GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: PG

Branch: Cyber Security

Subject Code : ME02059061

Course / Subject Name : Web and Database Security Concepts

w. e. f. Academic Year:	2024-25
Semester:	2
Category of the Course:	Professional Elective Course

Prerequisite:	• Fundamentals of web technology, Database management system.
Rationale:	• This subject will give an introduction to security aspects in web applications and database systems. Students will be taught various types of attacks and risks to web applications and database systems. They will also learn how to mitigate those risks and attacks.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Understand the authentication flaws and loopholes in the web environment.	UN
02	Analyse cross-site scripting, forgery and SQL injection attacks on the vulnerable web application.	AN
03	Apply and examine the existing database security models.	AP
04	Apply and examine web and database security policies.	AP
05	Evaluate various security models for web and database.	EL

**Revised Bloom's Taxonomy (RBT)*

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
03	00	02	04	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	**UNIT 1: Web Authentication Security** Difference between HTTP and HTTPS Protocols, Web Functionality, Encoding Schemes, Authentication Techniques, Design Flaws in Authentication, Implementation Flaws in Authentication, Securing Authentication.	06	15
2.	**UNIT 2: Injection Attacks** Taxonomy of Attacks, Injecting into Interpreted Contexts, SQL Injection, XPath Injection, LDAP Injection, XML Injection, HTTP Injection, Mail Service Injection.	06	15
3.	**UNIT 3: Cross Site Scripting (XSS)** Types of XSS, XSS in real world application, Finding and Exploiting XSS Vulnerabilities, Detection and Prevention of XSS Attacks.	06	15
4.	**UNIT 4: Database Security Models** Harrison-Ruzzo-Ullman Access Matrix Model, Wood et al. Model, Dion Model, The Sea View Model, The Lattice Model for Flow Control.	07	15
5.	**UNIT 5: Database Security Design** Introduction, Secure DBMS Design, Design of Secure Databases. Data base Security Models, Data base Security Policies.	10	20
6	**UNIT 6: Security Models for Next-generation Databases** Security in Active Databases, Security in Object-oriented Database, The ORION Authorization Model, SORION Model, The Millen-Lunt Model.	10	20
	TOTAL	**45**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
10	**20**	**20**	**20**	**20**	**10**

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. The Web Application Hacker's Handbook by Dafydd Stuttard and Marcus Pinto, Wiley Publishing, Inc., Latest Edition.
2. Database Security by S. Castano, M. Fugini, G. Martella and P. Samarati, Addison-Wesley Publishing Company, Latest Edition.
3. Database Security by Alfred Basta and Melissa Zgola, Cengage Publication, Latest Edition.

(b) Open source software and website:

1. Course-related online MOOC on SWAYAM NPTEL/Coursera Platform.
2. Recently published papers/articles of reputed journals/conferences.s

Suggested Course Practical List:

- List of Laboratory/Learning Resources Required: The practical work will be carried out based on the content covered during the academic sessions.

List of Laboratory/Learning Resources Required: Open source tools for data base security.

Suggested Project List: Creation of local network and its security projects.

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