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Subject Code : EC8395	**Subject Name** : Communication Engineering	Rev. No.	02
Unit No : 4	**Unit Name** : Information Theory & Coding	Date	30.09.2020

OBJECTIVE TYPE QUESTION BANK

S. No.	Objective Questions (MCQ /True or False / Fill up with Choices)	BTL
1.	Entropy is **a. Average information per message** b. Information in a signal c. Amplitude of signal d. All of the above	L2
2.	The information I contained in a message with probability of occurrence is given by (k is constant). **a. I = k $\log_2 1/P$** b. I = k $\log_2 P$ c. I = k $\log_2 1/2P$ d. I = k $\log_2 1/P^2$	L2
3.	The expected information contained in a message is called **a. Entropy** b. Efficiency c. Coded signal d. None of the above	L4
4.	The mutual information a. Is symmetric b. Always non negative **c. Both are correct** d. None of the above	L5
5.	The relation between entropy and mutual information is **a. I(X;Y) = H(X) – H(X/Y)** b. I(X;Y) = H(X/Y) – H(Y/X) c. I(X;Y) = H(X) – H(Y) d. I(X;Y) = H(Y) – H(X)	L1
6.	Information rate is defined as a. Information per unit time b. Average number of bits of information per second c. rH **d. All of the above**	L1
7.	The memory less source refers to. a. No previous information b. No message storage	L2

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	c. Emitted message is independent of previous message d. None of the above	
8.	The technique that may be used to increase average information per bit is. **a. Shannon-Fano algorithm** b. ASK c. FSK d. Digital modulation techniques	L1
9.	Code rate r, k information bits and n as total bits, is defined as **a. r = k/n** b. k = n/r c. r = k * n d. n = r * k	L1
10.	The information rate R for given average information H= 2.0 for analog signal band limited to B Hz is a. 8 B bits/sec **b. 4 B bits/sec** c. 2 B bits/sec d. 16 B bits/sec	L3
11.	For a binary symmetric channel, the random bits are given as **a. Logic 1 given by probability P and logic 0 by (1-P)** b. Logic 1 given by probability 1-P and logic 0 by P c. Logic 1 given by probability P^2 and logic 0 by 1-P d. Logic 1 given by probability P and logic 0 by $(1-P)^2$	L2
12.	The probability density function of a Markov process is **a. p(x1,x2,x3…….xn) = p(x1)p(x2/x1)p(x3/x2)…….p(xn/xn-1)** b. p(x1,x2,x3…….xn) = p(x1)p(x1/x2)p(x2/x3)…….p(xn-1/xn) c. p(x1,x2,x3……xn) = p(x1)p(x2)p(x3)…….p(xn) d. p(x1,x2,x3……xn) = p(x1)p(x2 * x1)p(x3 * x2)……..p(xn * xn-1)	L3
13.	The capacity of Gaussian channel is a. C = 2B(1+S/N) bits/s b. $C = B^2(1+S/N)$ bits/s **c. C = B(1+S/N) bits/s** d. C = B(1+S/N)2 bits/s	L1
14.	For M equally likely messages, the average amount of information H is a. $H = \log_{10}M$ **b. $H = \log_2 M$**	L1

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	c. $H = \log_{10}M^2$ d. $H = 2\log_{10}M$	
15.	The channel capacity is **a. The maximum information transmitted by one symbol over the channel** b. Information contained in a signal c. The amplitude of the modulated signal d. All of the above	L2
16.	The capacity of a binary symmetric channel, given H(P) is binary entropy function is **a. 1 – H(P)** b. H(P) – 1 c. $1 – H(P)^2$ d. $H(P)^2 – 1$	L3
17.	According to Shannon Hartley theorem, a. The channel capacity becomes infinite with infinite bandwidth b. The channel capacity does not become infinite with infinite bandwidth c. Has a tradeoff between bandwidth and Signal to noise ratio **d. Both b and c are correct**	L1
18.	The negative statement for Shannon's theorem states that **a. If R > C, the error probability increases towards Unity** b. If R < C, the error probability is very small c. Both a & b d. None of the above	L5
19.	For M equally likely messages, M>>1, if the rate of information R ≤ C, the probability of error is **a. Arbitrarily small** b. Close to unity c. Not predictable d. Unknown	L1
20.	For M equally likely messages, M>>1, if the rate of information R > C, the probability of error is a. Arbitrarily small **b. Close to unity** c. Not predictable d. Unknown	L1
21.	The prefix code is also known as **a. Instantaneous code** b. Block code	L2

