

**INFORMATION SYSTEM SECURITY**

Time : 3 Hours

Min. Passing Marks : 24

Maximum Marks : 80

**Instruction to Candidates :**

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)

**Unit-I**

1. (a) Explain Euler's theorem in Detail. [6]  
 (b) Write short note on:  
 (i) Groups and Field  
 (ii) Entropy and Unicity Distance [5×2=10]

**OR**

1. (a) Use Chinese remainder theorem to solve the simultaneous equation  
 $x \equiv 2 \pmod{3}$ ,  $x \equiv 3 \pmod{5}$ ,  $x \equiv 2 \pmod{7}$  [8]  
 (b) Find the result of the following:  
 (i)  $5^{-1} \pmod{13}$   
 (ii)  $d$ , if  $7d \equiv 1 \pmod{30}$   
 (iii)  $15^{18} \pmod{17}$   
 (iv)  $21^{24} \pmod{8}$  [4×2 = 8]

**Unit-II**

2. (a) Explain IDEA with all its steps and sub-key generation in detail. [10]  
 (b) Write short note on:  
 (i) Substitution and Transposition techniques.  
 (ii) Key Distribution in Symmetric Encryption. [3×2 = 6]

**OR**

2. (a) Explain DES with Triple DES with all its steps in detail. [10]  
 (b) Explain all block cipher modes of operation with neat diagram. [6]

**Unit-III**

3. (a) Explain RSA in detail with security analysis of RSA. [8]  
 (b) Write short note on:  
 (i) Principles of Public key cryptosystems.  
 (ii) RSA exponentiation in Modular Arithmetic. [4×2 = 8]

**OR**

3. (a) Explain with all Diffie-Hellman key Exchange steps in detail. [8]  
 (b) Write short note on:  
 (i) Distribution of public keys.  
 (ii) Distribution of secret keys using public key cryptosystems. [4×2 = 8]

**Unit-IV**

4. (a) Why is message authentication required? Explain various authentication protocols. [6]  
 (b) Explain SHA-1 algorithm in detail. [6]  
 (c) Write short note on:  
 (i) Birthday attack  
 (ii) Digital signature [2×2 = 4]

**OR**

4. (a) What is message authentication code (MAC)? Explain types of MAC. [8]  
 (b) Write short note on:  
 (i) Model of Authentication Systems  
 (ii) Elgamal signatures and undeniable signatures. [4×2 = 8]

**Unit-V**

5. (a) Explain X-509 Authentication procedure with X-509 versions in detail. [8]  
 (b) Explain Pretty Good Privacy (PGP) with general structure of private and public key rings. [8]

**OR**

5. Write short note on:  
 (a) S/MIME  
 (b) IPsec  
 (c) AH and ESP in Transport and Tunnel Mode  
 (d) SSL [4×4 = 16]