MCS-215

Important Notes

1. UNCITRAL Model Law (1996)

The UNCITRAL Model Law on Electronic Commerce, adopted in 1996 by the United Nations Commission on International Trade Law (UNCITRAL), was created to promote legal uniformity and to support the expansion of electronic commerce across international boundaries. The primary aim of the model law was to eliminate barriers—both legal and technical—that hinder the use of electronic means in commercial activities.

The model law is founded on three core principles:

1. **Non-discrimination Principle**: It establishes that no electronic document should be denied legal effect simply because of its electronic form. This principle emphasizes that electronic data and communications are as valid and enforceable as physical documents.
2. **Technological Neutrality**: This means that the law is not tied to any specific technology, allowing for future advancements to also fall under its ambit without legal redefinition.
3. **Functional Equivalence**: This principle ensures that electronic communications are treated the same as their paper-based counterparts in legal terms, thereby facilitating online transactions.

The Model Law is divided into two parts:

- **Part I** contains general provisions applicable to all forms of electronic commerce, such as legal recognition of electronic records (Article 5), writing and signature requirements (Articles 6 and 7), and the reliability of electronic communications (Article 8).
- **Part II** addresses more specific areas such as the carriage of goods and the use of transport documents.

Key articles include:

- **Article 1**: Scope of application, dealing with data messages in commercial activities.
- **Article 2**: Definitions, such as ‘data message’ including any future technologies.
- **Articles 3–8**: Cover interpretation, agreements between parties, legal validity of electronic communication, and standards for reliability.
- **Articles 9–15**: Discuss evidentiary value, data retention, contract formation, and acknowledgment of receipt.
- **Articles 16–17**: Focus on logistics like transport documents and carriage of goods.

India’s **Information Technology Act, 2000** is largely inspired by the UNCITRAL Model Law, incorporating these standards to create a robust legal framework for e-commerce in the Indian context.

2. Cyber Forensics

Cyber forensics, also known as computer forensics, is the process of acquisition, authentication, analysis, and documentation of digital evidence retrieved from electronic devices or online platforms used in the commission of crimes. It plays a critical role in criminal investigations, especially in cases involving data breaches, hacking, fraud, and cyber terrorism.

Cyber forensics is significant not only because it helps recover deleted or hidden files but also because it can detect system tampering and trace unauthorized activities. Investigators extract data from various sources such as hard drives, emails, internet activity, and mobile devices, ensuring the integrity and admissibility of evidence in court.

The forensic process follows five standard phases:

1. **Policy and Procedure Development**: Establishes standard protocols for forensic activities.
2. **Assessment**: Evaluating what data can be retrieved and preserved.
3. **Acquisition**: Collecting digital evidence in a secure and tamper-proof manner.
4. **Examination**: Analyzing data using tools like steganography or cross-drive analysis.
5. **Reporting**: Documenting findings to present in legal proceedings.

Tools and techniques used in cyber forensics include:

- **Cross-drive analysis**: Correlating data from multiple storage devices.
- **Live analysis**: Acquiring data before a system is shut down.
- **Deleted file recovery**
- **Stochastic Forensics**: Detecting patterns of data theft.
- **Steganography**: Concealing data within other files.

Given the sensitive nature of digital evidence, forensic experts often work with **duplicate copies** of original drives (using imaging) and use **write-blocking** techniques to prevent modification. The field has evolved significantly, leading to the establishment of global bodies like the **Scientific Working Group on Digital Evidence (SWGDE)** to standardize procedures.

3. Six Principles of Security Management

Security management involves a strategic approach to safeguarding information systems and data against unauthorized access, destruction, or alteration. It ensures the integrity, availability, and confidentiality of data.

The **six principles of security management** are:

1. **Availability**: Ensures that systems and data are accessible to authorized users when needed. This prevents denial-of-service scenarios and enhances business continuity.
2. **Integrity**: Refers to maintaining the accuracy and consistency of data. This principle ensures data is not altered in unauthorized ways and that systems remain trustworthy.
3. **Confidentiality**: Protects sensitive data from being accessed or disclosed to unauthorized individuals. It involves encryption, secure login protocols, and restricted access controls.
4. **Accountability**: Tracks user actions within systems to ensure that operations can be traced back to individuals. Logs, audit trails, and user authentication help maintain accountability.
5. **Assurance**: Builds confidence that the security controls are functioning as intended. Regular audits and compliance checks fall under this principle.
6. **Privacy**: Focuses on protecting personal and sensitive information according to legal and ethical standards. It includes how data is collected, stored, and shared, and ensures that data subjects' rights are respected.

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4. Security Issues in Cyberspace

“Cyber Space” refers to the digital environment where communication and data exchange occur through the internet. Due to its open nature, cyberspace is prone to various security breaches that threaten confidentiality, integrity, and availability of information.

