

**University of Mumbai**  
**Examinations Summer 2022**

Time: 3 hour

Max. Marks: 80

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	The capacity of Gaussian channel is
Option A:	$C = 2B(1+S/N)$ bits/s
Option B:	$C = B2(1+S/N)$ bits/s
Option C:	$C = B(1+S/N)$ bits/s
Option D:	$C = B(1+S/N)2$ bits/s
2.	The sequence of operations in which PCM is done is
Option A:	Sampling, quantizing, encoding
Option B:	Quantizing, encoding, sampling
Option C:	Quantizing, sampling, encoding
Option D:	Encoding, quantizing, sampling
3.	Granular noise occurs when
Option A:	Step size is too small
Option B:	Step size is too large
Option C:	There is interference from the adjacent channel
Option D:	Bandwidth is too large
4.	Generation of SSB SC signal is done by
Option A:	Phase discrimination method
Option B:	Product modulator
Option C:	Envelope detector
Option D:	PLL detector
5.	For a (7, 4) block code, 7 is the total number of bits and 4 is the number of
Option A:	Information bits
Option B:	Redundant bits
Option C:	Total bits- information bits
Option D:	Parity bits
6.	For decoding in convolution coding, in a code tree,
Option A:	Diverge upward when a bit is 0 and diverge downward when the bit is 1
Option B:	Diverge downward when a bit is 0 and diverge upward when the bit is 1
Option C:	Diverge left when a bit is 0 and diverge right when the bit is 1
Option D:	Diverge right when a bit is 0 and diverge left when the bit is 1
7.	While representing the convolutional code by (n, k, m), what does 'm' signify or represent in it
Option A:	Parity bits
Option B:	Coded bits
Option C:	Message bits
Option D:	Memory order

8.	A satellite signal transmitted from a satellite transponder to earth's station is
Option A:	Uplink
Option B:	Downlink
Option C:	Terrestrial
Option D:	Earthbound
9.	Code rate $r$ , $k$ information bits and $n$ as total bits, is defined as
Option A:	$r = k/n$
Option B:	$k = n/r$
Option C:	$r = k * n$
Option D:	$n = r * k$
10.	The 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:	Emitted message is dependent of previous message

<b>Q2</b>																	
<b>A</b>	<b>Solve any Two</b> <span style="float: right;"><b>5 marks each</b></span>																
i.	Explain the structure of optical fiber.																
ii.	Explain linearity and cyclic property of Cyclic code.																
iii.	Compare AM and FM.																
<b>B</b>	<b>Solve any One</b> <span style="float: right;"><b>10 marks each</b></span>																
i.	Consider the seven symbols of Discrete Memoryless Source and their probabilities as shown in the table below. Follow the Huffman's algorithm to find the code words for each message. Also find the average code word length and entropy.																
	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>Message</td> <td>M1</td> <td>M2</td> <td>M3</td> <td>M4</td> <td>M5</td> <td>M6</td> <td>M7</td> </tr> <tr> <td>Probability</td> <td>0.4</td> <td>0.2</td> <td>0.12</td> <td>0.08</td> <td>0.08</td> <td>0.08</td> <td>0.04</td> </tr> </table>	Message	M1	M2	M3	M4	M5	M6	M7	Probability	0.4	0.2	0.12	0.08	0.08	0.08	0.04
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ii.	Explain the generation of delta modulated signal. State the drawbacks of DM and suggest methods to overcome it.																

<b>Q3.</b>	
<b>A</b>	<b>Solve any Two</b> <span style="float: right;"><b>5 marks each</b></span>
i.	Explain the need of modulation in communication system.
ii.	Explain the quantization process in PCM.
iii.	Explain Shannon's theorem on channel capacity.
<b>B</b>	<b>Solve any One</b> <span style="float: right;"><b>10 marks each</b></span>
i.	Draw and explain block diagram of BFSK generation and detection.
ii.	Explain the generation of PWM with block diagram and waveforms.

<b>Q4.</b>	
<b>A</b>	<b>Solve any Two</b> <span style="float: right;"><b>5 marks each</b></span>
i.	Derive an expression for Entropy.
ii.	Explain sampling theorem.
iii.	Explain the types of noise.

<b>B</b>	<b>Solve any One</b>	<b>10 marks each</b>
i.	Consider (3, 1, 2) convolution code with $g(1) = 101$ , $g(2) = 110$ , $g(3) = 011$ . a. Draw the encoder for this code b. Draw the state transition diagram c. Using state transition diagram, find the codeword for the sequence 110	
ii.	Explain Power line carrier Communication	