ORDRE DES INGÉNIEURS DU QUÉBEC

MAY 2021 SESSION

Any documentation permitted Calculators: authorized models only Exam duration: 3 hours

14-EC-3 – SUSTAINABILITY, ENGINEERING AND THE ENVIRONMENT

This exam consists of 4 independent questions.

1- Sustainable engineering: Principles for integrating the challenges of sustainable development in engineering (25%)

In order to fully play their role, engineers must take into account the challenges of sustainable development.

1-2) Name three (3) main principles of sustainable engineering (12%).

1-2) Illustrate your choices with tools that allow you to implement these principles (13%).

2- Several tools are available for companies aiming to adopt sustainable management practices. The BNQ 21000 approach (Standard and method) guides and equips companies in the gradual adoption of sustainable development practices (25%).

2-1) Present the BNQ 21000 approach: objectives, issues, stages of implementation ... (15%).

2-2) Present one (1) international standard with which the BNQ 21000 standard is consistent (10%).

3- Be inspired by nature to sustainably innovate in engineering: Biomimetic design (25%)

Biomimicry, but more specifically biomimetic design, is the use of nature-inspired design processes in order to innovate. The biomimetic design methodology is marked out by the ISO 18458: 2015 standard, which governs the stages of this approach, initially proposed by the biomimicry institute.

3-1) Describe biomimicry in a few lines: what it is, its origins, its use in engineering, the main principles found in sustainable ecosystems. (12%)

3-2) Describe the main steps, or the sequence to follow, for a biomimetic design process. (13%).

4- Environmental life cycle analysis (LCA) quantifies the impacts of products or services in order to help the engineer in an eco-design process (25%).

4-1) Describe in a few lines, what an LCA is, and its objectives (10%).

4-2) With precise terms, describe the main stages to perform an LCA. (15%).