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***CSX430 Semantic Web***

**L-T-P-Cr: 3-0-0-3**

**Pre-requisites:** Object oriented programming, Web technology

**Course/Overviews:**

* To impart knowledge of fundamental of evolution of web.
* To make students proficient in XML syntax and semantics.
* To impart the ability to design and implement Semantic Web Technology.
* To make students understand existing work done using concepts of Semantic web Technology

**Course Outcomes:**

At the end of the course, a student should:

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| **Sl. No** | **Outcome** | **Mapping to PO** |
|  | Recall basic concepts of web, Internet and Evolution of Web | PO2, PO3  |
|  | Explain XML fundamentals such as: DTD,XSD, XSLT,XQuery | PO2, PO3 |
|  | Describe Ontology, Types of Ontology and various relationships that can be represented by Ontology | PO2, PO3,PO4 |
|  | Relate the importance of rules in Ontology | PO2, PO3 |
|  | Experiment with Ontology Rules and SPARQL using Protege.  | PO2,PO3, PO4 PO6, PO12 |

**UNIT I: Lectures: 10**

**Introduction to the Semantic Web:** General overview of the semantic web with special emphasis on ontologies and resource annotation (documents, texts, web pages, web services, DBs, etc). Description of the types of problems this technology can be applied to. From today’s web to semantic web

**Structured Web Document:** XML Language, Structuring, Namespaces, Addressing and querying the XML documents, Processing.

**UNIT II: Lectures: 10**

**Describing Web Resources:** RDF Basic Idea, XML based syntax, RDF Schema, Semantics for RDF and RDF schema, Direct interface between RDF and RDFS, Querying in SPARQL.

**UNIT III : Lectures: 10**

**Web Ontology Language:** Definition, scope, types of ontologies, ontology repositories, OWL and RDF/RDFS, Three sublanguages of OWL, Description of OWL language, Layering of OWL, OWL in OWL, Tools used in building and storing ontologies (Sesame, Jena, Protégé, NeOn toolkit) as well as in ontology reasoning (RACER). Life cycles and development methodologies used in building ontologies from scratch. Ontology networks used in building ontologies through collaborative work. . Methods, techniques and tools used to carry out alignments and mappings between ontologies and other resources, Case Study using Protégé.

 **UNIT IV: Lectures: 12**

**Logic and Interface:** Rules & Applications: Monotonic Rules: Family relationship, Monotonic rule: syntax & Semantic, Description language program, Semantic web rules language (SWRL), Nonmonotonic rules, RuleMarkup Language (RuleML), Case Study Using Protégé.

**The Semantic Web:** Methods, techniques and tools used in (semi)-automatic annotation of texts and multimedia documentation. Procedures and methods to turn content information from databases into semantic contents usable in the semantic web. Accessing data bases in terms of semantic contents. Architectures and languages used in creating semantic web services (WSMO, OWL-S). Applications using semantic web technologies (e-commerce, e-learning, web services, knowledge management, semantic portals, etc.).

**Text / Reference Books:**

1. A Semantic Web Primer by Grigoris Antoniou and Frank van Harmelen, PHI
2. The Semantic Web: A Guide to the Future of XML, Web Services, and Knowledge Management by Michael C. Daconta, Leo J. Obrs, Kevin T. Smith, Wiley
3. Foundations of Semantic Web Technologies, by Pascal Hitzler, Markus Krötzsch, Sebastian Rudolph, CRC Press/Chapman and Hall
4. Programming the Semantic Web, by Toby Segaran, Jamie Taylor, and Colin Evans, O'Reilly
5. Semantic Digital Libraries, by Sebastian Ryszard Kruk, Bill McDaniel, Springer
6. Semantic Techniques for the Web, by François Bry and Jan Maluszynski, Springer
7. Semantic Web for Dummies, by Jeffrey T. Pollock, Wiley
8. Semantic Web Programming, by John Hebeler, Matthew Fisher, Ryan Blace, Andrew Perez-Lopez, Mike Dean, Wiley,
9. The Social Semantic Web, by John Breslin, Alexandre Passant, Stefan Decker, Springer