

**Advanced Environmental Systems Analysis**  
**Academic Year 2020-21**  
**September 8, 2021**  
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**POLITECNICO**  
MILANO 1863

## 1<sup>st</sup> Module

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

ID number: \_\_\_\_\_

Signature: \_\_\_\_\_

### **IMPORTANT**

- The duration of this part is **60 min.**
- Books, notes, handouts and any other material **cannot be** used.
- Use **only these sheets**, including back. Any additional submitted sheet will not be considered in the assessment.

## QUESTION 1

15/30

A town is located few kilometres from an industrial plant. The plant is on a flat terrain and emits  $\text{SO}_2$  to produce 30 units of energy. During the past winter, with an average wind speed of 3 m/s, the production cycle required 1 ton of fuel per unit of energy with an emission factor of 30 g/s per ton of fuel used. This resulted in an average ground level concentration of  $\text{SO}_2$  in the town equal to  $50 \mu\text{g m}^{-3}$ , well above the limit set by the local authority ( $20 \mu\text{g m}^{-3}$ ).

For the coming spring, the meteo situation is expected to remain similar except for the wind speed that will probably raise to 5 m/s. You are asked to determine a new fuel with a reduced sulphur emission and an efficiency of 1,2 ton per unit of energy, in order to bring the concentration down to the required limit value ( $20 \mu\text{g m}^{-3}$ ).

What is the value of the required sulphur reduction?

Is it possible that some other areas will still suffer from concentrations above the limit? Why?

**QUESTION 2**

7.5/30

Which changes do we expect in the BOD-DO balance of a river in summer condition, i.e., with temperatures higher than average?

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**QUESTION 3**

7.5/30

Which are the most relevant characteristics of the SWAT integrated model?

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