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Final Exam

Department: Computer science

Course Title: Selected Topics
Course Code: SNIT462
Semester: Second
Instructor: Prof. Abeer ElKorany
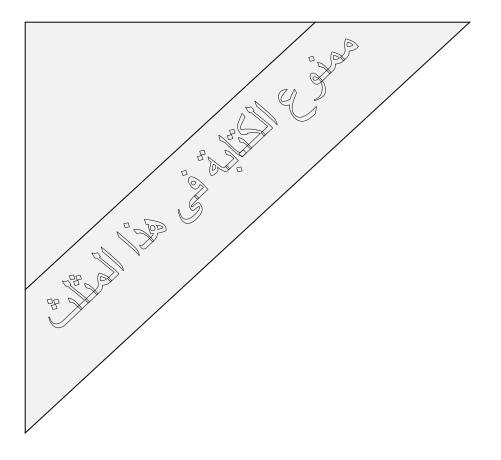**Date: 11-5-2019**
Exam Duration: 2 Hours

60

Question	Mark	Signature
One		
Two		
Three		
Four		
Five		
Six		
Seven		
Eight		
Nine		
Ten		
Total Marks		

Total Marks in Writing: _____

Question 1 [20 marks]
  A. Complete the following statements.   **(10 Marks)**

1. There are two kinds of relationships between classes in semantic net ……**Is-A**……… And **AKO => A Kind Of**

2. An …**owl:Thing**…. class that refers to the same concept in real world.

3. For the following RDF statement "BinElkasrin has-auther Nagib Mahfoz". The type of nagib Mahfoz is 'Person' and the type of BinElkasrin is a `Novel `

   a. Domain of the property 'has-auther ' is: …**Novel**….
   b. Range of the property 'has-auther ' is: …**Person**…

4. Any RDF statement could be represented in three ways: …**Code**….., …**Pedicate**.., …**Graph**……

5. …**Ontology**….. apply the open world assumption approach

6. …**Namespace**.. primitive is used by RDF to identify where predicates are defined.

b) State True/False (Explain in case of false) *[10 Marks]*
   1. A node is used to represent only classes in semantic net

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EXAM IS ONLY 7 PAGES   1

2. In RDF graph , a blank node is a node that represents a specific resource for which a URI or literal is give

3. RDF was introduced to allow defining vocabulary and class hierarchies.

4. In Frame knowledge representation, a slot is allowed to contain procedures.

5. Optional is a solution modifier used in SPARQL to specify the maximum number of rows that should be returned.

6. One of the main disadvantage of semantic net is that Inheritance particularly from multiple sources

7. Disjoint Classes in ontology could have common instances

.
8. RDF graph must be directed
   True

9. A functional property is a property that can have single value for each individual

10. In SPARQL ASK is used to check if there is at least one result for a given query pattern and if the result is true or false

Question 2 [4marks]

a) One of the main advantages of OWL is that it has the ability to provide different restrictions on the value of property, state those restrictions, with analogy to predicate logic and give example of each

Question3(8 Marks)

Given the following ontology that represent the university class

```
<rdf:RDF
          xmlns:rdf=http://www.w3.org/1999/02/22-rdf-syntax-nsl#
          xmlns:rdfs=http://www.w3.org/2000/01/rdf-schema#
          xmlns:owl=http://www.w3.org/2002/07/owl#
          <owl:Ontology rdf:about="University Courses"/>
<owl:Class rdf:ID="course">
<rdfs:comment>Courses form a class.</rdfs:comment>
</owl:Class>
<owl:Class rdf:ID="laboratoryCourse">
<rdfs:comment>Laboratory course is a type of course.</rdfs:comment>
<rdfs:subClassOf rdf:resource="#course"/>
</owl:Class>
</owl:Class>
<owl:Class rdf:ID="teacher">
<rdfs:comment>Teachers form a class.</rdfs:comment>
</owl:Class>
<owl:Class rdf:ID="assistant">
<rdfs:comment>Assistants are those teachers that teach laboratory courses.</rdfs:comment>
<owl:Class rdf:ID="professor">
<rdfs:comment>Professors are those teachers that teach courses.</rdfs:comment>
</rdf:RDF>
```

