

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
SEVENTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), DECEMBER 2019

**Course Code: CE405**

**Course Name: ENVIRONMENTAL ENGINEERING- I**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer any two full questions, each carries 15 marks.*

Marks

- |   |  |     |
|---|--|-----|
| 1 | a) Discuss the method of arriving at the quantity of water to be supplied to a community.  | (7) |
|   | b) Compare the different sources of water for selecting them as a source for a water supply project.   | (5) |
|   | c) Define MPN . Explain the significance of determining the same.  | (3) |
| 2 | a) Enlist any eight important chemical characteristics of raw water. Mention the method of analysis and its acceptable value as per drinking water quality standards of any three of them.   | (6) |
|   | b) The population of a city in three consecutive years i.e. 1991, 2001 and 2011 is 80,000; 250,000 and 480,000, respectively. Determine (a) The saturation population, (b) The equation of logistic curve, (c) The expected population in 2021.  | (9) |
| 3 | a) Define intake as referred in a water supply system and distinguish between Dry intake and wet intake. Also list the important factors governing the selection of site for the selection of an intake  | (8) |
|   | b) What are the points which needs consideration while selecting location for a pumping station? Compute the cost of electric energy in a month for a pump which is operated 8 hours daily for 30 days, The pump lifts 93600 litres of water per hour against a total head of 25 m. Pump has an efficiency of 75% and the electric motor have an efficiency of 80% .The cost of electric energy is Rs 15 per unit. | (7) |

**PART B**

*Answer any two full questions, each carries 15 marks.*

- |   |  |     |
|---|--|-----|
| 4 | a) Distinguish between Type I and Type II settling of suspended particles. | (4) |
|   | b) Describe any two mixing devices of coagulants with figure.              | (6) |

- c) Find the diameter of the particles with specific gravity 1.2 removed in a tank having a surface area of  $250 \text{ m}^2$ , treating 10 MLd of water at  $21^\circ\text{C}$ . (5)
- 5 a) Design a slow sand filter from following data. (5)
- |                         |   |                   |
|-------------------------|---|-------------------|
| Population to be served | = | 50,000 persons    |
| Per capita demand       | = | 150 Lpcd          |
| Rate of filtration      | = | 180 L/hr./sq.m    |
| Length of each bed      | = | Twice the breadth |
- Assume maximum demand as 1.8 times the average daily demand. Also assume that one out of six will be kept as stand by.
- b) Design a clariflocculator to treat 6 MLd of water. Assume suitable data wherever necessary. (10)
- 6 a) Name any four commonly used coagulant in water treatment. What are the factors which affect coagulant dosage. (5)
- b) With the help of a neat sketch explain the construction, working and back washing of a rapid sand filter. (10)

### PART C

*Answer any two full questions, each carries 20 marks.*

- 7 a) Define disinfection. Enlist various methods of disinfection and mention where they are suitable. (6)
- b) Explain various types of chlorination in water treatment? (8)
- c) Explain analysis of a water distribution system using Hardy Cross method. (6)
- 8 a) Discuss the purpose and methods of aeration in water treatment. (8)
- b) Explain any three common methods employed in desalination of water. (6)
- c) Explain equivalent pipe method in water distribution network design. (6)
- 9 a) Name the various types of water distribution systems. (4)
- b) Determine the distribution of flow in the pipe network shown in figure. The head loss  $h_L$ , may be assumed as  $KQ^2$ . The flow is turbulent and pipes are rough. The value of  $k$  for each pipe is indicated in the figure. Use Hardy-Cross method. (16)

