Two hours - on line

The exam will be taken on line.
This is the paper format, which will be available as a backup.

QUESTION PAPER MUST NOT BE REMOVED FROM THE EXAM ROOM

UNIVERSITY OF MANCHESTER
SCHOOL OF COMPUTER SCIENCE

Ontology Engineering for the Semantic Web

Date: Friday 16th January 2015
Time: 14:00 - 16:00

Please answer ALL Questions provided.

The exam contains MULTIPLE CHOICE, TRUE/FALSE and SHORT ESSAY QUESTIONS.
Be sure to answer ALL Questions.

Please note that wrong answers on MULTIPLE CHOICE and TRUE/FALSE questions may be penalized (i.e. receive some small negative mark) so random guessing works against you.

This is a CLOSED book examination
The use of electronic calculators is NOT permitted
Q1 – Q18 Multiple Choice Questions and are therefore restricted
19. Linked Data has four "principles".

(a) Use URIs as names for things.
(b) Use HTTP URIs so that people can look up those names.
(c) When someone looks up a URI, provide useful information, using standards (e.g. RDF, SPARQL).
(d) Include links to other URIs, so that they can discover more things.

If a data source follows principles a), b) and d) but ignores c) by returning data in non-standard forms, can it still play a part in the Linked Data Web? Answer in 4-5 sentences.

(5 marks)

20. Sketch out a design for an application that checks the profile (e.g. OWL QL, OWL EL etc) of an ontology. Identify the key features of the OWL API that you would use in doing so. Would reasoning play any role in such an application? Answer in 4-5 sentences.

(5 marks)

21. What is the key difference between the broader/narrower hierarchies found in a SKOS vocabulary and the subsumption hierarchies of an OWL ontology? In your answer make reference to how SKOS hierarchies might be used in applications. Answer in 3-4 sentences.

(4 marks)

22. SKOS is defined as an OWL ontology. Why is this of benefit? What problems might be introduced due to this? Answer in 2-3 sentences.

(2 marks)

23. Consider the following:

A Fault in the Fan which is part of a Computer is necessarily a Fault in the Computer

What design pattern might we use to capture this kind of reasoning in a language that does not support transitivity or property chains? Sketch out the classes that you would need to describe the situation above. Answer in 4-5 sentences.

(5 marks)
24. An ontologist wishes to model the classes in the following text using the PIMPS upper-level ontology. For each of the highlighted classes, state which PIMPS class they belong to.

A school boy is punished for running fast down a dark corridor. His punishment is to write out by hand 100 times the line 'I must not run in the corridor'.

(5 marks)

25. Write a closure axiom for the property r1 in the following class description:

Class: A
SubClassOf: r1 some c1 and
   r1 some C2 and
   r1 some C3 and
   r2 some C4

(3 marks)

26. Read the following scenario:

A plant grows from a seed in a process known as germination. Plants can be very small, but also grow to a great size. The seed itself is formed after fertilisation of a flower by an insect such as a bee. Flowers themselves come in many colours and their petals can have many different shapes. Flowers have great variety in the number of petals and in the arrangement of their petals. Many plants have flowers - trees, grasses, as well as the ones we usually think of as flowering plants, e.g., garden flowers and vegetables.

Using the normalisation approach to writing an ontology, which major dimensions of classification would you use when modelling this scenario? Give the root classes you would use for each of the dimensions.

(5 marks)

27. Read the description below:

Sugar beet is a plant widely used in industry. A company that processes sugar beet wants a sugar beet ontology to help manage the company’s corporate knowledge.

All sugar beet take part in processes that separate them into many types of product stream. Each product stream contains many types of chemical, which themselves take part in many refinement processes, ultimately leading to refined chemicals.

Using Manchester OWL Syntax write the axiom(s) for the Sugar beet class of the ontology.

(2 marks)