CT303: Digital Communications

Section B, Autumn, 2022-2023, DAIICT

Lecture-wise breakup of the content, and problems to be solved.

S. No.	Lecture Date	Focus of the lecture	Where to read from?	Problems to be solved
1.	02 August, 2022	Introduction to course; 4 categories of signal; Analog communication	[1]: Section 1.1; [2]: Sections 1.2.2, 1.2.3	None
2.	04 August, 2022	Analog vs Digital Communication (AvD-C)	[1]: Section 1.1.2; [3]: Chapter 1, parts 5,6,7,8; [4]: Section 1-2 for benefits of DC in brief.	None
3.	05 August, 2022	Closing comments for AvD-C; Discussion on Pulse modulation	[3]: Section 3.1; [1]: Section 1.1.2, 1.1.3, 1.1.4	None
4.	12 August, 2022	Sampling theorem	[3]: Sections 3.1, 3.2 [4]: Section 2-7	[3]: Problems 3.2, 3.3
5.	19 August, 2022	Sampling theorem (contd.)	[3]: Sections 3.1, 3.2	[4]: Problems 2-48, 2-54
6.	23 August, 2022	Revision of lectures 4 & 5 due to low attendance in past two lectures.	[3]: Sections 3.1, 3.2	[4]: Problems 2-46, 2-49
7.	25 August, 2022	Revision of lectures 4 & 5 due to low attendance in past two lectures.	[3]: Sections 3.1, 3.2	None
8.	26 August, 2022	Signal recovery, Band pass filtering, sampling signals with impulse	[5]: Page 253 and footnote therein and Pgs. 258 - 262	[5]: Problems 6.1-5, 6.1-6, 6.1-7
9.	30 August, 2022	Anti-Aliasing filter	[5]: Section 3.4, 3.5 (pgs. 91-97) and [5]: Pgs. 258 - 262	
10.	01 September, 2022	Anti-Aliasing filter (contd.), PAM – Natural Sampling (gating)	[4]: Sections 3-1, 3-2; [5]: Pgs. 258 - 262	[5]: Problems 6.1-1 to 6.1-4; [4]: Problems 3-4, 3-5
11.	02 September, 2022	Natural sampling (Contd.) and Instantaneous sampling	[4]: Sections 3-1, 3-2; [5]: Section 3.4, 3.5 (pgs. 91-97)	[3]: Problems 3.6, 3.7

12.	06 September, 2022	Instantaneous sampling (Contd.)	--- Same - as - above -------	None
13.	08 September, 2022	Quantization, derivation of average qantization noise error.	[3]: Section 3.6 (pgs. 193-195); [5]: Section 3.7.1 (self-study)	[5]: Problem 6.2-10, 3.7-2, 3.7-4
	Video lectures	Companding and PCM	[6]: Section 2.7 – Initial Parts; [5]: Section 6.2.2 – Initial Parts; [6]: Section 13.2.5 [4]: Section 3-5; [5]: Section 6.2.4; PCM system diagram – [4]: Fig. 3-7;	[5]: Problem 6.2-1, 6.2-2, 6.2-3, 6.2-6, 6.2-10 [3]: Problems 3.14, 3.15
16.	20 September, 2022	Companding: Mu-Law & A-Law	--- Same - as - above -------	--- Same - as - above -------
17.	22 September, 2022	PCM – Bandwidth & SQNR with companding	--- Same - as - above -------	--- Same - as - above -------
18.	23 September, 2022	Line Codes, Differential coding	[4]: Section 3-5;	[4]: Problems 3-30
19.	27 September, 2022	DPCM	[6]: Section 13.3 – Initial parts; [5]: Section 6.5.	None
20.	29 September, 2022	DPCM (contd.), Time Division Multiplexing (TDM)	[4]: Section 3-9	[3]: Problems 3.8, 3.36, 3.37
21.	30 September, 2022	DPCM (contd.)	[6]: Section 13.3 – Initial parts; [5]: Section 6.5.	None
22.	04 October, 2022	Signal space concepts	[5]: Section 2.4.1; To be self-read from [5]: 2.4.2, 2.4.3, 2.5, 2.6; [3]: Section 5.2	[5]: Problem 2.4-1, 2.4-2, 2.4-3, 2.4-4, 2.5-1
23.	06 October, 2022	Signal space concepts (contd.)	----- Same as above ---------	----- Same as above ------
24.	07 October, 2022	Signal space (contd.), Gram-Schmidt (GS) orthogonalization procedure	[3]: Section 5.2	[3]: Problem 5.2, 5.3, 5.4, 5.8
25.	11 October, 2022	Example of GS procedure and concluding remarks	[7]: Example 7.1.1, [3]: Section 5.2	None

26.	13 October, 2022	Complex base band representation of passband signal	[2]: Section 2.5, [1]: Section 2.8	[1]: Problem 2.17, 2.20 [2]: Problem 2.59
27.	14 October, 2022	Complex baseband representation of passband signal (contd.)	[2]: Section 2.5, [1]: Section 2.8	None

References:

[1] Introduction to Communication systems, U. Madhow.
[2] Digital Signal Processing: principles, algorithms and applications, 4th edition, J. G. Proakis and D. G. Manolakis.
[3] Communication Systems, S. Haykin, 4th edition.
[4] Digital and Analog Communication systems, 6th edition, Leon W. Couch II.
[5] Modern Digital and Analog Communication Systems, B. P. Lathi and Z. Ding, International 4th edition.
[6] Digital Communications: Fundamentals and Applications, 2nd edition, B. Sklar and P. B. Ray.
[7] Communication Systems Engineering, 2nd edition, J. G. Proakis and M. Salehi, LPE, Pearson Education