 M.

**Question No.4 :-** Write down drinking water requirement unit for following parameter. (10)

- (I) pH (II) Hardness  
(III) Chloride (IV) Total dissolved solid

**Question No.5 :-** Answer in one sentence (10)

(1) Financial pattern for A class municipal council ( Sujal Nirmal Abhiyan)

(2) What should be the % of available chlorine in fresh bleaching powder.

(3) Scour valve

(4) Purpose of aeration.

(5) Recuperation test.

Question No	1	2	3	4	5	6	7	8	9	10	Total
Marks obtained											

Signature of Supervisor-----

Signature of Examiner-----

**MAHARASHTRA JEEVAN PRADHIKARAN**  
**MAHARASHTRA ENVIRONMENTAL ENGINEERING TRAINING &**  
**RESEARCH ACADEMY, NASHIK**

**Professional Examination of Asstt.Engineer- II /**  
**Sectional Engineer / Jr.Engineer**  
**October 2012**

&

**Subject :- Water Supply & Sanitation Engineering (Written)**

Date :- 3/10/2012

Time :- 14.00 to 17.00

Marks :- 100

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- Note :-
- (1) Question No.1 is compulsory & solve any five Questions out of Remaining.
  - (2) Use of log table, slide rule, calculator are allowed.
  - (3) make suitable assumptions where necessary and state them clearly.
  - (4) Figures in bracket on right hand side indicate full marks.
  - (5) Marks are reserved in Each questions for clear sketches, good hand writing and neatness in general.
  - (6) Make suitable assumptions wherever necessary & specify them clearly.
  - (7) Laptop, Mobile & Tablets are not allowed.
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Questions No.1 :-

- (A) State the important points to be considered for a proposed water supply scheme. Discuss any two points in brief. (5)
- (B) The census records of a city show population as follows : (5)
- |                     |          |
|---------------------|----------|
| Present             | : 50,000 |
| Before one decade   | : 47,100 |
| Before two decade   | : 43,500 |
| Before three decade | : 41,000 |
- Workout the probable population after one, two & three decade by using arithmetical increase method.
- (C) What are the purposes for which pumping is adopted in water supply schemes ? (5)
- (D) Define a trap & state its function in house drainage system. (5)

**OR**

Questions No.1 :-

- (A) What is a sewer ? Mention the terms which are commonly used in connection with different types of sewers. (5)
- (B) What are the requirements of potable or wholesome water for domestic use ? (5)

(C) Name the various methods of forecasting population (5)

(D) What are the various types of reservoirs that commonly used in water supply scheme ? What are the purposes served by the service reservoirs ? (5)

Questions No.2 :-

(A) Name the factors which affects the rate of water demand ? (4)

(B) Name the tests by which the yield of a well can be determined & explain any one in brief. (4)

(C) Name the different forms of chlorination, discuss any one in briefly. (4)

(D) State the three systems of sewerage & sewerage, what are the advantage & disadvantage of separate system ? (4)

Questions No.3 :-

(A) Explain the working of centrifugal pumps. Mention its advantages & disadvantages. (4)

(B) State the disadvantages of intermittent system of supply of water. (4)

(C) What are the aspects to be considered at the time of selection of site for sewage treatment works ? (4)

(D) What are the advantages & disadvantages of land treatment of sewage ? (4)

Questions No.4 :-

(A) Name some of the appertences required for the pipes of water distribution system. (4)

(B) Why are water meter installed on a pipeline ? What are the requirements of good water meters ? (4)

(C) What is a hydrant ? Where it is located ? What are its types ? (4)

(D) Define the term activated sludge ? State the properties of activated sludge. (4)

Questions No.5 :- Draw neat sketches (Any four) (16)

(A) Simons rain gauge

(B) Infiltration gallery.

(C) Flash mixer

(D) Catch Basin

(E) Continuous flow type tank (6)



Questions No.6 :- Write short notes (any four) (16)

- (A) Water table (16)
- (B) Tube wells
- (C) Submersible pumps
- (D) pH value
- (E) Ventilation of sewer

Questions No.7 :- Distinguish between, (16)

- (A) Surface source & underground source.
- (B) Hydraulic Ram & Jet pump
- (C) C.I. Pipes & Cement concrete pipes
- (D) Scour valve & sluice valve.

