

**Program:** Electronics and Telecommunication Engineering

**Curriculum Scheme:** Revised 2012

**Examination:** Third Year Semester VI

**Course Code and Course Name:** ETC601, Digital Communication

Time: 1 hour

Max. Marks: 50

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Note to the students:- All Questions are compulsory and carry equal marks .

Q1.	Consider two sources $X$ and $Y$ with marginal entropies given by $H(X)$ , $H(Y)$ , joint entropy given by $H(X, Y)$ and the conditional entropies given by $H(X Y)$ and $H(Y X)$ . What is the correct expression for the mutual information $I(X;Y)$ ?
Option A:	$H(X) - H(Y X)$
Option B:	$H(X) - H(X, Y)$
Option C:	$H(X) - H(X Y)$
Option D:	$H(X, Y) - H(Y X)$
Q2.	What is the modulation scheme in which the amplitude of the carrier is varied based on the digital signal?
Option A:	ASK
Option B:	BPSK
Option C:	QPSK
Option D:	FSK
Q3.	A slow FH /MFSK signal is characterized by having _____ symbols transmitted per hop.
Option A:	Multiple
Option B:	Single
Option C:	Less than one
Option D:	Zero
Q4.	The parity check matrix of (6, 3) LBC is given by $H = [1\ 0\ 1\ 1\ 0\ 0; 1\ 1\ 0\ 0\ 1\ 0; 0\ 1\ 1\ 0\ 0\ 1]$ . How many errors can be detected and corrected by this code, respectively?

Option A:	1, 2
Option B:	1, 1
Option C:	2, 2
Option D:	2, 1
Q5.	In channel coding theorem, channel capacity decides the _____ permissible rate at which error free transmission is possible.
Option A:	Maximum
Option B:	Minimum
Option C:	Constant
Option D:	Infinity
Q6.	A matched filter is used to provide _____ signal-to-noise power ratio for a given transmitted symbol waveform.
Option A:	minimum
Option B:	equal
Option C:	moderate
Option D:	maximum
Q7.	Which modulation scheme is referred to as ON-OFF keying?
Option A:	ASK
Option B:	BPSK
Option C:	QPSK
Option D:	QAM
Q8.	The carrier frequency will change or hop several times during the transmission of one symbol in
Option A:	DSSS
Option B:	Time hopping spread spectrum
Option C:	Slow frequency hopping spread spectrum
Option D:	Fast frequency hopping spread spectrum
Q9.	Consider a (7, 4) cyclic code with the generator polynomial $G(x) = x^3 + x + 1$ . Determine the syndrome polynomial for the received codeword $R = 0011100$ .
Option A:	1
Option B:	$x + 1$
Option C:	$x^2 + x + 1$
Option D:	$x^2 + 1$
Q10.	The filter used for recovering the pulse with less ISI is called as

Option A:	Recovery filter
Option B:	Correlator filter
Option C:	Elliptic Filter
Option D:	All Pass Filter
Q11.	The discrete memory less source refers to
Option A:	no previous information
Option B:	no message storage
Option C:	emitted message is independent of previous message
Option D:	unpredictable
Q12.	Consider a 1/2 rate convolution encoder defined by $v_1 = (1, 1, 1)$ and $v_2 = (1, 0, 1)$ . Determine the impulse response of this encoder.
Option A:	111100
Option B:	111011
Option C:	110101
Option D:	101011
Q13.	Minimum bandwidth is occupied by
Option A:	ASK
Option B:	BPSK
Option C:	QPSK
Option D:	FSK
Q14.	An FHSS system has its frequency synthesizers controlled by 5 stage shift registers with feedback connection taken from the 2nd and 5th stages. The number of slots available for frequency hopping is
Option A:	32
Option B:	31
Option C:	24
Option D:	28
Q15.	Determine the parity check polynomial for a (7, 4) cyclic code having the generator polynomial $G(x) = x^3 + x + 1$ .
Option A:	$x^4 + x + 1$
Option B:	$x^4 + x^3 + x + 1$
Option C:	$x^4 + x^3 + 1$
Option D:	$x^4 + x^2 + x + 1$
Q16.	Consider the duobinary decoder where precoder was used in the corresponding encoder. Decode the received code $\{2, 2, 0, -2, 0, 0, -2\}$ using duobinary decoding rules.

Option A:	0, 0, 1, 0, 1, 1, 0
Option B:	1, 0, 1, 1, 1, 0, 0
Option C:	1, 1, 1, 0, 0, 1, 1
Option D:	0, 1, 0, 0, 1, 1, 1
Q17.	In OQPSK, the odd and even bit streams are offset by
Option A:	$T_b$
Option B:	$2 T_b$
Option C:	$0.5 T_b$
Option D:	$1.5 T_b$
Q18.	Using the Viterbi algorithm, decode the convolution codeword 0100010000 for the convolution code defined by $v_1 = (1, 1, 1)$ , $v_2 = (1, 0, 1)$ .
Option A:	00010
Option B:	10010
Option C:	00001
Option D:	00000
Q19.	What does the width of eye opening indicate?
Option A:	Time interval may be sampled without error
Option B:	Fading
Option C:	White noise
Option D:	no distortion
Q20.	In BFSK, 0 and 1 are encoded respectively as
Option A:	$+A$ and $-A$
Option B:	0 and $+A$
Option C:	$-A$ and $+A$
Option D:	0 and $-A$
Q21.	We define _____ space characterized by a set of 'N' linearly independent functions.
Option A:	Pre-defined
Option B:	Orthogonal
Option C:	Sample
Option D:	Orthonormal
Q22.	The impulse response of the matched filter in terms of the input signal $s(t)$ , with $T =$ bit duration, is given as
Option A:	$s(T-t)$
Option B:	$s(-T)$

Option C:	$s(-t)$
Option D:	$s(t+T)$
Q23.	In the Viterbi algorithm for decoding of convolution codes, which rule is used for decision making of optimum message?
Option A:	Maximum likelihood decoding
Option B:	Hamming distance
Option C:	Hamming bound
Option D:	Parity check
Q24.	A complex low-pass signal has a bandwidth of 400 kHz. What is the minimum sampling rate for this signal?
Option A:	200000 samples per second
Option B:	1600000 samples per second
Option C:	800000 samples per second
Option D:	400000 samples per second
Q25.	In a good modulation scheme, the distance between points in signal space representation should be
Option A:	Zero
Option B:	More
Option C:	Less
Option D:	Does not matter