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	c. Convolutional code d. Parity bit	
22.	Self information should be **a) Positive** b) Negative c) Positive & Negative d) None of the mentioned	L1
23.	The unit of average mutual information is **a) Bits** b) Bytes c) Bits per symbol d) Bytes per symbol	L1
24.	Binary Huffman coding is a **a) Prefix condition code** b) Suffix condition code c) Prefix & Suffix condition code d) None of the mentioned	L3
25.	The method of converting a word to stream of bits is called as a) Binary coding **b) Source coding** c) Bit coding d) Cipher coding	L2
26.	When the base of the logarithm is 2, then the unit of measure of information is **a) Bits** b) Bytes c) Nats d) None of the mentioned	L2
27.	When X and Y are statistically independent, then I (x,y) is a) 1 **b) 0** c) Ln 2 d) Cannot be determined	L5

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28.	The self information of random variable is a) 0 b) 1 **c) Infinite** d) Cannot be determined	L2
29.	Entropy of a random variable is a) 0 b) 1 **c) Infinite** d) Cannot be determined	L1
30.	Lempel-Ziv algorithm is **a) Variable to fixed length algorithm** b) Fixed to variable length algorithm c) Fixed to fixed length algorithm d) Variable to variable length algorithm	L1
31.	Coded system are inherently capable of better transmission efficiency than the uncoded system. **a) True** b) False	L1
32.	Parity bit coding may not be used for a. Error in more than single bit b. Which bit is in error **c. Both a & b** d. None of the above	L2
33.	Parity check bit coding is used for a. Error correction **b. Error detection** c. Error correction and detection d. None of the above	L2
34.	For hamming distance d_{min} and t errors in the received word, the condition to be able to correct the errors is a. $2t + 1 \leq d_{min}$ b. $2t + 2 \leq d_{min}$	L4

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	c. $2t + 1 \leq 2d_{min}$ **d. Both a and b**	
35.	For hamming distance d_{min} and number of errors D, the condition for receiving invalid codeword is a. $D \leq d_{min} + 1$ **b. $D \leq d_{min} - 1$** c. $D \leq 1 - d_{min}$ d. $D \leq d_{min}$	L5
36.	The minimum distance for unextended Golay code is a. 8 b. 9 **c. 7** d. 6	L1
37.	The Golay code (23,12) is a codeword of length 23 which may correct a. 2 errors **b. 3 errors** c. 5 errors d. 8 errors	L1
38.	Orthogonality of two codes means **a. The integrated product of two different code words is zero** b. The integrated product of two different code words is one c. The integrated product of two same code words is zero d. None of the above	L2
39.	Hamming distance can be given by the number of elements in which a) They are same **b) They differ** c) Which are non zero d) None of the mentioned	L1
40.	Code strength is characterized by its **a) Minimum distance** b) Maximum distance c) Code weight d) Code size	L1
41.	The distance between two code-words is equal to the _____ of the third code-word which is the sum of the first two code-words.	L3

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	a) Size **b) Weight** c) Minimum distance d) None of the mentioned	
42.	The minimum distance Dmin can also be given as **a) Dmin >= α + β + 1** b) Dmin <= α + β + 1 c) Dmin >= α + β – 1 d) Dmin <= α + β + 1	L2
43.	The number of errors that can be corrected without erasure information is a) Dmin+1 b) Dmin – 1 c) (Dmin+1)/2 **d) (Dmin – 1)/2**	L3
44.	Channel coding relates to area such as a) Waveform coding b) Structured sequence **c) Waveform coding & Structured sequence** d) None of the mentioned	L1
45.	The ratio of redundant bits to data bits is called as a) Code rate **b) Redundancy rate** c) Symbol rate d) Transmission rate	L1
46.	If the parity bit takes value one then the summation of code-word gives **a) Even result** b) Odd result c) Even & Odd result d) None of the mentioned	L2
47.	The probability of message error is written as a) Block error b) Word error	L3

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	c) Block & Word error d) None of the mentioned	
48.	The cyclic codes are designed using **a) Shift registers with feedback** b) Shift registers without feedback c) Flipflops d) None of the mentioned	L1
49.	A cyclic code can be generated using **a) Generator polynomial** b) Generator matrix c) Generator polynomial & matrix d) None of the mentioned	L5
50.	The received code contains an error if the syndrome vector is a) Zero **b) Non zero** c) Infinity d) None of the mentioned	L1
51.	The measure of the amount of redundancy is given by a) Code size b) Code weight **c) Code rate** d) Minimum distance	L1
52.	The number of k bit shift over which a single information bit influences the encoder output is given by a) Code rate **b) Constraint length** c) Code length d) Code weight	L2
53.	The method used for representing convolution encoder are a) Connection pictorial b) State diagram c) Tree diagram **d) All of the mentioned**	L3