Questions No.8 :-

- (A) Differentiate between water pollution & water contamination. (4)
- (B) Define Dry weather flow ? Name the two types of D.W.F. and also name the factors considering while determining the D.W.F. (4)
- (C) Why are pumps required in sanitary works ? (4)
- (D) Differentiate between slow sand filters & Rapid sand filter. (4)

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**MAHARASHTRA JEEVAN PRADHIKARAN**  
**MAHARASHTRA ENVIRONMENTAL ENGINEERING TRAINING &**  
**RESEARCH ACADEMY, NASHIK**

**Professional Examination of Asstt.Engineer- II /**  
**Sectional Engineer / Jr.Engineer**  
**October 2012**

**Subject :- Water Supply & Sanitation Engineering (Oral)**

Date :- 5/10/2012

Time :- 14.00 to 14.30

Marks :- 50

- Note :-
- (1) All Questions are compulsory.
  - (2) Use of Calculator, Log table are allowed.
  - (3) Figure in bracket on right hand side indicate total marks.
  - (4) Mobile, Laptop, Tablets are not allowed.

Question No	1	2	3	4	5	6	7	Total
Marks obtained								

Question No.1 :-		Write full form of the following	(10)
	(1)	MSNA- .....	
	(2)	LPCD- .....	
	(3)	HDPE- .....	
	(4)	CPHEEO- .....	
	(5)	ZBR- .....	
	(6)	B.O.D.- .....	
	(7)	P.P.M.- .....	
	(8)	N.R.V. ....	
	(9)	L.D.L.- .....	
	(10)	S.T.P.- .....	
Question No.2 :-		Fill in the blanks	(10)
	(1)	As per CPHEEO manual, the norms of water supply for towns without sewerage system is .....LPCD	
	(2)	Acceptable range of pH value of potable water is .....	

	(3)	If P is the population in thousands, then a provision for fire demand in kilolitres per day based on the formula of .....	
	(4)	Distribution system should be designed for single storey building, minimum residual pressure at ferrule points is .....M.	
	(5)	Minimum pipe size of .....mm for towns having population upto 50,000 is recommended.	
	(6)	The peak factor recommended for population less than 50,000 is equal to .....	
	(7)	Scour valves are provided @ ..... point of pipeline.	
	(8)	ESR's are designed for .....hrs. capacity in rural water supply scheme.	
	(9)	For drinking water the acceptable range of turbidity (NTU) is ... .....	
	(10)	The acceptable range of total dissolved solids (mg/L) in drinking water is .....	
Question No.3 :-		State whether the following statements are true or false.	(10)
	(1)	Bibcocks are the water taps which are attached at the end of water pipes. ....	
	(2)	The % of unaccounted water to the extent of about 15% ..... .....	
	(3)	In the Air lift pumps, compressed air is used to lift the air ..... .....	
	(4)	The desirable temperature of potable water is 25°C ..... .....	
	(5)	The acceptable range of the total Hardness in drinking water is 600 mg/L. ....	
	(6)	Typhoid is a water borne disease .....	
	(7)	Slow sand filters are suitable for big cities .....	
	(8)	Prechlorination reduces the taste & odour of water ..... .....	
	(9)	Plate bearing Test is carried out for knowing the strength of the soil. ....	
	(10)	The construction of building should not be damp proof ..... .....	

Question No.4 :-		Answer in one sentence	(10)
	(1)	Sewer .....	
	(2)	Sullage .....	
	(3)	Storm water .....	
	(4)	Aeration .....	
	(5)	Stand pipes .....	
Question No.5 :-		Explain in short	(10)
	(1)	Rate of Demand .....	
	(2)	Orthotolidin test .....	
	(3)	Name the four methods of layout of distribution system  (a) ..... (b) ..... (c) ..... (d) .....	
	(4)	Fire Hydrants .....	
	(5)	Stop cocks .....	

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# MAHARASHTRA JEEVAN PRADHIKARAN

Examination conducted by

Maharashtra Environmental Engineering Training & Research Academy  
(MEETRA), Nashik.

Professional Examination of Asstt. Engineer-II / Sectional Engineer / Jr. Engineer

October 2013

**Subject** :- Water Supply & Sanitation Engineering (WRITTEN)  
**Date** :- 22/10/2013 **Time** :- 14.00 to 17.00  
**Marks** :- 100

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Note :- (1) Question No. 1 compulsory & Solve Any Five From the remaining.  
(2) Use of Calculator, Log table are allowed.  
(3) Figure in bracket on right hand side indicate total marks.  
(4) Mobile, Laptop, Tablets are not allowed.  
(5) Make suitable assumptions where necessary & state them.

