Exam Date & Time: 26-Apr-2019 (02:00 PM - 05:00 PM)



# MANIPAL ACADEMY OF HIGHER EDUCATION

# INTERNATIONAL CENTRE FOR APPLIED SCIENCES IV SEMESTER B.Sc. (APPLIED SCIENCES) IN ENGINEERING END SEMESTER THEORY EXAMINATION-APRIL/MAY 2019

### WATER SUPPLY ENGG. [ICE 243]

#### Marks: 100

C)

## Duration: 180 mins.

(6)

### Answer 5 out of 8 questions.

Explain

#### Missing data if any may be suitably assumed.

- What are the objectives of public protected water supply scheme? Also
  highlight the necessity of water supply scheme for any city or town.
  - B) For the water supply of a small town with population 30,000 and daily (10) requirement of 4 ML, it is proposed to construct a distribution reservoir. Pumping is to be done at a constant rate for 8 hours (8AM to 4PM). Work out the storage capacity required. Assume break down reserve as 1.5 hours supply and fire reserve at one lpcd.

The pattern of draw off is as follows.

OI	draw off is as follows	•
	6AM to 9AM	30% of daily supply
	9AM to 12PM	15% of daily supply
	12PM to 5PM	20% of daily supply
	5PM to 9PM	25% of daily supply
	9PM to 6AM	10% of daily supply

(ii) Give any four requirements of a good disinfectant.
 <sup>2)</sup> Define Rate of demand of water and explain any six factors affecting the same.
 A)

(i) Free available chlorine and Combined chlorine.

- <sup>B)</sup> Compare Surface and Underground sources of water with respect to their <sup>(6)</sup> quantity and quality for water supply scheme.
- C) What is meant by yield of a well? List the factors affecting the yield of well. (8)
  Explain any one method to determine the yield of a well.
- <sup>3)</sup> List the different systems of layout of distribution system and explain any (6) one system with its merits and demerits.
  A)

B) Compare rapid and slow sand filter under following heads. (6)
 (i)Rate of filtration
 (ii) Quantity of wash water
 (iii) Method of cleaning

(iv) Effective size of sand.

	C)	Explain (i) Unit of turbidity (ii) Uniformity coefficient (iii) Chlorine demand (iv) Optimum dosage of coagulant					
4)	۵)	Explain Lime soda method of softening with its advantages and disadvantages.			(6)		
	B)	Explain (i) Specific yield of well. (ii) Double Chlorination (iii) Fire Reserve (iv) Coagulant aid (v) Aerator					
	C)	Explain with a flow diagram the Nalgonda technique of defluoridation of <sup>(4)</sup> water.					
5)	A)	For the following census data, calculate the prospective population by 2040 using Arithmetical increase, Geometrical increase and Incremental increase				(10)	
		Year:	1980	1990	2000		
		2010 Population in thousands: 257	90	135	189		
	В)	What is an Intake structure? Explain Canal Intake with a neat sketch. (6					
	C)	Explain the four mechanism of filtration.					
6)		Write a note on mixing devices.					
	A) B)	Give any four objectives of water analysis? Give the permissible limit and <sup>(?</sup> harmful effects of following impurities in drinking water. (i) Iron (ii) Nitrates.					
	C)	Determine the chlorine demand of water if the residual desired is 0.4 mg/l when15 kg of bleaching powder with 30% available chlorine is added to 4ML of water.					
7)	۸)	Define (i) Surface over flow rate (ii) Detention time (iii) Contact time (iv) Flocculation				(8)	
	А) В)	Explain any three operational problems of rapid sand filter (RSF)				(6)	
	C)	List any four requirements of a good distribution system.					
8)	A)	What is design period? What is its significance? Give any three factors affecting the design period.					
	В)	List the different methods of population forecasting and explain (i) the <sup>(8)</sup>					

comparative method and (ii) the Master plan method of population forecasting.

C) Design a circular sedimentation tank for a peak flow of 5MLD. Assume a <sup>(6)</sup> detention period of 2.5 hours. Assume a suitable surface over flow rate and give check for weir loading. Also give the schematic diagram of the designed tank.

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