School of Electrical Electronics and Communication Engineering
Electronics and Communication Engineering
ETE - Jun 2023

Time : 3 Hours   Marks : 50

Sem VI - BECE3302 - Information and Theory Coding
Your answer should be specific to the question asked
Draw neat labeled diagrams wherever necessary

1.	In binary PCM if '0' occur with probability 1/4 and '1' occur with probability 3/4 then calculate amount of information conveyed by each binit.	K1 CO1 (2)
2.	Prove the statement, "If receiver knows the message being transmitted, the amount of information carried is zero".	K2 CO3 (2)
3.	Define efficiency of source encoder and code redundancy.	K2 CO4 (2)
4.	What is the channel capacity of a Gaussian channel?	K2 CO4 (2)
5.	Define information rate.	K1 CO2 (2)
6.	A source generates four messages m_0, m_1, m_2 and m_3 with probabilities 1/3, 1/6, 1/4 and 1/4 respectively. The successive messages emitted by the source are statistically independent. Calculate entropy of the source.	K3 CO2 (5)
7.	Explain the significance of the entropy H(X/Y) of a communication system where X is the transmitter and Y is the receiver.	K3 CO1 (5)
8.	Prove that the mutual information of the channel is symmetric i.e., I(X; Y) = I(Y; X).	K4 CO5 (6)
9.	A discrete memoryless source 'x' has six symbols x_1, x_2, x_3, x_4, x_5 and x_6 with probabilities 0.3, 0.25, 0.2, 0.12, 0.08 and 0.05 respectively. Using Shannon-Fano algorithm find compact code for every symbol and calculate entropy of the source, average length of the code, efficiency an redundancy of the code.	K5 CO6 (8)
10.	For a discrete memoryless source there are three symbols with the probabilities $p_1 = \alpha$ and $p_2 = p_3$. Determine the entropy of the source and sketch its variation for different values of α.	K4 CO3 (8)
11.	The channel transition matrix is given by, $\begin{bmatrix} 0.9 & 0.1 \\ 0.2 & 0.8 \end{bmatrix}$. Draw the channel diagram and determine the probabilities associated with outputs assuming equiprobable inputs. Also find the mutual information I(X; Y) for the channel.	K5 CO4 (8)