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**Que. No. 1. (a)** Draw a detailed schematic flow diagram (not to scale) of a Rural Water Supply Scheme having river infiltration work as a source show following work. (10)

- 1) Inspection
- 2) Slotted pipe gallery
- 3) Intake well
- 4) Connecting pipe
- 5) Jack well
- 6) Pumping machinery
- 7) Pump House
- 8) Raw Water Rising main
- 9) Elevated Service reservoir
- 10) Gravity Main
- 11) Stand post

(Assume suitable levels & dimensions for the different units)

Also show the cross-section of slotted pipe gallery.

(b) Discuss any four methods forecasting future population while designing the water supply scheme. (5)

(c) Write short notes on Improvement to Water Supply Scheme & Augmentation to Water Supply Scheme. (5)

Que. No. 2. (a) What are the various factors affecting water demand and state the permissible standard, for the drinking water (physical & chemical & biological). (5)

(b) Why is disinfection necessary for drinking water and name the various Disinfectants? (5)

(c) Describe the various kinds of pipe used in distribution system in Rural as well as Urban areas. Discuss merits and demerits of any three. (6)

Que. No. 3. (a) Write the name of various types of valves used in Rural & Urban Supply Scheme and discuss the functions of any two valves in details. (4)

(b) Write down the Hazen William's & Manning's formula with its notation and unit & its application. (4)

(c) Discuss water hammer – occurrence and causes. (4)

(d) Name the two impurities due to which water become impure and name three water borne diseases. (4)

Que. No. 4. Distinguish between the following. (Any Four) (16)

- (a) Scour valve and sluice valve
- (b) Oxidation ditch and sludge drying bed
- (c) Sewage & Sullage
- (d) Aerobic and anaerobic bacteria
- (e) Surface source and underground source
- (f) CI Pipes and cement concrete pipe

Que. No. 5. (a) What are advantages and disadvantages of land treatment of sewage? (4)

(b) Why is a water meter installed on a pipe line?  
What are the requirements of a good water meter? (4)

(c) What is a hydrant? Where is it located? What are its types? (4)

(d) Define a trap and state its function in a house drainage system. (4)

Que. No. 6. (a) What is low cost sanitation? (5)

(b) Draw a typical sketch of a dry leach pit latrine as a low cost sanitation method. (5)

(c) Work out the annual bleaching powder requirements of a 1 mld water supply scheme having a dose of 1 ppm. (Bleaching powder is having 30% chlorine) & explain super chlorination. (6)

Que. No. 7. (a) Design a pumping machinery for Raw. Water Rising main from following data given. (8)

- (a) Discharge  $Q = 37500$  Lph
- (b) Static head = 33m.
- (c) Dia of D.I. K9 pipe = 200mm.
- (d) Length of Rising main = 3.00 km
- (e) Assume frictional losses = 4.637m/1000m.
- (f) Add 10% frictional losses for specials Assume 60% efficiency of Pump Driving head = 2m.

(b) Describe the following (4)

- i) Total head of pump.
- ii) Static head
- iii) Frictional head
- iv) Velocity head.

(c) Distinguish between monoblock pump and submersible pump and vertical turbine pipe. (4)

Que. No. 8. Write short notes (Any Four) (16)

- i) Sanitation around public stand post.
- ii) *pH Value*
- iii) Ventilation of sewer
- iv) Flash mixer.
- v) Storm rain gauge.
- vi) Grit Chamber.



# MAHARASHTRA JEEVAN PRADHIKARAN

Examination conducted by

Maharashtra Environmental Engineering Training & Research Academy  
(MEETRA), Nashik.

Professional Examination of Asstt. Engineer-II / Sectional Engineer / Jr. Engineer

October 2013

Roll No.

Subject :- Water Supply & Sanitation Engineering (Oral)

Date :- 24/10/2013

Time :- 14.00 to 14.30

Marks :- 50

- Note :- (1) All Questions are compulsory.  
(2) Use of Calculator, Log table are allowed.  
(3) Figure in bracket on right hand side indicate total marks.  
(4) Mobile, Laptop, Tablets are not allowed.

