The following 15 questions are divided in two parts. In the first part, questions 1 to 10 are worth ½ point. Write a short answer (max 5 lines) for each of them. The second part is specific to your project. Questions 11 to 15 are worth 1 point. Write a detailed answer (5-10 lines) for each question.

Part I.

1. Assuming that you have a numerical model to predict the volume of a muscle exceeding damaging strain, what is the first obvious verification of your model?
2. When and why the small strain theory should be avoided?
3. Assuming that arterial blood is a pulsatile Poiseuille flow, how would you set the boundary condition of the inlet?
4. For the model of the previous question, what are the other boundary conditions, and what should be the initial conditions?
5. Why a two-way coupling would be required to analyze the dynamical mechanical behavior of an artificial heart valve?
6. What is the way to model numerically an experimental nominal stress-strain curve of a menisci cylindrical sample? What is the advantage of imposing Dirichlet conditions only?
7. How a partial differential equation (strong form) is transformed into an integral (weak) form, and then into the discretized (matrix) form used in the finite element method?
8. In a numerical model predicting the concentration of proteins released by cells in a micro-fluidic chamber, describe all multi-physics couplings.
9. Why Euler implicit can be preferred over Euler explicit to solve initial value ordinary differential equations?
10. How would you decide which hyperelastic model to use when a soft tissue deforms in a non-linear way?

Part II.

11. Explain the relevance of your project (for health care, or another domain). What could be practically improved by your study?
12. Explain the research question of your project. What was your answer, or why could you not answer?
13. Explain and justify how your model choices (physics and numerical technics) are related to your research question.
14. Explain your strategy to verify your model, and propose an experiment to validate your model.
15. Comment the limitations of your model, and their effects on the results and conclusions.