

- 1. Q. 1 is compulsory. Solve any 3 questions from remaining 5.
- 2. Assume required data where ever necessary with proper justification.

- Q.1 (a) What is the significance of modeling and coding in data compression? (20)
- (b) What are the goals of cryptography? Explain any one in detail.
- (c) List techniques used for lossless image compression.
- (d) Solve the following
- (i) $4^{-1} \pmod{55}$
 - (ii) $3^{144} \pmod{13}$
 - (iii) $6^{-1} \pmod{17}$
 - (iv) Euler's totient function $\Phi(49)$
- Q.2 (a) What is 'frequency' and 'temporal' masking? Explain how it is used and implemented in MP3 audio compression. (10)
- (b) Explain Diffie Hellman Key exchange with the help of an example. (10)
- Q.3 (a) Explain standard JPEG with neat block diagram. What are advantages of JPEG 2000 over standard JPEG? Justify the use of DCT in JPEG? (10)
- (b) Explain RSA in detail and also discuss attacks on RSA. (10)
- Q.4 (a) State following theorems with their applications in cryptography (10)
- (i) Fermat's Theorem (ii) Euler's Theorem (iii) Chinese Remainder Theorem.
- (b) Explain Hash and MAC functions with their role in cryptography. (10)
- Q.5 (a) Consider the probabilities $p(a)=0.2, p(b)=0.3, p(c)=0.1, p(d)=0.4$. Encode and decode the sequence 'abcd' using arithmetic coding technique. (10)
- (b) What is Motion compensation and Motion Estimation in video compression? Explain how they are used in MPEG video compression with appropriate block diagram. (10)
- Q.6 (a) Encode and decode the sequence 'abbacbbabbacc' using LZ78. Compare LZ77 and LZ78. (10)
- (b) Write short notes (Any two) (10)
- (i) μ Law and A Law Companding
 - (ii) Fire walls
 - (iii) Intruders and viruses
