Coláiste na Tríonóide, Baile Átha Cliath
Trinity College Dublin
Ollscoil Átha Cliath | The University of Dublin

Faculty of Engineering, Mathematics and Science

School of Computer Science & Statistics

Engineering **Semester 2 2021**
Senior Sophister

CSU44D02/CS4D2b – Knowledge Engineering

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Instructions to Candidates:

Attempt **both** questions. Both questions carry equal marks. Each question is scored out of a total of 50 marks.

Please pay attention to the following:

- The deadline for submission is the 26th May 2021 at 11:59pm (Irish Time).
- This is an individual assignment. Text similarity will be assessed via TurnItIn. Please include a declaration of individual work (template available on Blackboard) as part of your submission.
- Please use a 12pt font (Calibri, Helvetica or similar) and 1.5 line spacing in your submission.
- Please upload your submission as a single file in PDF format via Blackboard.
- The combined effort to complete both questions should take no more than 7 hours.
- Please observe word limits (where applicable) as excess words will incur a penalty.
- If you use external sources in completing these assessments, please reference them appropriately.

Q1 (No word limit)

(a) Develop a DTD to describe a new XML vocabulary of your choosing, e.g. a music collection with artists and albums (but please choose a different example). The DTD should specify both elements and attributes. Element nesting and cardinality of some elements should also be included. Use as many features of DTD as you deem appropriate.

[5 Marks]

(b) Create a XSD version of the DTD from part (a). Feel free to augment the vocabulary by leveraging some of the advanced features of XSD. Illustrate how leveraging these features has enabled more rigorous validation of XML documents.

[10 Marks]

(c) Create two example XML documents that are valid against your XSD. Give four supplementary partial examples of how your XSD would catch invalid pieces of XML documents.

[10 Marks]

(d) Demonstrate, using four XPATH expressions on one of your XML documents, different features of the XPATH specification.

[10 Marks]

(e) Create an XSLT that will transform documents that correspond to your XSD into HTML. Provide a step-by-step illustration of how this XSLT could be used to process one of your example XML documents.

[10 Marks]

(f) Discuss how, with partial examples, XSLT may be used to transform documents that correspond to your XSD into RDF or RDFS.

[5 Marks]

Q2 (2000 word limit)

Web search, using tools such as Google and Bing, has been the dominant means of discovering information online, but semantic-based approaches are becoming increasingly important in making sense of such information. Discuss this statement in reference to the emergence of the Semantic Web and its evolving interaction with web search. What are the current technical limitations of how the Semantic Web is realised that restrict semantic-based approaches? In your opinion how will these technologies (and related ideologies) impact how we discover, access and interact with content online over the next 10 years.

[50 Marks]