MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

THIRD SEMESTER B.TECH (CIVIL ENGINEERING)

END SEMESTER EXAMINATION, NOV-DEC 2023

WATER SUPPLY ENGINEERING (CIE 2125)

TIME: 3 HRS. **MAX. MARKS: 50**

Note: 1. Answer all questions.
2. Any missing data may be suitably assumed.

Q. NO	QUESTION	MARKS	CO	BL
1A	The average increase in population of a city over a period of 5 decades was 5200 and the average percentage increase was 10%. If the population at the end of 5th decade was 2,30,000, estimate the population for the next two decades by i) arithmetic increase method and ii) geometric increase method.	3	CO1	**3**
1B	Enumerate the different surface and subsurface sources of water and compare its availability and suitability.	3	CO1	**2**
1C	For a city of a population 1.3 lakh with average consumption of 180lpcd, find the following with respect to water distribution system: i) Maximum daily demand ii) fire demand (use National board of fire under writer's formula) iii) Maximum hourly demand iv) Coincident draft. Suggest for what capacity (MLD) the distribution system and pipe mains must be designed.	4	CO1	**3**
2A	Explain the significance and ill effects of the chlorides, and hardness of water.	3	CO2	**2**
2B	Explain the method of coliform test conducted using multiple tube fermentation technique.	3	CO2	**2**
2C	Design the dimensions of a rectangular sedimentation tank for 5.8 MLD of water with depth of tank 3.5m. It is recommended to effectively remove the particles of size larger than 0.025mm at 25°C having specific gravity 2.65. Assume width to length ratio of 1:3. Also, determine the detention time and flow velocity.	4	CO4	**3**
3A	Design 8 slow sand filter units for a town having population of 35000 with average demand of 130 LPCD. Assume maximum demand as 2 times average demand, length to width ratio 2:1, one filter unit as standby and rate of filtration as 160liters/hr/sqm.	3	CO4	**3**

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<tr><td>3B</td><td>Chlorine used in the treatment of 2.6 million litres of water per day. The chlorine dosage required for disinfection is 0.5 mg/l. Bleaching powder is used for chlorination which has 33% of available chlorine. Evaluate the amount of bleaching powder required annually for treatment and the chlorine demand if expected residual chlorine is 0.2 mg/l.</td><td>3</td><td>CO4</td><td>4</td></tr>
<tr><td>3C</td><td>Explain the grid iron system of water distribution system with neat sketch and mention its features, advantages, disadvantages, and suitability.</td><td>4</td><td>CO5</td><td>2</td></tr>
<tr><td>4A</td><td>Evaluate the balancing storage required in a distribution reservoir for a population of 60000 with average per capita demand of 200litres/day. Pumping into reservoir is done from 5am to 12noon and from 1 pm to 10pm.
<table>
<tr><td>Period of day in hrs</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td></tr>
<tr><td>% in average hourly flow expected</td><td>25</td><td>25</td><td>25</td><td>35</td><td>45</td><td>100</td><td>150</td><td>190</td><td>250</td><td>210</td><td>150</td><td>120</td></tr>
<tr><td>Period of day in hrs</td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td><td>21</td><td>22</td><td>23</td><td>24</td></tr>
<tr><td>% in average hourly flow expected</td><td>90</td><td>100</td><td>120</td><td>150</td><td>160</td><td>130</td><td>100</td><td>80</td><td>50</td><td>40</td><td>30</td><td>25</td></tr>
</table></td><td>5</td><td>CO5</td><td>4</td></tr>
<tr><td>4B</td><td>Explain the pressure conduits used for conveyance of water.</td><td>2</td><td>CO5</td><td>2</td></tr>
<tr><td>4C</td><td>Describe the electrodialysis method of desalination process. Also state its advantages and suitability.</td><td>3</td><td>CO3</td><td>2</td></tr>
<tr><td>5A</td><td>Explain any two methods of detecting leakages in pipes.</td><td>2</td><td>CO5</td><td>2</td></tr>
<tr><td>5B</td><td>Discuss the process, advantages and disadvantages of disinfection using potassium permanganate and ozone.</td><td>4</td><td>CO3</td><td>2</td></tr>
<tr><td>5C</td><td>Explain different types of mixing basins used for mixing the coagulants for sedimentation process.</td><td>4</td><td>CO3</td><td>2</td></tr>
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