ORDRE DES INGÉNIEURS DU QUÉBEC

MAY 2021 SESSION

Open-book examination Calculators : only authorized models Duration : 3 hours

14-EC-2 ENGINEERING IN SOCIETY, HEALTH AND SAFETY

Question 1. (10 marks)

a. In all aspects of his work, the engineer must respect his obligations towards man and take into account the consequences of the performance of his work on the environment and on the life, health and property of every person. Why is this important? (2 marks)

b. An engineer may not cease to act for the account of a client unless he has just and reasonable grounds for so doing. What are these just and reasonable grounds? (2 marks)

c. An engineer must safeguard his professional independence at all times and avoid any situation which would put him in conflict of interest. Give two examples of such situations. (2 marks)

d. An engineer must charge and accept fair and reasonable fees. What constitutes fair and reasonable fees? (2 marks)

e. What are considered derogatory acts to the dignity of the profession? (2 marks)

Question 2. (10 marks)

Plastic injection presses are used for manufacturing plastic products. The *Commission des normes, de l'équité, de la santé et la sécurité du travail* (CNESST) described in a guide how to analyze risk using four factors namely: (i) hazards, (ii) hazardous situations, (iii) hazardous events and (iv) possible harm. An example of electrical hazard in the injection molding machine is described in Table 1.

Table 1: Electrical risk for the injection molding machine

Tasks	**Hazard**	**Hazardous situation**	**Hazardous event**	**Possible harm**
Operation	Electric – electrical panel of machine	Worker in proximity of live electrical parts during operation	Worker unintentionally in contact with live electrical parts	Electrocution, electric shock
Maintenance	Electric – electrical panel of machine	Worker in proximity of live electrical parts during maintenance	Worker unintentionally in contact with live electrical parts	Electrocution, electric shock

A **snow blower** operates using gasoline and is used for removing and blowing snow. This machinery has several types of hazards. Identify the **tasks, hazards, hazardous situations, hazardous events and possible harm** associated with these hazards for the various tasks which are described. **It is important to identify the most relevant ones, to include operation and maintenance tasks and to identify different hazards. You can make assumptions.** (10 marks)

Tasks	**Hazards**	**Hazardous situations**	**Hazardous events**	**Possible harm**

Question 3 (10 marks)

a. Give an example of a confined space. (2 marks)
b. What are the main risks associated with interventions related to confined space? Describe the interventions and the risks (4 marks)
c. How can the risks associated with the confined space be reduced? (4 marks)

Question 4 (10 marks)

a. Explain what is the hierarchy of risk reduction measures, also known as the hierarchy of controls, in machine safety? (2 marks)
b. Give an example of risk reduction based on the hierarchy of risk reduction measures in machine safety. (2 marks)
c. Risk assessment in machine safety can be subjective. Explain how this subjectivity can be reduced? (2 marks)
d. Explain why risk reduction measures in machine safety are sometimes bypassed or neutralized? (2 marks)
e. How can we prevent the bypass of risk reduction measures in machine safety? (2 marks)