S.E (SEM IV) (CBSGS)
INFORMATION TECHNOLOGY
INFORMATION THEORY AND CODING
DT 12/06/17

Q.P. Code : 3660

(3 Hours) **[Total Marks : 80**

N.B. : (1) Question No. 1 is compulsory.
(2) Solve **Any Three** questions out of the remaining questions.
(3) Figures to the right indicate **Full Marks.**

1. (a) State the properties of Information? Also derive the expression for entropy. **5**

(b) What is Compression? List different Compression algorithm. Why adaptive Huffman coding is used? **4**

(c) Explain Asymmetric key cryptography. **5**

(d) What are the security goals? Define Cryptography **3**

(e) Describe Fermat's Little Theorem. **3**

2. (a) Given $x_i=\{x_1,x_2,x_3,x_4,x_5,x_6\}$ with probabilities as below: **10**
$P(xi)=\{0.3,0.25,0.2,0.06,0.04,0.05,0.06,0.04\}$
(i) Determine the efficient fixed length code for the source.
(ii) Determine the Huffman code for this source.
(iii) Compare the two codes and comment.

(b) Explain convolution code in brief. **10**

3. (a) A (7,4) cyclic code has a generator polynomial: $g(x) = X^3+X+1$. **10**
(i) Draw the block diagram of encoder.
(ii) Find generator and parity check matrices in systematic form.

(b) Explain Chinese Remainder theorem and also Explain the properties of Modular Arithmetic and Congruences. **10**

4. (a) Describe about Discrete probability and logarithms. **10**

(b) For a (6,3) linear block code, the coefficient matrix [p] is as follows: **10**

$$P=\begin{bmatrix}0 & 1 & 1\\ 1 & 0 & 1\\ 1 & 1 & 0\end{bmatrix}$$

The received code words at the receiver are :
1) 0 0 1 1 1 0 2) 1 1 1 0 1 1
Check whether they are correct or contains some errors.

5. (a) Explain Diffie-Hellman algorithm. Which attack is it vulnerable to? **10**

(b) Explain convolution code in brief. **10**

6. (a) What do you mean by Symmetric key cryptography? Explain DES in detail. **10**

(b) Write a short note on: Types of Entropy and LZW compression. **10**