Question No.	1	2	3	4	5	6	7	Total
Marks obtained								

Que. No. 1:- Fill in the blanks.

(10)

- a) Filtration rate of slow sand filter is \_\_\_\_\_ L/m<sup>2</sup>/hr.
- b) Back washing of filter bed is continue for \_\_\_\_\_ minutes.
- c) Bleaching powder is used for \_\_\_\_\_ of water.
- d) Thrust blocks are provided for \_\_\_\_\_ on pipeline.
- e) Filtration rate of rapid sand filter \_\_\_\_\_ L/m<sup>2</sup>/hr.
- f) Minimum residual chlorine at tap should be \_\_\_\_\_ ppm.
- g) Air valve should be provided at interval of \_\_\_\_\_ m.
- h) The waste water from W.C. is called \_\_\_\_\_.
- i) Algae in water treatment plant is removed by \_\_\_\_\_.
- j) The detention time in septic tank is \_\_\_\_\_ hr.



**Que. No. 2 :- Write the full form of the following:**

**(10)**

- 1) CLF :- \_\_\_\_\_
- 2) RO process :- \_\_\_\_\_
- 3) GSR :- \_\_\_\_\_
- 4) OPC :- \_\_\_\_\_
- 5) DWF :- \_\_\_\_\_
- 6) COD :- \_\_\_\_\_
- 7) BPT :- \_\_\_\_\_
- 8) ppm :- \_\_\_\_\_
- 9) HGL :- \_\_\_\_\_
- 10) NRDWP :- \_\_\_\_\_

**Que. No. 3 :- Write in short.**

**(10)**

i) Orthotolidine Test :-

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ii) Fire hydrants :-

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iii) Name the four types of Intake of water supply scheme :-

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iv) Name various types of pumps used in water supply scheme :-

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- v) Write the Name of various test or examination of water, carried out in the Laboratory to ascertain purity for Drinking purpose.

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b)

**Que. No. 4. Write Answer in one sentence:**

**(10)**

c)

- 1) What is the function of settling tank in W.T. Plant?

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- 2) What is the purpose of pre-chlorination?

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- 3) What should be the percentage of available chlorine in fresh bleaching powder?

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- 4) What is the function of ferrule?

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- 5) What is the function of zero velocity Valve

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d)

**Que. No. 5 Write in short about the following:**

**(10)**

- a) Aeration :-

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b) Scour valve :-

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c) Flushing cisterns :-

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d) Sullage :-

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e) Recuperation test :-

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**MAHARASHTRA JEEVAN PRADHIKARAN**  
**Examination conducted by**  
**Maharashtra Environmental Engineering Training & Research Academy**  
**(MEETRA), Nashik**  
**Professional Examination of Asstt. Engineer-I/Sectional Engineer/Jr. Engineer /**  
**Technical Assistant (Civil)**  
**November 2014**

**Subject** :- Water supply & Sanitation Engineering (Written)  
**Date** :- 12/11/2014 **Time** :- 10.00 to 13.00  
**Marks** :- 100

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- Note :-** 1) Question No.1 Compulsory & solve any five from the remaining.  
2) Use of calculator, Log, table are allowed.  
3) Figure in bracket on right hand side indicate total marks.  
4) Make suitable assumptions where necessary & state them.  
5) Use of mobile, laptop & tab are not allowed.
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- Que.No.1.** A) Draw schematic flow diagram (not to scale) of unconventional type W.T.P. of 5 mld capacity giving name of each component. Write down importance of each unit in the treatment plant. How much head loss is allowed from aeration fountain to sump? (10)
- B) What is the purpose of Govt. of Maharashtra behind the programme 'Maharashtra Sujal Nirmal Aabhiyan' (MSNA)? (5)
- C) What is the use of break pressure tank in pipe line works? (5)
- Que.No.2.** A) Which are the various technologies used for treatment of sewage. Explain SBR technology in brief with various steps/- OR Explain any one in brief. (6)
- B) Write any four methods of forecasting future population while designing the Water Supply Scheme. (6)
- From the census, data given below, find the population of year 2026 & year 2041 by incremental increase method.
- |    | Census (Year) | Population |
|----|---------------|------------|
| 1. | 1951          | 18,000     |
| 2. | 1961          | 22,000     |
| 3. | 1971          | 27,000     |
| 4. | 1981          | 36,000     |
| 5. | 1991          | 42,000     |
| 6. | 2001          | 50,000     |
- C) Discuss Rain Water Harvesting in brief. (4)

