SEMESTER S8
SEMANTIC WEB

Course Code	PEITT864	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	3:0:0:0	ESE Marks	60
Credits	3	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	PBITT504 - Web Application Development	Course Type	Theory

Course Objectives:

1. To introduce the foundational concepts and architecture of the Semantic Web.
2. To explore RDF and SPARQL as the core technologies for representing and querying data on the Semantic Web.
3. To provide an understanding of Ontology design and the use of OWL for Semantic Web applications.
4. To investigate the practical applications of the Semantic Web and the role of reasoning techniques.

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	**Introduction to the Semantic Web and RDF:** Evolution of the Web and the need for the Semantic Web, Semantic Modeling, Semantic Web Technologies: RDF, RDFS, OWL, and SPARQL RDF (Resource Description Framework): Syntax , Semantics URI, Vocabularies, Metadata and the Semantic Web	9
2	**RDF and SPARQL:** Semantic Web Application Architecture, RDF and Interfacing, RDF Schema, RDFS-Plus, SKOS,FOAF, The Semantic Web, RDF, and Linked Data (and SPARQL) , SPARQL Queries- Copying, Creating, and Converting Data (and Finding Bad Data)	9
3	**Ontologies and OWL:** Introduction to Ontologies: Concepts and Importance, Ontology Design Principles Basic OWL(Web Ontology Language), Ontologies in OWL, OWL Formal Semantics, Ontologies and Rules, Ontology Engineering	9
4	**Semantic Web Applications:** Applying Machine Reasoning and Learning in Real World Applications, Case Studies of Semantic Web Applications - Achieving Balance Between Innovation and Security in the Cloud With Artificial Intelligence of Things: Semantic Web Control Models- Traffic: An Intelligent System for Detecting Traffic Events Based on Ontologies- Multi-Factor Authentication Web	9

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	Security System Based on Facial Recognition, One Time Password, and Hashed Secure Question- Enhancing Usability and Control in Artificial Intelligence of Things Environments (AIoT) Through Semantic Web Control Models- Emerging Trends in Artificial Intelligence of Things With Machine Learning and Semantic Web Convergence	

Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Micro project	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	15	10	10	40

End Semester Examination Marks (ESE):

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 =24marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 sub divisions. **(4x9 = 36 marks)**	**60**

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Course Outcomes (COs)

At the end of the course students should be able to:

	Course Outcome	Bloom's Knowledge Level (KL)
CO1	Apply the principles of the Semantic Web to describe its layered architecture.	**K3**
CO2	Construct and query RDF data using SPARQL in Semantic Web environments.	**K3**
CO3	Develop and implement ontologies using OWL for semantic data representation.	**K3**
CO4	Utilize reasoning techniques in Semantic Web applications to solve complex problems.	**K3**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	3	-	-	-	-	1	1	2
CO2	3	2	3	3	3	-	-	-	-	1	2	2
CO3	3	2	3	3	3	-	-	-	-	1	2	2
CO4	3	3	3	3	3	-	-	-	-	1	1	2

Note: *1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation*

Text Books

Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Semantic Web for the Working Ontologist: Effective Modeling in RDFS and OWL	Dean Allemang, James Hendler	Morgan Kaufmann	2nd Edition, 2011
2	Foundations of Semantic Web Technologies	Pascal Hitzler, Markus Krötzsch, Sebastian Rudolph	Chapman and Hall/CRC	1st Edition, 2009

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Reference Books

Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Learning SPARQL	Bob DuCharme	O'Reilly Media	2nd Edition, 2013
2	Ontology Engineering in a Networked World	Mari Carmen Suárez-Figueroa, Asunción Gómez-Pérez, Enrico Motta	Springer	1st Edition, 2012
3	Reasoning Web: Logical Foundation of Knowledge Graph Construction and Query Answering	Gerhard Lakemeyer, Bernhard Nebel	Springer	1st Edition, 2015
4	Semantic Web Technologies and Applications in Artificial Intelligence of Things	Fernando Ortiz-Rodriguez, Amed Leyva-Mederos, Sanju Tiwari, Ania R. Hernandez-Quintana, Jose L. and Martinez-Rodriguez	IGI Global	May, 2024

Video Links (NPTEL, SWAYAM…)	
Sl. No	**Link ID**
1	https://www.youtube.com/watch?v=sLnbDyG2z3Q
2	https://youtu.be/8LBS5S3-4bI
3	https://youtu.be/HEQDRWMK06I
4	https://www.youtube.com/watch?v=3JZ7l_OeQyE

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