

## ASSIGNMENT-2

### UNIT-2(CO-2)

1. a. Show that  $I(X; Y)$  is non negative with relevant proof. 4M.  
b. Deduce the Expression for mutual information of a Binary Symmetric Channel, using the derived expression find the Channel Capacity of a BSC. 6M.
2. a. Outline the procedure to find coding efficiency of Huffman coding in detail. 4M.  
b. A discrete Memory less Source is generating the following messages with the given probabilities, Calculate the Coding efficiency using Huffman coding Algorithm. 6M.

<b>Message</b>	$X_1$	$X_2$	$X_3$	$X_4$	$X_5$	$X_6$	$X_7$
<b>Probability</b>	0.4	0.08	0.08	0.08	0.12	0.04	0.2

3. a. Consider a Discrete Memory less source with 8 messages whose probabilities are given below

<b>Symbol</b>	$M_0$	$M_1$	$M_2$	$M_3$	$M_4$	$M_5$	$M_6$	$M_7$
<b>Probability</b>	$\frac{1}{2}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{32}$	$\frac{1}{32}$

Calculate the efficiency of the coder using Shannon-Fano coding technique. 6M.

- b. State the following 4M.
  - i. Information rate
  - ii. Source Coding Theorem