- Que.No.3.** a) Write Hazen William's formula and manning's formula for calculating velocity with its notation & unit. (4)
- b) Write merits and demerits of following sewage treatment technologies. (4)
- i) Waste stabilization pond.
- ii) Conventional activated sludge process.
- c) Differentiate between surface water and ground water characteristics with reference to temperature, turbidity colour, mineral content (4)
- d) Write short note on infiltration gallery. (4)
- Que.No.4.** a) Write short note on septic tank along with sketch. (4)
- b) What is mean by priming of the pump? What are two ways of priming of centrifugal pump (4)
- c) Write short note on water hammer. (4)
- d) Write in detail about manhole on sewer lines. (4)
- Que.No.5.** a) Write short note on solid waste management with respect to types of waste, reasons for increase in solid waste & various techniques for disposal. (4)
- b) Write short note on tube settler. (4)
- c) What is mean by self cleansing velocity? Explain in brief. (4)
- d) Give any four reasons, if pump is not delivering water. (4)
- Que.No.6.** a) Define a Trap and state its function in house drainage system. (4)
- b) What is mean by artificial recharge, explain with the help of diagram. (4)
- c) Which are various raingauges used for measuring rainfall? (4)
- d) Write about function of air valve. (4)
- Que.No.7.** a) What is runoff? Which are various factors affecting runoff? (4)
- b) What are the various criteria for pump selection. (4)
- c) Distinguish between sewage & sullage. (4)
- d) Write short note on water softening. (4)

- Que.No.8. a) What is difference between continuous & intermittent Supply of water in distribution system. (4)
- b) What is manifold. Write in brief. (4)
- c) Write short note on pipe / specials. (4)
- d) Write short note on contamination of water. (4)

MAHARASHTRA JEEVAN PRADHIKARAN

Examination conducted by

Maharashtra Environmental Engineering Training & Research Academy  
(MEETRA), Nashik

Professional Examination of Asstt. Engineer-I/Sectional Engineer/Jr. Engineer /  
Technical Assistant (Civil)

November 2014

Roll No.	
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Subject :- Water Supply & Sanitation Engineering (Oral)

Date :- 12/11/2014

Time :- 14.00 to 14.30

Marks :- 50

Note :- 1) All question Compulsory.

2) Use of calculator, Log, table are allowed.

3) Figure in bracket on right hand side indicate total marks.

4) Make suitable assumptions where necessary & state them.

5) Use of mobile, laptop & tab are not allowed.

Que.No.1. Write long form of the following.

(10)

1. NRDWP :- \_\_\_\_\_
2. DWF :- \_\_\_\_\_
3. BOD :- \_\_\_\_\_
4. PPM :- \_\_\_\_\_
5. UIDSSMT :- \_\_\_\_\_
6. HGL :- \_\_\_\_\_
7. DOL Starter :- \_\_\_\_\_
8. MCCB :- \_\_\_\_\_
9. NPSH :- \_\_\_\_\_
10. HDPE :- \_\_\_\_\_

Que.No.2. Fill in the blanks.

(10)

- 1) In PVC pipes class IV represents the working pressure of .....
- 2) Air valve should be provided at the interval of .....
- 3) Minimum rate of water supply for design of Urban water supply schemes where sewerage system is existing / contemplated is .....
- 4) Technical sanction power of Executive Engineer as per MJP's latest circular is .....
- 5) Filtration rate of rapid sand filter is .....

- 6) Minimum residual head in the distribution system of single storey building should be .....
- 7) The detention time in septic tank is .....
- 8) For required residual chlorine, water is allowed to stay in contact with chlorine for at least .. Before it can be delivered to the consumer.
- 9) In sewerage system, ventilating shafts are usually provided at interval of .....
- 10) Turbidity is measured in unit .....

