

Roll No:

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BTECH
(SEM V) THEORY EXAMINATION 2024-25
ANALOG & DIGITAL COMMUNICATION

TIME: 3 HRS

M.MARKS: 100

Note: Attempt all Sections. In case of any missing data; choose suitably.

SECTION A

1. Attempt all questions in brief. 2 x 10 = 20

Q no.	Question	CO	Level
a.	Describe basic block diagram of communication system.	1	K2
b.	Discuss modulation and need of modulation.	1	K2
c.	Explain effect of signal to noise ratio in communication system.	2	K2
d.	Express frequency deviation and modulation index in FM signal.	2	K2
e.	Discuss Nyquist Sampling Theorem.	3	K2
f.	Explain PCM transmission with the block diagram.	3	K2
g.	Express different Digital Modulation Techniques.	4	K2
h.	Differentiate between coherent and non-coherent reception.	4	K2
i.	Illustrate Time Division Multiplexing.	5	K3
j.	Illustrate Shannon Channel Capacity Theorem.	5	K3

SECTION B

2. Attempt any three of the following: 10 x 3 = 30

Q no.	Question	CO	Level																		
a.	Differentiate between TRF receiver and Super Heterodyne receiver.	1	K2																		
b.	Explain different type of internal and external noises.	2	K2																		
c.	Describe Delta Modulation with transmitter and receiver diagram and its slope over load and Granular noise.	3	K2																		
d.	Discuss generation and detection of FSK with diagram.	4	K2																		
e.	Consider Eight alphabet source with probability of occurrence as given below and According to Shannon –Fano Techniques, Determine the binary codes , average word length, entropy and efficiency.	5	K3																		
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Symbol(x_i)</th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>E</th> <th>F</th> <th>G</th> <th>H</th> </tr> </thead> <tbody> <tr> <td>Prob[p(x_i)]</td> <td>0.30</td> <td>0.20</td> <td>0.15</td> <td>0.12</td> <td>0.10</td> <td>0.07</td> <td>0.04</td> <td>0.02</td> </tr> </tbody> </table>	Symbol(x_i)	A	B	C	D	E	F	G	H	Prob[p(x_i)]	0.30	0.20	0.15	0.12	0.10	0.07	0.04	0.02		
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Prob[p(x_i)]	0.30	0.20	0.15	0.12	0.10	0.07	0.04	0.02													

SECTION C

3. Attempt any one part of the following: 10 x 1 = 10

Q no.	Question	CO	Level
a.	Explain the method of generation of DSB-SC signal with the help of balanced modulator.	1	K2
b.	Describe Frequency Division Multiplexing system with the help of suitable diagram .	1	K2

4. Attempt any one part of the following: 10 x 1 = 10

Q no.	Question	CO	Level
a.	Differentiate between Narrowband FM and Wideband FM with their frequency spectrum and mathematical expression.	2	K2
b.	Explain Indirect method (Armstrong method) of FM generation.	2	K2



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5. Attempt any *one* part of the following: 10 x 1 = 10

Q no.	Question	CO	Level
a.	Explain Quantization process and derive the expression for quantization error.	3	K2
b.	Describe the method of generation and detection of PWM with waveform.	3	K2

6. Attempt any *one* part of the following: 10 x 1 = 10

Q no.	Question	CO	Level
a.	Give the comparison of ASK, FSK and PSK in detail.	4	K2
b.	Explain the working of PSK with transmitter and receiver.	4	K2

7. Attempt any *one* part of the following: 10 x 1 = 10

Q no.	Question	CO	Level																
a.	Consider the seven source symbols (messages) of a discrete memoryless source and their probabilities as shown in the table. Follow the Huffman's algorithm to determine the code words for each message. Also express the average code word length and the average information per message.	5	K3																
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Message</th> <th>m1</th> <th>m2</th> <th>m3</th> <th>m4</th> <th>m5</th> <th>m6</th> <th>m7</th> </tr> </thead> <tbody> <tr> <td>Prob.(p)</td> <td>0.25</td> <td>0.25</td> <td>0.125</td> <td>0.125</td> <td>0.125</td> <td>0.0625</td> <td>0.0625</td> </tr> </tbody> </table>	Message	m1	m2	m3	m4	m5	m6	m7	Prob.(p)	0.25	0.25	0.125	0.125	0.125	0.0625	0.0625		
Message	m1	m2	m3	m4	m5	m6	m7												
Prob.(p)	0.25	0.25	0.125	0.125	0.125	0.0625	0.0625												
b.	Explain T1 carrier system and calculate the bit rate for transmission.	5	K3																