

Problems Set-C

		Answer	Correction of the False statement
C1	1- The 2 nd moment about the origin is the mean square value 2- Maximum information transmission is obtained when we have independent transmission. 3- The entropy of source may be negative value 4- Nyquist theorem state that the rate over channel with bandwidth B is $R_x > 2B$. 5- The bandwidth expansion factor of ECC is given by $(k/n).100\%$. 6- If $S/N = 20$ dB, then the corresponding ratio is 100.	1- True 2- False 3- False 4- False 5- False 6- True	2-Maximum information when noiseless channel 3-Entropy of the source is always +ve 4-Nyquist theorem is $R_x \leq 2B$ 5-The bandwidth exp.factor of ECC is given by $(n/k).100\%$.
C2	1- The mutual information may be negative value 2- The unit of calculated average length of binary source code is Bits/Symbol 3- The number of check bits in even-PCC is 2. 4- If the joint pdf $f(x,y)=f(x).f(y)$ then x and y are said to be independent. 5- The mean of the random variable represents its power. 6- The joint probability $P(x,y) = P(x).P(y)$ when x and y are independent.	1- True 2- True 3- False 4- True 5- False 6- True	3-The number of check bits in even-PCC is 1. 5-The mean of the random variable represents its DC level.
C3	1- $P(A \text{ or } B) = P(A) + P(B)$ when A and B are mutual exclusive. 2- The 2 nd moment about the origin is the mean square value. 3- The following relation is true $H(x) < I$. 4- dBm is a measure for signal power when measured in Watt. 5- A noiseless channel is always symmetric. 6- Prefix property of source code is not important in decoding.	1- True 2- True 3- False 4- False 5- True 6- False	3- The following relation is true $H(x) \geq I$. 4- dBm is a measure for signal power when measured in mWatt. 6- Prefix property of source code is important in decoding
C4	1- Fixed length source coding is always decodable. 2- Shannon-Hartley equation of channel capacity state that $C_r = S.\text{Log}_2(1+N)$ 3- The following relation is true $I \leq H(x)$. 4- The check bit in Odd-PCC is determined by ANDing all message bits. 5- Maximum source entropy is obtained when CRV has uniform pdf. 6- Fano code is always better than Huffman code	1- True 2- False 3- True 4- False 5- False 6- False	2- Shannon-Hartley equation state that $C_r = B.\text{Log}_2(1+S/N)$ 4- The check bit is determined by \overline{XOR} of all message bits. 5-Max. source entropy is obtained when CRV has Gaussian pdf. 6-Huffman code is always better than Falso code
C5	1- The unit of calculated average length of ternary source code is Bits/Symbol. 2- The dimension of the parity check matrix H for LBC is $k \times n$. 3- $P(A \text{ or } B) = P(A) + P(B) - P(A.B)$ 4- Maximum information transmission is obtained when we have noiseless channel. 5- Expectation of positive function is also +ve. 6- The conditional entropy $H(y x)$ is also called losses entropy.	1- False 2- False 3- True 4- True 5- True 6- False	1-The unit of Av. length of ternary code is Ternary unit/Symbol. 2-The dimension of the parity check matrix H for LBC is $(n-k) \times n$. 6-The conditional entropy $H(y x)$ is also called noise entropy.
C6	1- The conditional entropy $H(x y)$ is also called noise entropy. 2- ASCII code is example of BRC code. 3- The average mutual information can be calculated from the equation $I=H(x) - H(y x)$ 4- Source code is used to match the channel alphabet. 5- Maximum source entropy is obtained when CRV has Gaussian or normal pdf. 6- The capacity of continues channel is increased as the noise power (N) is increased.	1- False 2- False 3- False 4- True 5- True 6- False	1-The conditional entropy $H(x y)$ is also called losses entropy. 2-ASCII code is example of even-PCC code. 3-The av. mutual info.can be calculated by $I=H(y) - H(y x)$ 6-The capacity is increased as the noise power (N) is decreased

C7	<ul style="list-style-type: none"> 1- The joint entropy $H(x,y)$ is given by $H(x) + H(y)$ always 2- The mutual information may be negative value. 3- The number of check bits in BRC is 1. 4- Source code is used to reduce channel errors. 5- The capacity of noiseless ternary channel is $\log_2 3$ Bits/symbol 6- The pdf of Normal or Gaussian random variable is non-symmetric about its mean. 	<ul style="list-style-type: none"> 1- False 2- True 3- False 4- False 5- True 6- False 	<ul style="list-style-type: none"> 1-Only for independent transmission 3-The number of check bits in BRC is even and >1. 4-Source code is used to match the channel alphabet. 6-The pdf of Gaussian RV is symmetric about its mean.
C8	<ul style="list-style-type: none"> 1- $H(x)$ for certain binary source is 2 Bits/Symbol 2- Shannon-Fano code can be considered as a statistical compression method. 3- Channel coding is used to match the channel alphabet. 4- Source entropy is maximum when all discrete symbols of the source are equal probable. 5- Good source code must be unique, decodable, and has the least average length. 6- The channel probability matrix is given by the probability $P(x y)$. 	<ul style="list-style-type: none"> 1- False 2- True 3- True 4- True 5- True 6- False 	<ul style="list-style-type: none"> 1-$H(x)$ for certain binary source is should be <1 Bits/Symbol 6-The channel prob. matrix is given by the probability $P(y x)$.
C9	<ul style="list-style-type: none"> 1- Noiseless channel has maximum capacity with equal probable source symbols. 2- The source entropy $H(x)$ for continues source depends on the mean of x 3- The columns of the parity check matrix H may be "0". 4- The bandwidth expansion of PCC is greater than that of BRC for the same word length. 5- The capacity of BSC is increased when the error probability P_e is also increased. 6- The pdf of CRV may be greater than 1. 	<ul style="list-style-type: none"> 1- True 2- False 3- False 4- False 5- False 6- False 	<ul style="list-style-type: none"> 2-$H(x)$ for cont. source depends on the variance of x 3-The columns of the parity check matrix H is non-zero. 4-The bandwidth expansion of PCC is less than that of BRC. 5-The capacity of BSC is decreased when P_e is also increased. 6-The pdf of CRV should be ≤ 1