

<b>Devi Ahilya University, Indore, India Institute of Engineering &amp; Technology</b>				<b>III Year B.E. (Information Technology)</b>				
<b>Subject Code &amp; Name</b>		<b>Instructions Hours per</b>			<b>Credits</b>			
<b>6ITRC3 NETWORK &amp; INFORMATION SECURITY</b>		<b>L</b>	<b>T</b>	<b>P</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Total</b>
<b>Duration of Theory Paper: 3 Hours</b>		<b>3</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>5</b>

### **Course Objectives:**

1. To impart the knowledge and in-depth reference to current information and network security standards and procedures.
2. This course provides you with an overview of data and computer security and concentrates in technical and continuity management issues.
3. Allow the student to gain expertise in some specific areas of information security such as the design and providing security to individual networks.

**Prerequisites:** Basic knowledge of programming and Computer Networks

### **Course Outcome:**

Students earned credits will develop ability to

<b>CO. No.</b>	<b>Course Outcome</b>	<b>Program Outcomes</b>
CO1	Students will be able to understand the fundamental need for security in computer networks, identify various security approaches and principles governing security services and their application contexts.	PO1, PO2, PO12
CO2.	Define symmetric key cryptography and its basic principles. Analyze possible types of attacks on symmetric encryption. Compare and contrast symmetric and asymmetric cipher models.	PO1, PO2, PO3
CO3	Understand the RSA algorithm and its significance in public key cryptography. Compare asymmetric and symmetric key cryptography approaches. Explain the concept of digital envelopes and digital signatures, digital certificates i.e public key infrastructure (PKI) in secure communication and message authentication.	PO2, PO4, PO5, PO12
CO4	Explain the architecture and functioning of Secure Socket Layer (SSL), Secure Hypertext Transfer Protocol (SHTTP), Time Stamping Protocol (TSP), email security and Kerberos protocol.	PO2, PO3, PO8
CO5	Describe the role and functioning of firewalls in network security. IP Security (IPsec), Virtual Private Networks (VPNs) and its use in securing IP communications.	PO3, PO6, PO8, PO12

### **CO-PO Relationship**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3		2								1
CO2	3	2	1									
CO3		2		2	3							1
CO4		2	3					3				
CO5			2			3		3				1

1. \* CO (rows) mention nil/very small/insignificant contribution to the PO(column)
2. 1 → relevant and small significance    2 → medium or moderate    and    3 → strong

## **COURSE CONTENTS**

### **Unit I**

**Introduction:** The need for security, security approaches, principles of security services, mechanisms and attacks, a model for network security. substitution & transposition techniques, steganography, key range & key size.

### **Unit II**

**Symmetric Cipher:** An general idea of symmetric key cryptography, classical symmetric ciphers, Algorithm types & modes, possible types of attacks, Symmetric & asymmetric cipher model, Data Encryption Standard (DES), Advanced Encryption Standard (AES).

### **Unit III**

**Asymmetric Cipher:** RSA algorithm, asymmetric & symmetric key cryptography together, digital envelopes, digital signatures & digital certificates & Public key infrastructure (PKI).

### **Unit IV**

**Information Security Protocols:** Secure Socket Layer, Secure Hyper Text Transfer Protocol (SHTTP), Time Stamping Protocol (TSP), 3- D Secure Protocol, Email Security, and Kerberos.

### **Unit V**

**Network Security:** Deffie-Hellman key exchange, Firewalls, IP Security, Virtual Private Networks, Intrusion detection system, IP spoofing, DNS spoofing. Introduction to block chain technology and crypto currency.

### **Learning Outcomes:**

After completing this course the student must demonstrate the knowledge and ability to:

1. Acquire a practical overview of the issues involved in the field of information security.
2. Demonstrate a basic understanding of the practice of IS, especially in the evaluation of information security risks across diverse settings including the Internet and WWW-based commerce systems, high bandwidth digital communications and funds transfer services.
3. The learning outcome is students shall be able to understand what are the common threats faced today, what are the foundational theory behind information security, what are the basic principles and techniques when designing a secure system, how to think adversarial, how today's attacks and defenses work in practice, how to assess threats for their significance, and how to gauge the protections and limitations provided by today's technology.
4. Familiarity with the basic protocols of Information Security, and how they can be used to assist in network security design and implementation.

**Books Recommended:**

1. Douglas R. Stinson; Cryptography Theory and Practice; 2nd Edition, Chapman & Hall/CRC
2. Williams Stallings; Cryptography & Network Security; 3rd Edition, Pearson Education
3. Bernard Menezes; Network Security and Cryptography; Cengage Learning India Pvt Ltd.
4. Neal Krawetz; Introduction to Network Security; 2nd Edition, Thomson Learning Inc.

**List of Practical Assignments:**

During learning, of course, students need to do assignments:

1. Implementation of various symmetric key algorithms.
2. Implementation of various asymmetric key algorithms.
3. Implementation of Algorithm types and modes (Electronic Code Book (ECB), Cipher Block Chaining (CBC), Cipher Feedback (CFB), Output Feedback (OFB)).
4. Study of Pretty Good Privacy open source security tool for email security.
5. Implementation of digital certificates.
6. Study of IP Tables.
7. Implementation of various open source security tools (Wireshark, Nmap, tables, pretty good privacy, Snort, LC5, OpenVPN, TrueCrypt, THC Hydra).