PROGRAMME : BTECH: ENGINEERING: CIVIL
SUBJECT : CONCRETE TECHNOLOGY 4
CODE : TBJ421
DATE : SUMMER SSA EXAMINATION 2017
       9 JANUARY 2017
DURATION : (SESSION 1) 08:00 - 11:00
WEIGHT : 40:60
TOTAL MARKS : 100%

ASSESSOR : PROF SALIM RW
MODERATOR : DR WEKESA BW
NUMBER OF PAGES : 3 PAGES

INSTRUCTIONS : ONLY ONE CALCULATOR PER CANDIDATE MAY BE USED.
REQUIREMENTS : NONE.

INSTRUCTIONS TO STUDENTS
1. PLEASE ANSWER ALL SIX QUESTIONS

NOTE: SYMBOLS HAVE THEIR USUAL MEANING
QUESTION ONE [20 Marks]

You have been assigned to be a lead Technologist in a major infrastructure project for client ABC (Pty) Ltd. Your company CEO has requested that you write a brief to the client discussing the effect of cement type, admixture and sand quality on the CO$_2$e of concrete that will be used on the project.

QUESTION TWO [20 Marks]

Concrete is mainly composed of cement, water, fine aggregate and course aggregate. It may also occasionally contain cement extenders and admixtures. Explain briefly to the technical meeting of the project the role of each of the above components of concrete and how they interact among themselves.

QUESTION THREE [20 Marks]

Condensed Silica Fume is used in South Africa as a cement extender, discuss its suitability, advantages and disadvantages as a cement extender.

QUESTION FOUR [10 Marks]

(a) Describe the process of placing concrete under water. (5 Marks)

(b) Discuss the objectives of compacting concrete. (5 Marks)

QUESTION FIVE [10 Marks]

What is the difference between No Fines Concrete and Fibre Reinforced Concrete? Base your differentiation on definition, composition, manufacture, placing, curing and properties.
QUESTION SIX  

The results of grading analysis of two sands (with the same Particle Relative Density are follows:

<table>
<thead>
<tr>
<th>SABS Sieve size (mm)</th>
<th>Cumulative percentage passing sieve</th>
<th>SANS Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sand A</td>
<td>Sand B</td>
</tr>
<tr>
<td>4.75</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>2.36</td>
<td>90</td>
<td>100</td>
</tr>
<tr>
<td>1.18</td>
<td>72</td>
<td>84</td>
</tr>
<tr>
<td>0.60</td>
<td>46</td>
<td>60</td>
</tr>
<tr>
<td>0.30</td>
<td>10</td>
<td>40</td>
</tr>
<tr>
<td>0.15</td>
<td>7</td>
<td>19</td>
</tr>
<tr>
<td>0.075</td>
<td>2</td>
<td>12</td>
</tr>
</tbody>
</table>

(a) Calculate the Fineness Modulus of each sand. (4 Marks)

(b) In what ratio should sands A and B be combined for good cohesiveness of the fresh concrete. (12 Marks)

(c) Calculate the FM of the blend. (4 Marks)

Total Marks for the examination paper [100 Marks]