Que.No.3. State whether following statements are true or false. (10)

- 1) A mass of concrete cast onto the pipe bends, tees or elbows to prevent movement of the pipe when it is carrying water is thrust block. :- \_\_\_\_\_
- 2) Recuperation test of supply well should be taken in the month of May. :- \_\_\_\_\_
- 3) Design period of WTP is 30 years. :- \_\_\_\_\_
- 4) For ductile iron (DI) pipes (Unlined) recommended C Value for new pipes is 130. :- \_\_\_\_\_
- 5) Drop manhole are provided at junction of 2 sewer line when they meet at same level. :- \_\_\_\_\_
- 6) The size of air valve shall be 1/4 to 1/6 of pipe diameter. :- \_\_\_\_\_
- 7) Conductor is used to improve the power factor. :- \_\_\_\_\_
- 8) One HP = 0.746 Kw. :- \_\_\_\_\_
- 9) Pumping machinery is designed for intermediate stage only. :- \_\_\_\_\_
- 10) Package treatment plants are typically installed for large systems serving flows. :- \_\_\_\_\_

Que. No.4. Write answer in short. (10)

1. What is the function of ferrule?

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2. What is the function of zero velocity valve?

---

---

3. What is HGL ?(Hydraulic grade line)

---

---

4. Write about working head and working pressure.

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---

5. Name any four sewer appurtenances.

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Que.No.5. Write in short.

(10)

1. Name various pumps used in water supply system.

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2. What is peak factor. What is peak factor for design of sewers having population between 20,000-50,000?

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3. Name various valves used in water supply system.

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4. What is mean by back washing in water treatment plant?

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5. Write full form of PVC & MDPE pipe.

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**MAHARASHTRA JEEVAN PRADHIKARAN**  
**Examination Conducted by**  
**MAHARASHTRA ENVIRONMENTAL ENGINEERING TRAINING &**  
**RESEARCH ACADEMY (MEETRA) NASHIK**

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**Professional Examination of AE-II / Sect. Engr. / Jr. Engr. / Technical  
Assistant (Civil) October 2015**

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**Subject- Water Supply & Sanitation Engineering Paper - II (Written)**

Date :- 28/10/ 2015

Time - 10.00 - 13.00

Marks-100

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- Note-**
- 1) Question No.1 is compulsory & solve any five from the remaining.
  - 2) Use of calculator, log table are allowed.
  - 3) Figure in bracket on the right hand side indicates total marks.
  - 4) Mobile, laptop & tablets are not allowed.
  - 5) Make suitable assumptions where necessary & state them.
- 
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**Question No.1**

- (a) Draw flow diagram of a urban water supply scheme having surface water source i.e. a minor irrigation tank. Assume suitable levels & dimensions for different units. Also state units of WTP in the direction of flow. ( 10)
- (b) What is residual chlorine? How it can be measured on field? (5)
- (c) State any five standard characteristics of drinking water along with their units to measure. (5)

**Question No.2**

- (a) Explain aeration with any two purposes of it. (4)
- (b) What is 'C' value of pipe? State 'C' value of C.I. pipe & PVC pipe to be considered for design purpose as per Hazen -Williams coefficients. (4)
- (c) State any four points to be considered while selecting pipe material. (4)

- (d) What are the possible causes for following water quality problems? What should be remedies? (4)
- i) Taste & Odour.
  - ii) Colour.

**Question No.3**

- (a) State any four valves & their purpose or functions to be used in drinking water supply system. (4)
- (b) State any two causes of water hammer encountered in water supply system & any two water hammer controlling devices. (4)
- (c) Explain disadvantages of intermittent water supply system in comparison with continuous water supply system. (4)
- (d) What is non-revenue water? State any three causes & their remedies. (4)

**Question No.4**

- (a) What precautions to be taken while laying of sewer? Also state safety measures needed with respect to avoid accident & inconveniences to the public. (6)
- (b) Explain the water tightness test of brickwork manhole on a sewer line. (5)
- (c) Why safe sanitation system is needed? (5)

**Question No.5**

- (a) State advantages & disadvantages of any two of following. (8)
- i) Sludge composting.
  - ii) Surface Source.
  - iii) Steel pipes.
  - iv) Super chlorination.
- (b) Explain about proper time to remove formwork of RCC components like columns, beams & slabs? Also state the effects of early removal of formwork. (4)
- (c) Name various methods of population forecasting. (4)

### Question No.6

Write short notes (Any four)

(16)

- i) Hydraulic test of a section of pipeline.
- ii) Plain Chlorination & super Chlorination.
- iii) Coagulation & Flocculation.
- iv) PH value.
- v) Periodical maintenance of M.S. pipes laid above GL.
- vi) Measures to be taken for scheme self supporting.