It is required to add appropriate owl code to represent the following:

1. Professors teach at least one course
2. Assistants only teach laboratory courses.
3. A course may be taught by more than one professor

Question4(8 Marks)

Consider the following OWL ontology that describes a customer bank:

```
<rdf:RDF xmlns:owl ="http://www.w3.org/2002/07/owl#"
 xmlns:rdf ="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
 xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#">
<owl:Class rdf:ID="A" />
<owl:Class rdf:ID="B" /> <rdfs:subClassOf rdf:resource="#A" />  </owl:Class>
<owl:ObjectProperty rdf:ID="C" />
<owl:ObjectProperty rdf:ID="D"> <rdfs:subPropertyOf rdf:resource="#C" />
</owl:ObjectProperty>
<owl:DatatypeProperty rdf:ID="E" />
<owl:ObjectProperty rdf:ID="#C ">
  <rdf:type rdf:resource="&owl;FunctionalProperty"/>
</owl:ObjectProperty>
<owl:Class rdf:about="#B">
      <equivalentClass
          rdf:resource="#F"/>
      </owl:Class> <owl:Restriction>
owl:onProperty rdf:resource="#C "/>
<owl:minCardinality rdf:datatype="&xsd;nonNegativeInteger"> 1</owl:minCardinality>
 </owl:Restriction>
 </owl:equivalentClass>
</owl:Class>
</rdf:RDF>
```

1)   Identify which of the following identifiers could be used to replace **A,B,C,D, E,F** respectively that are used by the above ontology to make it more descriptive of bank customer account and then draw the ontology graphically.

Person, Customer, approved-loan ,has-account, interest-value, Client

2)   Add necessary primitive to the ontology graph (if needed) and represent domain and range of each object property.

Question5(10 Marks)
Read the following data and answer the questions based on this data:
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX owl: <http://www.w3.org/2002/07/owl#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX ex: <http://www.semanticweb.org//ontologies/book_ontology#>

ex:book1	ex:hasTitle	"Lord of the Rings".
ex:book1	ex:writtenBy	ex:JRRTolkien.
ex:book1	ex:publishedInYear	"1954".
ex:book1	ex:originalLanguage	ex:English.
ex:book1	ex:hasGenre	ex:Fantasy.
ex:book1	ex:hasISBN	ex: "abc567"
ex:book2	ex:hasTitle	"Brida".
ex:book2	ex:writtenBy	ex:PauloCoelho.
ex:book2	ex:publishedInYear	"1990".
ex:book2	ex:originalLanguage	ex:Portugese.
ex:book2	ex:hasGenre	ex:Novel.
ex:book2	ex:hasISBN	ex: "abc123"
ex:book2	ex:hasTitle	" The Valkyries".
ex:book2	ex:writtenBy	ex:PauloCoelho.
ex:book2	ex:publishedInYear	"1992".
ex:book2	ex:originalLanguage	ex:Portugese.
ex:book2	ex:hasGenre	ex:Novel.
ex:book2	ex:hasISBN	ex: "abc235"
ex:book3	ex:hasTitle	"Harry Potter and the Prisoner of Azkaban".
ex:book3	ex:writtenBy	"ex: J. K. Rowling"
ex:book3	ex:publishedInYear	"1999".
ex:book3	ex:originalLanguage	ex:English.
ex:JRRTolkien	ex:hasNationality	ex:British.
ex:JRRTolkien	ex:hasNationality	ex:British.
ex:PauloCoelho	ex:hasNationality	ex:Brazilian.

Write appropriate Queries that could do the following
1. Retrieve all books and their ISBN

2. Retrieve all books that are written by PauloCoelho during period from 1990 till 2000

3. Retrieve all books that are written by an English author

Question6(10 Marks)
Model the following ontology using graph and model appropriate restriction using OWL
• Herbivores, Carnivores, and Omnivores are animals
• People are omnivores
• People have names of type "string"
• Vegetarians are people who are herbivores
• "eats" is a property of animals and the values of the property must be of the type "food"
• Meat and Veggies are types of food
You must identify the following:
         i. Classes, subclasses and their restriction
        ii. Property types and restriction