<table>
<thead>
<tr>
<th><strong>PROGRAM</strong></th>
<th>NATIONAL DIPLOMA ENGINEERING CIVIL</th>
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<tbody>
<tr>
<td><strong>SUBJECT</strong></td>
<td>Water &amp; Wastewater Treatment 2B</td>
</tr>
<tr>
<td><strong>CODE</strong></td>
<td>CEW2B11</td>
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<tr>
<td><strong>DATE</strong></td>
<td>WINTER SSA EXAMINATION 2016 28 JULY 2016</td>
</tr>
<tr>
<td><strong>DURATION</strong></td>
<td>(SESSION 2) 11:30 - 14:30</td>
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<tr>
<td><strong>WEIGHT</strong></td>
<td>40 : 60</td>
</tr>
<tr>
<td><strong>TOTAL MARKS</strong></td>
<td>105</td>
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<tr>
<td><strong>FULL MARKS</strong></td>
<td>100</td>
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<tr>
<td><strong>EXAMINER</strong></td>
<td>MR LF SHIRLEY 80609822</td>
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<tr>
<td><strong>MODERATOR</strong></td>
<td>MR J DATELING 2254</td>
</tr>
<tr>
<td><strong>NUMBER OF PAGES</strong></td>
<td>4 PAGES</td>
</tr>
<tr>
<td><strong>INSTRUCTIONS</strong></td>
<td>ANY TYPE OF POCKET CALCULATOR PERMITTED.</td>
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<tr>
<td><strong>REQUIREMENTS</strong></td>
<td>NONE</td>
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HAND IN THE EXAMINATION PAPER WITH YOUR SCRIPT.
ANSWER ALL THE QUESTIONS.

**Question 1**

1.1 The term "water quality" is used to describe the ......?...... , ......?...... and ......?...... properties of water that determines its fitness for use.  

(3)

1.2 Name four human activities that typically cause problems for water quality.  

(4)

1.3 Name four general categories of substances of concern (types of contaminants) that must be removed from water during water treatment.  

(4)

1.4 Name four aspects that you will take into account when considering different treatment options to be employed once a water source has been identified for use.  

(4)

1.5 What do you understand by *acute health effects* related to poor water quality?  

(1)

1.6 Name two coagulants that are commonly used in water treatment.  

(2)

1.7 How can one tell whether water is properly disinfected and safe to drink?  

(2)

1.8 Name three places where samples of water for domestic use should be taken.  

(3)

1.9 Name five determinants which are general indicators of water quality.  

(5)

1.10 Why is it important that water for domestic use is chemically stable?  

(2)

1.11 Name two advantages of package water treatment plants.  

(2)

1.12 Name five substances which are commonly present in surface/ground water at concentrations which may lead to health problems.  

(5)

1.13 Name four water treatment processes which are generally considered to be advanced water treatment processes.  

(4)

1.14 Give an example of sensitive groups when it comes to the consumption of water.  

(1)

1.15 What does the softening of water by means of ion exchange involve?  

(1)

1.16 Name three typical (common) surface water quality problems in SA.  

(3)

1.17 Name three typical (common) groundwater quality problems in SA.  

(3)
1.18 What are the two main problems that could be encountered at a water treatment plant? (2)

1.19 Which act stipulates the safety regulations that must be adhered to at water treatment plants? (2)

1.20 What waste products are generated during conventional water treatment? (2)

[55]

**Question 2**

2.1 What do you understand by the pH of water? (1)

2.2 Give three reasons why the temperature of water is important as far as water quality is concerned. (3)

2.3 Where does most of the dissolved oxygen in surface water come from? (1)

2.4 What do you understand by Biochemical Oxygen Demand? (2)

2.5 Name two sources of nitrates in surface water. (2)

2.6 Are faecal coliform bacteria by themselves pathogenic? (1)

2.7 What do you understand by the turbidity of a water? (1)

2.8 What does NTU stand for? (2)

2.9 Give three reasons why high turbidity levels in natural streams are problematic. (3)

2.10 How can one get a rapid indication of the amount of dissolved salts in water? (2)

2.11 Why is alkalinity useful in water? (2)

[20]
Question 3

For a conventional water treatment plant having a throughput of 100M³ per day, calculate the following:

3.1 The required surface area of the sedimentation basins in m² if the loading on the sedimentation basins is 35 m³/m².d; (3)

3.2 If there will be six identical circular sedimentation basins, what should the diameter of each basin be? (3)

3.3 The required volume of the chlorine contact tanks in m³ if the retention time of the contact tanks is to be 30 minutes; (3)

3.4 If there will be two identical rectangular contact tanks of depth 5.0 m and length to width ratio of 2.5 to 1, what should the length and width of each tank be? (6)

[15]

Question 4

Prepare a neat schematic flow diagram of a typical conventional sewage treatment plant. Your diagram should reflect all the processes involved in a typical conventional sewage treatment plant. (15)

[Total = 105]

HAND IN THE EXAMINATION PAPER WITH YOUR SCRIPT.