Common **security issues** include:

1. **Unauthorized Access**: When a person gains access to systems or data without permission, e.g., guessing passwords or exploiting vulnerabilities.
2. **Denial-of-Service (DoS)**: Overloading systems to make services unavailable to legitimate users.
3. **Phishing and Identity Theft**: Deceptive emails or websites used to steal personal credentials.
4. **Malware Attacks**: Viruses, worms, and ransomware designed to disrupt, damage, or gain control over systems.
5. **Data Modification**: Unauthorized alteration of data to mislead or corrupt systems.

A “Cyber Incident” as per CERT-IN is any event that threatens the availability, integrity, or confidentiality of information. The consequences may include:

- Threats to national security
- Financial losses
- Reputational damage
- Breach of privacy

As threats evolve rapidly, continuous monitoring, proactive defense strategies, and user awareness are key to mitigating risks.

5. Classification of Cyber Crimes

Cybercrimes refer to unlawful acts where computers or networks are either tools or targets. The **Information Technology Act, 2000**, along with IPC provisions, governs cybercrimes in India.

Cybercrimes can be classified as:

1. **Against Individuals**:
   - Harassment via email or social media
   - Cyberstalking
   - Identity theft
   - Distribution of obscene material
2. **Against Property**:
   - Hacking systems to steal confidential data
   - Credit card and banking fraud
   - Intellectual property theft
3. **Against Government/Organizations**:
   - Cyberterrorism (hacking government networks)
   - Espionage
   - Spreading disinformation

The **2008 amendment** to the IT Act added clarity to cyber offenses and prescribed penalties. These include fines, imprisonment, or both depending on the severity. Investigations require specialized skills in **cyber forensics** and jurisdictional challenges are addressed by provisions like **Section 75**, which ensures applicability even if crimes occur outside India but impact Indian systems.

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6. Digital Signature / Certificates

A digital signature is a cryptographic mechanism used to authenticate the source and integrity of electronic documents. In a digital environment where physical signatures are impractical, digital signatures ensure that a sender's identity is verifiable and that the message content remains untampered.

Digital signatures rely on **asymmetric key cryptography**, where two keys are used—a **private key** to sign and a **public key** to verify the signature. This ensures:

- **Authentication**: The recipient can verify the sender's identity.
- **Non-repudiation**: The sender cannot deny sending the message.
- **Data Integrity**: The message has not been altered during transmission.

To ensure trust, a **Certificate Authority (CA)** issues a **Digital Certificate**. This certificate contains:

- Issuer details
- Public key of the entity
- Validity period
- Algorithms used
- Thumbprint and versioning info

The digital certificate confirms that a public key belongs to a particular individual or organization. Indian CAs include **SafeScrypt Ltd**, **TCS**, **IDRBT**, **MTNL**, and **NIC**. Globally known CAs are **VeriSign** and **Thawte**.

Digital certificates are often used in **Secure Socket Layer (SSL)** connections, marked by "https" in URLs and a lock icon in browsers. Section 2(p) of the IT Act defines digital signatures and provides them with legal validity. Compared to **electronic signatures** (e.g., scanned images or typed names), digital signatures are encrypted and thus more secure.

7. Need for Regulation of Cyberspace

Cyberspace, while enabling communication and commerce, also exposes users to threats like obscenity, fraud, identity theft, and intellectual property infringement. Hence, there's a critical **need to regulate** cyberspace to ensure safety, privacy, and compliance with national laws.

Key reasons include:

1. **Obscenity and Child Exploitation**: Internet can be misused for spreading pornographic material and child abuse content.
2. **Jurisdiction Issues**: Crimes committed in one country can impact another, requiring clear global regulations.
3. **Intellectual Property Protection**: The shift from physical to digital assets necessitates strong online IPR protection.
4. **Privacy Violation**: New technologies can breach user privacy, making **data protection** laws essential.
5. **Cryptography Usage**: While encryption protects users, it can also conceal criminal activities.
6. **Anonymity and Crime**: Fake identities make tracking cyber criminals difficult.

Legal frameworks should balance **freedom of expression** and **community standards**. Some scholars like **Lawrence Lessig** argue that cyberspace can be regulated through laws, social norms, market forces, and code (software architecture).

8. Role of Filtering Devices and Rating System

To regulate harmful internet content, countries and organizations employ **filtering technologies and content rating systems**. These tools are designed to **block or limit** access to inappropriate or offensive material, especially for children.

Types of filtering devices include:

- **Email filters**: Remove spam.
- **Site blockers**: Block URLs based on keywords or content types.
- **Protocol-based filters**: Use predefined standards like **PICS** (Platform for Internet Content Selection).

