

Subject Code: XXXXX

Roll No:

--	--	--	--	--	--	--	--	--	--

BTECH
(SEM-5) ANALOG AND DIGITAL COMMUNICATION 2021-22

TIME:3 HOUR

Total Marks: 100

Instruction: Attempt the questions as per the given instructions. Assume missing data suitably.

SECTION - A

Attempt *All Parts* in Brief

2*10 = 20

Q1	Questions	Marks
(a)	Define modulation, amplitude modulation and angle modulation.	2
(b)	Draw the block diagram of communication system and mention the name of each block.	2
(c)	What is frequency deviation of FM signal ?	2
(d)	Define modulation index and percentage modulation in case of FM.	2
(e)	Explain briefly, signal to noise ratio.	2
(f)	Discuss Nyquist criteria for sampling.	2
(g)	Draw the signal waveform of PAM, PWM and PPM.	2
(h)	Explain briefly, quantization process.	2
(i)	What do you understand by Shannon Hartley theorem ?	2
(j)	What is electronic commutator in TDM system?	2

SECTION - B

Attempt Any Three of the following

3*10 = 30

Q2	Questions	Marks
(a)	Why is modulation needed ?	10
(b)	Differentiate between narrowband FM and wideband FM with their frequency spectrum and suitable mathematical expressions.	10
(c)	Explain coherent method of generation and detection of PAM signal with suitable mathematical expressions.	10
(d)	Compare ASK, PSK and FSK: Also give the advantages and disadvantages of ASK, PSK and FSK.	10
(e)	Explain Time Division Multiplexing (TDM) technique with suitable diagram.	10

SECTION - C

Attempt Any One of the following

5*10 = 50

Q3	Questions	Marks
(a)	Why super heterodyne receiver is better than the TRF receiver ? Explain.	10
(b)	An arbitrary modulating signal consisting of two modulating frequencies of 1 kHz and 2 kHz modulated a carrier signal having peak amplitude level of 1 V and frequency of 1 MHz, with amplitude modulation index of 0.5 and 0.2 respectively. Write the resultant expression for complex AM signal and sketch its frequency spectrum.	10
Q4	Questions	Marks
(a)	What is noise ? Explain various forms of noise and its sources.	10
(b)	An FM modulator operates at carrier-signal frequency of 500 kHz having peak amplitude of 10 V. A modulating frequency (f_m) of 10 kHz modulates it with a peak frequency deviation (δ) of 10 kHz. From the Bessel function table, it is observed that a frequency modulation index of one yield three sets of significant sidebands. Compare actual minimum bandwidth as obtained using Bessel function and the approximate minimum bandwidth using Carson's rule.	10
Q5	Questions	Marks
(a)	Explain the working of delta modulation. How adaptive delta modulation improves the performance of delta modulation ?	10
(b)	Let the maximum spectral frequency component (f_m) in an analog information signal is 3.3 kHz. Illustrate the frequency spectra of sampled signals under the following relationships between the sample frequency, f_s and maximum analog signal frequency, f_m - i. $f_s = 2f_m$ ii. $f_s > 2f_m$	10

Q6	Questions	Marks																		
(a)	What is pulse code modulation (PCM) ? Explain briefly, generation and detection of PCM.	10																		
(b)	A discrete memoryless source X has five symbols (s_0, s_1, s_2, s_3, s_4) and their probabilities of occurrence are given as 0.40, 0.20, 0.20, 0.10, 0.10, respectively. Construct Huffman code and calculate efficiency.	10																		
Q7	Questions	Marks																		
(a)	Explain T-1 carrier system with the help of block diagram.	10																		
(b)	<p>Consider 8 different alphabet source with probability of occurrence are given in Table 2:</p> <table border="1" data-bbox="185 611 1037 730"> <thead> <tr> <th data-bbox="185 611 383 667">Symbol</th> <th data-bbox="383 611 456 667">A</th> <th data-bbox="456 611 529 667">B</th> <th data-bbox="529 611 602 667">C</th> <th data-bbox="602 611 675 667">D</th> <th data-bbox="675 611 748 667">E</th> <th data-bbox="748 611 821 667">F</th> <th data-bbox="821 611 894 667">G</th> <th data-bbox="894 611 967 667">H</th> </tr> </thead> <tbody> <tr> <td data-bbox="185 667 383 730">Probability</td> <td data-bbox="383 667 456 730">0.30</td> <td data-bbox="456 667 529 730">0.20</td> <td data-bbox="529 667 602 730">0.15</td> <td data-bbox="602 667 675 730">0.12</td> <td data-bbox="675 667 748 730">0.10</td> <td data-bbox="748 667 821 730">0.07</td> <td data-bbox="821 667 894 730">0.04</td> <td data-bbox="894 667 967 730">0.02</td> </tr> </tbody> </table> <p>According to Shannon-Fano technique generates binary code and calculates average word length, Entropy, and efficiency.</p>	Symbol	A	B	C	D	E	F	G	H	Probability	0.30	0.20	0.15	0.12	0.10	0.07	0.04	0.02	10
Symbol	A	B	C	D	E	F	G	H												
Probability	0.30	0.20	0.15	0.12	0.10	0.07	0.04	0.02												