MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL
(A constituent unit of MAHE, Manipal)

VII SEMESTER B.TECH. (INFORMATION TECHNOLOGY/COMPUTER AND COMMUNICATION ENGINEERING) END SEMESTER EXAMINATIONS, DECEMBER 2018

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

REVISED CREDIT SYSTEM

(01/12/2018)

Time: 3 Hours   MAX. MARKS: 50

Instructions to Candidates:

❖ Answer **ALL** the questions.

❖ Missing data if any, may be suitably assumed.

1A. With suitable examples, discuss the two mechanisms defined in RDF which enables to point to particular statements or parts of the graph. **5**

1B. Here are the 8 triples of an RDF graph G about writers and their works: **3**
(all identifiers correspond in fact to URIs, _:b is a blank node):

(d:Poe; o:wrote; d:TheGoldBug)   (d:Baudelaire; o:translated; d:TheGoldBug)
(d:Poe; o:wrote; d:TheRaven)   (d:Mallarm´e; o:translated; d:TheRaven)
(d:TheRaven; rdf:type; o:Poem)   (d:Mallarm´e; o:wrote; _:b)
(_:b; rdf:type; o:Poem)   (d:TheGoldBug; rdf:type; o:Novel)

i. Draw an RDF graph corresponding to these statements.
ii. Express in English the meaning of these statements.

1C. Discuss the following modelling primitives of RDFS. **2**
   i.   Core properties for defining relationships.
   ii. Core properties for restricting properties.

2A. With a neat diagram, explain the Semantic Web knowledge management architecture. **5**

2B. Fig.Q.2B shows an RDF graph representing some interactions between genes within the early development of drosophila embryo. Write the RDF triples of the graph. **3**
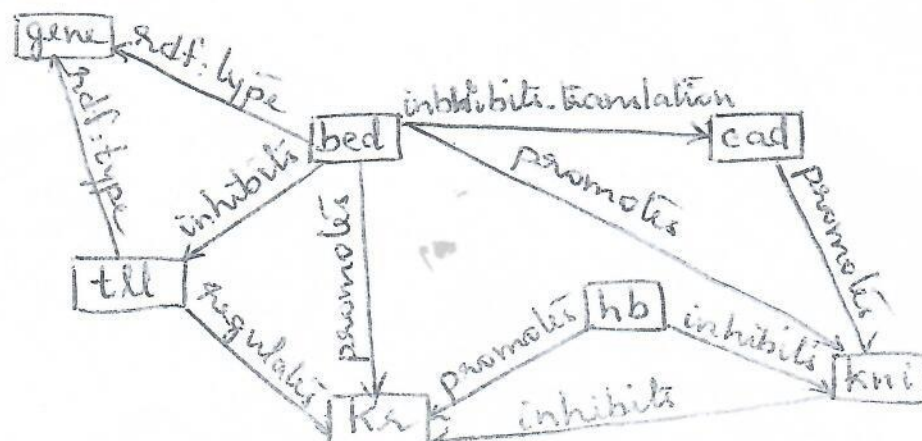

Fig. Q.2B

2C. What does the following SPARQL query return?   2
SELECT ?name
WHERE {
?person ex:liveIn ex:France .
?person foaf:name ?name .
}
ORDER BY ?name ASC
LIMIT 10
OFFSET 5

3A. Given the following SPARQL query: 5
SELECT ?t
PREFIX
foaf: http://xmlns.com/foaf/0.1/
m: http://mydomain.com/myExample#
dc: http://purl.org/dc/elements/1.1/
rdf: http://www.w3.org/1999/02/22-rdf-syntax-ns#
WHERE {
?x foaf:name "Albert".
?x ?r ?l.
?r rdf:type rdf:Property.
?l rdf:type m:Roman.
?l dc:title ?t.
}
i.   What is the informal meaning of this query?
ii.   Draw the RDF graph corresponding to the graph patterns of the query.
iii.   What must be added to this query for returning the year of publication of the
        m:Roman if it is available?

3B. The following query: 3
SELECT ?z ?y ?k
WHERE {
{ ?x ex:hasDaughter ?y . } UNION { ?x ex:hasSon ?y . }
AND { ?x ex:hasSon ?z . } UNION { ?x ex:hasDaughter ?z . }
AND { ?w ex:hasChild ?z . ?v ex:hasChild ?y . }
FILTER { ?w != ?v && ?v != ?x && ?x != ?w }
OPTIONAL { ?x foaf:lastname ?k . }
}
is to be evaluated on:
ex:Peter foaf:lastname "MacCartney" .
ex:Peter ex:hasDaughter ex:Mary . ex:Shirley ex:hasChild ex:Mary .
ex:Peter ex:asSon ex:Paul . ex:Kate ex:hasChild ex:Paul .
ex:Peter ex:hasDaughter ex:Julia. ex:Kate ex:hasDaughter ex:Julia .
i.   What are the tuples returned by the query?
ii. What are the additional tuples returned if used with the query type:
            CONSTRUCT { ?z ex:hasHalfSibling ?y . }

3C. Write a query to search in the network of Figure Q.2B, a gene ?x which inhibits a   2
product that regulates a product that ?x promotes, and returns these three entities:

4A. What are property axioms in OWL 2? Explain the following property axioms with examples. **5**

    i. Domain and Range   ii. Equivalent

    iii. Inverse   iv. Disjoint

4B. Represent the following Object Property in OWL. **3**

    i.   an ancestor such as

        If person A is an ancestor of person B and B of C then A is also an ancestor of C.

    ii.   akin such as

        If a Person A is akin to a Person B then B is also akin to A.

4C. Represent the following in OWL. **2**

The set of parents that only have daughters (female children).

5A. Consider the text below. Identify the predicates and list the defeasible rules. **5**

Carlos is looking for an apartment of at least 45 sq m with at least two bedrooms. If it is on the third floor or higher, the house must have an elevator. Also, pet animals must be allowed. Carlos is willing to pay $300 for a centrally located 45 sq m apartment, and $250 for a similar apartment in the suburbs. In addition, he is willing to pay an extra $5 per square meter for a larger apartment, and $2 per square meter for a garden.

He is unable to pay more than $400 in total. If given the choice, he would go for the cheapest option. His second priority is the presence of a garden; his lowest priority is additional space.

5B. Explain the following Go! Constructs with examples. **3**

    i.   Functions

    ii.   Relations

    iii.   Actions

5C. What are the results of the following queries. **2**

    i. ASK

```
        WHERE { ?person foaf:name "Faisal" .
            ?person ex:hasChild ?child .
            }
```

    ii. CONSTRUCT { ?son1 ex:brother ?son2 .}

```
            WHERE {
                ?son1 ex:sonOf ?person .
                ?son2 ex:sonOf ?person .
            FILTER ( ?son1 != ?son2 ) .
            }
```