PICS was developed by **World Wide Web Consortium (W3C)** to promote content labeling standards. Other systems include:

- **RSACi** (Recreational Software Advisory Council): Rates content for violence, sex, nudity, etc.
- **SafeSurf**, **CyberPatrol**, **SurfWatch**: Used by parents, schools, and libraries.

Filtering tools are beneficial but not foolproof. Keyword filters may also block legitimate content. Metadata protocols like **RDF (Resource Description Framework)** can describe content better but are limited in real-time filtering.

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9. Advantages / Functions of Cryptography

Cryptography is the science of securing communication through encoding. It is a foundation for cybersecurity, ensuring data confidentiality, authentication, and integrity.

Five main **functions** of cryptography are:

1. **Privacy/Confidentiality**: Only authorized users can read the information.
2. **Authentication**: Verifies the identity of sender/receiver.
3. **Integrity**: Ensures the message has not been altered.
4. **Non-repudiation**: Prevents the sender from denying a transaction.
5. **Key Exchange**: Mechanism to securely share cryptographic keys.

Cryptographic systems include **symmetric key** (same key for encryption and decryption) and **asymmetric key** (public/private keys). Applications span **SSL encryption**, **digital signatures**, and **secure email**. It is fundamental for secure e-governance, e-commerce, and military communication.

10. Trademark / Infringement / Remedies

A **trademark** distinguishes goods/services of one entity from another. Infringement occurs when someone uses a similar mark, leading to confusion.

As per **Section 29 of Trademark Act, 1999**, infringement includes:

- Affixing a registered trademark without permission
- Import/export under registered mark
- Using in business papers or advertising

Section 29(7) further covers misleading packaging, while Section 27(8) targets misleading advertising.

Remedies for trademark infringement:

1. **Civil**: Injunctions, damages, destruction of goods, ex parte orders.
2. **Criminal**: Section 103 and 104 penalize the application and sale under false trademarks.
3. **Administrative**: Seizure under **Customs Act, 1962**, preventing parallel import of infringing goods.

Unregistered trademarks can seek common law protection under **passing off**. Courts increasingly address **digital infringement**, such as trademark misuse in search engine ads or domain name disputes.

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11. Section 43 of IT Act (Damages for Violation)

Section 43 of the **Information Technology Act, 2000** addresses damages caused by unauthorised access or operations on a computer system. It applies primarily to civil offenses, unlike Section 66 which deals with criminal actions.

A person is liable under Section 43 if they do the following **without permission**:

- Access or download data from a computer system.
- Introduce viruses or malicious code.
- Damage or disrupt any computer or network.
- Deny access to an authorized user.
- Assist others in doing any of the above.

Penalty: Compensation to the affected party, which can be claimed through adjudication by IT authorities. There is no need to prove intent—mere unauthorized action is enough.

Example: Deleting files, altering server configurations, sending spam that disrupts systems—these all attract liability under this section.

This section is crucial for companies, websites, and individuals to safeguard their digital infrastructure from internal or external misuse. It strengthens **data protection and privacy** regimes in India.

12. Public Key Cryptography / Symmetric Key

Cryptography is mainly of two types—**symmetric** and **asymmetric (public key)**:

1. **Symmetric Key Cryptography**:
   - Uses a single shared key for both encryption and decryption.
   - Faster and suitable for encrypting large datasets.
   - Key distribution is a security risk.
2. **Public Key Cryptography (Asymmetric)**:
   - Uses a pair of keys—public key for encryption and private key for decryption.
   - More secure but slower.
   - Used in digital signatures and secure email.

Both have pros and cons. Hence, **Hybrid encryption** is used today, combining speed of symmetric with the security of public key. RSA is a popular public key algorithm, whereas DES and AES are symmetric key algorithms.

Public key cryptography is fundamental to secure internet protocols like **SSL**, **HTTPS**, and digital certificates. It ensures confidentiality and is widely adopted across e-commerce, government communication, and personal data protection.

Repeated Questions with Section Numbers

S.No	Question Topic	Unit No.	Section No.
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2	Cyber Forensics	Unit 5	**5.5**
3	Six Principles of Security Management	Unit 3	**3.8**
4	Security Issues in Cyberspace	Unit 1	**1.3**
5	Classification of Cyber Crimes	Unit 5	**5.2**
6	Digital Signature / Certificates	Unit 3	**3.4**
7	Need for Regulation of Cyberspace	Unit 4	**4.5**
8	Filtering Devices and Rating System	Unit 4	**4.4**
9	Advantages / Functions of Cryptography	Unit 2	**2.2**
10	Trademark / Infringement / Remedies	Unit 6	**6.6**
11	Section 43 of IT Act (Damages for Violation)	Unit 5	**5.3**
12	Public Key Cryptography vs Symmetric Key	Unit 2	**2.4**