ORDRE DES INGÉNIEURS DU QUÉBEC

NOVEMBER 2020 SESSION

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

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

Question 1 (10 marks)

Indicate whether the following statements are TRUE or FALSE.

a. An engineer is a manager in a factory. His employer is his client.
b. An engineer who is a manager in a factory is responsible if the machines under his responsibility are hazardous.
c. An engineer can prevent his client from seeking advice from another engineer.
d. Before accepting a mandate, the engineer must take into account the limits of his knowledge and skills as well as the means available to him to execute it.
e. If the opinion of an engineer is ignored when he is responsible for the technical quality of engineering work, the engineer must clearly indicate to his client the consequences that may result therefrom. He can do it verbally.
f. An engineer can pay or undertake to pay, directly or indirectly, any benefit, rebate or commission in order to obtain a contract or upon carrying out engineering work.
g. An engineer does not need to show reasonable availability and diligence in the practice of his profession.
h. Before ceasing to offer his professional services to a client, the engineer must notify his client in advance within a reasonable time.
i. An engineer must affix his seal and signature on the original and the copies of every engineering plan and specification prepared by himself or prepared under his immediate supervision by persons who are not members of the Order.
j. An engineer must respect the secrecy of all confidential information obtained in the practice of his profession.

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 **lawn mower** operating using gasoline and used for cutting grass has several types of risks. Identify the **tasks, hazards, hazardous situations, hazardous events and harm** associated with these hazards for the various tasks which are described. **It is important to identify the most relevant ones.** (5 marks)

Tasks	**Hazards**	**Hazardous situations**	**Hazardous events**	**Possible arm**

Complete the table by explaining for each task how the risks are reduced based on the hierarchy of risk reduction methods. (5 marks)

Question 3 (10 marks)

a. Give an example of a confined space. (2 marks)
b. What are the main risks associated with interventions into the 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 risk. (2 marks)
b. Risk estimation tools are made up of which variables? (4 marks)
c. Why are there several risk estimation tools? (4 marks)