

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular), April-May 2018

B. Tech in Civil Engineering, Semester IV

Roll No.....

CE407: ENVIRONMENTAL ENGINEERING-I

Time: 3 hours

Max. Marks: 100

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

Q.1A	Objective type multiple choice questions (10 questions @ 1 mark)	10
i.	The fire demand for ascertaining the empirical formula : $Q = 4637 \sqrt{\frac{P}{1000}} \left(1 - 0.01 \sqrt{\frac{P}{1000}} \right)$ known as (a) Kuichling's formula (b) Buston's formula (c) Freeman formula (d) National Board of Fire Underwriters/ American Insurance Association Formula	
ii.	Aeration of water is done to remove: (a) odour (b) colour (c) bacterias (d) hardness	
iii.	Biochemical Oxygen Demand (B.O.D.) of safe drinking water must be: (a) Nil (b) 5 (c) 10 (d) 15	
iv.	The period of cleaning of a slow sand filter, is usually: (a) 5 to 10 days (b) two weeks to three weeks (c) one month to three months (d) one year.	
v.	At the socket and spigot joint: (a) enlarged end of the pipe is called socket (b) normal end of the pipe is called spigot (c) molten lead is used for water proofing (d) All the above.	

vi.	Mostly used coagulant, is (a) chlorine (b) alum (c) lime (d) Bleaching powder.
vii.	The maximum pressure to which cast iron pipes may be subjected to, is (a) 3 kg/cm ² (b) 5 kg/cm ² (c) 7 kg/cm ² (d) 10 kg/cm ²
viii.	Chemical coagulation of drinking water, is done (a) to settle suspended materials (b) to increase rate of settlement of suspended materials (c) to remove the bacterias (d) None of these.
ix.	The type of joint generally used in cast iron pipes, is (a) socket and spigot joint (b) flanged joint (c) Coupling joint (d) All the above.
x.	Estimates of a water supply project depends upon the rate of water supply per capita consumption and probable population estimated at the end of the design period of (a) 5 to 10 years (b) 10 to 15 years (c) 15 to 20 years (d) 20 to 30 years

Q.2	Short answer type questions (4 questions @ 2.5 marks) Differentiate: (i) Sterilization' and 'disinfection' of water. (ii) Discrete Particles and Flocculating Particles Explain why? (i) Direct application of equation of terminal velocities is seldom possible in water treatment. (ii) Cl ₂ gas preferred for disinfection purpose?	10
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Q.3A	Define water demand. Describe and classify the water requirement for domestic purpose in different usages.	05
Q.3B	Define the terms Alkalinity and Acidity. Write the importance of determining them in public water supply.	05

Q.4A	Write a short note on "Design Period" with examples.	05
Q.4B	Explain the colloidal stability with the help of Double layer theory.	05

Q.5A	Write the essential steps for designing a waste water treatment plant for a city. Discuss the importance of sedimentation and coagulation process in WWT.	05
Q.5B	In water treatment plants, chemical coagulation is usually accomplished by the addition of metallic salts, than explain the various theories behind this coagulation process.	05
Q.6A	List down three physical, three chemical and three Biological parameters in drinking water. Describe the lab procedure for measurement of Total Suspended Solids (TSS) and organic matter.	05
Q.6B	What do you understand by Chlorine Demand and Free Residual Chlorine? Explain the importance of residual chlorine.	05
OR		
Q.6B	Derive an expression for the determination of settling velocity of discrete particles.	05
Q.7A	Differentiate between: i. Type-I Settling ii. Type-II Settling	05
Q.7B	What are gravity system and combined gravity and pumping system of water distribution? What are the advantages of combined system?	05
OR		
Q.7B	The population of a city in 2000 is 50,000. The average increase in population over last 8 decades is 7500 and average incremental increase during 8 decades is 750. Predict the population of the city based on incremental method, in the year 2020.	05
Q.8A	In order to achieve variable discharge at maximum efficiency explain the following in detail: i. Parallel operation of pumps ii. Series operation of pumps iii. Variable speed operation	10 (4+4+2)
Q.9A	Explain in detail the different water distribution systems. Mention their advantages and disadvantages.	10
Q.9B	Write the step by step procedure for designing a community based RO system for water scarce city in India.	10
OR		
Q.9B	Explain the different methods of forecasting future population of a city for which a water supply scheme is to be planned.	10