Q1 – [10 points] Logic programming in prolog

Five students (s1, s2, s3, s4, s5) of CS program at Habib University have to choose a course to be taken in next semester. Here are some constraints and preferences for course selection:

- To register in a course, students are required to cover all of its pre-requisites.
- Obviously, students will not take a course if they have already done it.
- s3 hates Dr. Saleha and does not want to take any of her course.
- s4 is a big fan of Dr. Waqar and wants to be in one of his course
- s1 and s5 loves getting hands-on and wants to be in a course that has labs,
- However, s2 does not want to take a lab based course.
- Each course has just one seat left.

Note: You need to install SWI-Prolog to do this assignment. Some facts are given in the attached prolog file. You need to add your rules in the file and run queries.

Q2 – [10 points] Making decisions under uncertainty using Bayesian Networks

In this question, you will construct a Bayesian network using a popular tool named GeNie (built by University of Pittsburg). You have to perform the following steps:

- Download and install the academic version of GeNie. The setup is available at: https://download.bayesfusion.com/files.html?category=Academia
- Identify a real-world scenario where probabilistic inference is applicable. Write a detailed description of the scenario that highlights uncertainties and causal relationships. You may want to take help from a domain expert (say a doctor, an economist, an electrician etc).
- Model the scenario in the form of a Bayesian network. The structure and probabilities of Bayesian network should be carefully specified so that they make sense during inferences.
- What type of inferences are likely to be performed in this scenario? Identify at least four question/inferences that you would like to make from this Bayesian network.

GeNie produces a .xdsl file which will be saved and submitted on LMS.

Your model will be assessed based on following criteria:

- Is the scenario clearly described?
- Is the scenario novel/non-trivial?
- Are nodes of the model and their relationships correctly identified?

- Are probabilities intuitive?
- Are valid questions being asked from the model? Is the model capable to answer them?