### Question No.7

- (a) Explain residual pressure & its significance in designing distribution system. (4)
- (b) Explain static head, friction head & velocity head. (4)
- (c) State significance of yield test of well? when it is to be conducted ? Describe the procedure in brief ? (4)
- (d) State four points the water works management should aim at. (4)

### Question No.8

- (a) Design a pumping machinery from following data given. (6)
  - i) Discharge - 37500 lph
  - ii) Dia. & type of pipe - 150 mm & D1 K-9
  - iii) Length of rising main - 2.50 km
  - iv) Static head - 31m
  - v) Rate of frictional losses - 4.637 m/ km
  - vi) Frictional losses for tees, bend 10 %
  - vii) Efficiency - 60%
- (b) Explain the motive behind cube test of concrete. What should be compressive strength of a cube tested for 7 days & 28 days when 43 grade cement is used for concrete? (5)
- (c) State the necessity of water audit & hydraulic modelling of distribution system. (5)

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**RESEARCH ACADEMY (MEETRA) NASHIK**

Professional Examination of AE-II / Sect.Engr. / Jr.Engr. / Technical Assistant  
 (Civil) October 2015  
 Subject- Water Supply & Sanitation Engineering Paper - II (Oral)

<b>Roll No</b>	
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Date - 28 /10 / 2015

Time-14.00- 14.30

Marks-50

- Note-**
- 1) All questions are compulsory.
  - 2) Use of calculator, log table are allowed.
  - 3) Figure in bracket on the right hand side indicates total marks.
  - 4) Make suitable assumptions where necessary & state them.
  - 5) Use of mobile, laptop & tab are not allowed.

Question No	1	2	3	4	5	Total
Marks obtained						

Signature of Supervisor ----- Signature of Examiner-----

**Question 1 - Fill in the blanks**

**(10)**

- 1) Pipe line can be emptied and drained completely by the operation of-----  
 -----
- 2) The process of adding oxygen for imparting freshness to water and expelling CO<sub>2</sub> & other gases causing taste & odour is called-----.
- 3) 'C' value for design purpose of prestressed concrete pipe upto 1200 mm dia.  
 is recommended as-----.

- 4) As per CPHEEO manual, per capita water supply levels for the cities provided with piped water supply, where sewerage system is existing, should be ----- lpcd.
- 5) Zero velocity valve is a device to control-----.
- 6) The most commonly used coagulant is-----.
- 7) NTU is the unit to measure -----.
- 8) ----- head is the difference between levels of liquid in the suction pump & the level of highest point on the delivery piping.
- 9) Design period for electric motors & pumps is ----- years.
- 10) Copper sulphate is used most commonly to control -----.

**Question 2- Write fullform of the following**

**(10)**

- 1) NRW -----
- 2) FSL -----
- 3) SBR -----
- 4) OPC -----
- 5) ESR -----
- 6) PMC -----
- 7) GIS -----
- 8) HFL -----
- 9) RO -----
- 10) MLD -----

**Question 3 - State whether the following statements are true or false. (10)**

- 1) Jar test is to be conducted to measure residual chlorine. -----
- 2) Ferric Alum is most commonly used disinfectant. -----
- 3) Reflux valve is for protecting a pumping main against water hammer. -----
- 4) Acceptable PH value of drinking water ranges between 7.0 to 8.5. -----
- 5) For towns where two storied buildings are common, minimum residual pressure @ ferrule point should be 7m. -----
- 6) Thermal conductivity of PVC pipe is very high compared to metals. -----
- 7) Gaseous chlorine is approximately 2.5 times heavier than air. -----
- 8) Nalgonda Technique is a mechanism of Defluoridation. -----
- 9) Centrifugal pumps have to be primed before starting. -----
- 10) Total dissolved solids in drinking water are acceptable up to 2000 mg/l -----

**Question 4 - Explain in short**

**(10)**

- 1) Sedimentation.
  
  
  
  
  
  
  
  
  
  
- 2) Back washing in WTP.
  
  
  
  
  
  
  
  
  
  
- 3) Hydraulic grade line.

4) Zoning of Distribution network.

5) Thrust block.

**Question 5 - Answer in short**

**(10)**

1) Name any four methods of population forecast.

2) Write longform of BOD & COD.

3) Explain the necessity of working survey.

4) Explain measures to protect M.S. pipes from corrosion.

5) State any four advantages of PVC pipes.

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