Reg. No.											

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

VII SEMESTER B.TECH. (INFORMATION TECHNOLOGY/COMPUTER AND COMMUNICATION ENGINEERING) MAKE-UP EXAMINATIONS, JANUARY 2019

SUBJECT: PROGRAM ELECTIVE VI - SEMANTIC WEB [ICT 4008]

REVISED CREDIT SYSTEM

(02/01/2019)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer ALL the questions.
- Missing data if any, may be suitably assumed.

1A. Write the following RDF/XML triples using Turtle syntax: **5**

```
<?xml version="1.0" encoding="utf-8" ?>
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
xmlns:ns0="http://dbpedia.org/ontology/">
 <rdf:Description rdf:about="http://dbpedia.org/resource/Tom_Hanks">
  <ns0:birthDate
rdf:datatype="http://www.w3.org/2001/XMLSchema#date">1956-07-
09</ns0:birthDate>
  <ns0:residence rdf:resource="http://dbpedia.org/resource/California"/>
 </rdf:Description>
</rdf:RDF>
```

1B. Show how the semantics of the following RDF and RDFS primitives can be represented using axiomatic semantics. **3**

i. Classes
ii. The type Property
iii. Reified Statements

1C. Describe the fundamental concepts of RDF. **2**

2A. Give an OWL-ontology that describes the following: **5**
There are courses and laboratory courses. Homeworks are part of courses. Courses are organized by teachers. Teachers are either professors or assistants. Professors teach courses while assistants only teach laboratory courses.

2B. Explain labelled theories in Go! language. Also, describe how do you create class instances in Go!. **3**

2C. Consider the following RDF data given below. **2**

```
@prefix ex: <http://example.org/> .
ex:Alice ex:email "alice@example.org" .
ex:Alice ex:email "a_miller@example.org" .
ex:Alice ex:phone "123456789" .
ex:Alice ex:phone "987654321" .
```

Write the outputs for the following SPARQL queries.

i.
```
PREFIX ex: <http://example.org/>
SELECT *
WHERE { ?person ex:email ?email .
?person ex:phone ?phone . }
```

ii.
```
PREFIX ex: <http://example.org/>
ASK { ?person ex:email ?email .
?person ex:phone ?phone . }
```

3A. What are Class Axioms on Properties of OWL 2? Explain the Class Axioms on following Properties. **5**

i. Enumerations
ii. Complement class
iii. Union
iv. Disjoint Classes

3B. What are assertions in OWL 2? Explain any two identity assertions of OWL 2. **3**

3C. In OWL, logical constructors are used to create complex class descriptions from atomic classes. What can be asserted from the following description? **2**

```
:Guitar a owl:Class ;
 owl:equivalentClass [
  owl:unionOf ( :Acoustic
                :Electric
                :Air )
 ].
```

4A. Consider the following RDF document with information about celestial bodies. **5**

```
@prefix ex: <http://example.org/> .
ex:Sun ex:radius "1.392e6"^^xsd:double ;
ex:satellite ex:Mercury, ex:Venus, ex:Earth, ex:Mars .
ex:Mercury ex:radius "2439.7"^^xsd:double .
ex:Venus ex:radius "6051.9"^^xsd:double .
ex:Earth ex:radius "6372.8"^^xsd:double ;
ex:satellite ex:Moon .
ex:Mars ex:radius "3402.5"^^xsd:double ;
ex:satellite ex:Phobos, ex:Deimos .
ex:Moon ex:name "Mond@de", "Moon@en" ;
ex:radius "1737.1"^^xsd:double .
ex:Phobos ex:name "Phobos" .
ex:Deimos ex:name "Deimos" .
```

Specify SPARQL queries which yield the following results in the form of a table.

i. Total number of triples contained in the dataset.
ii. Objects which orbit around the sun or around a satellite of the sun.
iii. Objects with a radius greater than 4000 together with the object if it exists, of which they are a satellite.
iv. All properties that are used in the triples.

4B. Describe the functions available in SPARQL to organize results sets. **3**

4C. How do the machine learning techniques support tasks in semi-automatic ontology acquisition? **2**

5A. Answer the following:

i. Represent the following given in OWL 2 RL using OWL Turtle syntax. **5**

$P(X, Y), P(Y,Z) \rightarrow P(X,Z)$

ii. Represent the following given in OWL 2 RL using SPIN.

$C1(X) \rightarrow D(X)$

$C2(X) \rightarrow D(X)$

iii. Write the statement "*Well tested software is reliable*" in predicate logic.

5B. Represent the following rule in Rule ML.

$brother(X, Y), childOf(Z, Y) \rightarrow uncle(X,Z)$ **3**

5C. What do you mean by Ontology Mapping? Distinguish between various methods of Ontology Mapping. **2**