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	Subject Code & Name: REC 303 SIGNALS AND SYSTEMS **Unit : I Branch : EC Semester :IV**	

UNIT I : **Signals**

Syllabus: Representation of Signals, Singularity Functions, Discrete Time Signals, Types of Signals, Time Scaling and Shifting, Convolution and Correlation of LTI Systems, Correlation of energy and power signals.

Objective: To Study the classification of Signals.

Session No.	Topics to be covered	Time	Ref with page number	Teaching Method
1.	Introduction to Signals and Systems	50 min	1 (31)	BB
2.	Continuous time signals (CT signals), discrete time signals (DT signals)	50 min	1 (32-36)	BB
3.	Elementary signals - Ramp, Pulse, Impulse, Exponential	50 min	1 (60-66)	BB
4.	Elementary signals - Ramp, Pulse, Impulse, Exponential	50 min	1 (60-66)	BB
5.	Classification of CT and DT signals - periodic and Aperiodic, Even and Odd	50 min	1 (41-44)	BB
6.	even/odd, energy/power	50 min	1(1.5-1.73)	BB
7.	Classification of CT and DT signals - Power and Energy	50 min	1 (45-46) 8(1.5-1.73)	BB
8.	Invertible and Non-invertible, Deterministic and Random	50 min	8(1.5-1.73)	BB
9.	CT and DT systems	50 min	1(68-73)	BB
10.	stability. Convolution integral	50 min	1(74-76)	BB
11.	co-relations ,Problems	50 min	1(77-81)	BB
12.	signal energy and energy spectral density	50 min	8(2.1-2.17)	BB

UNIT II : Laplace-Transform (LT) and Z-transform (ZT):

Syllabus:

Laplace Transform and Z Transform: Laplace Transforms- Introduction, Laplace Transforms of common signals, Theorems and properties of Laplace Transforms, Concept of Region of Convergence, Inverse Laplace Transforms; Z Transforms – Introduction, Z Transforms of Common Signals, Theorems and properties of Z Transforms, Inverse Z Transforms.

Objective: To study the frequency domain representation of continuous time signal using F, Laplace and Z-transform

Session No.	Topics to be covered	Time	Ref with page number	Teaching Method
13.	Laplace Transform – ROC	50 min	1(212-216)	BB
14.	Laplace Transform – ROC__continued	50 min	1(234-240)	BB
15.	Properties of Laplace Transform	50 min	3(231-250)	BB
16.	Problems on Laplace Transform	50 min	8(5.2-5.23)	BB
17.	solutions of differential equations using LT	50 min	1(314-320)	BB
18.	solutions of differential equations using + Bilateral LT	50 min	1(330-360)	BB
19.	Z-transform and ROC	50 min	1(365-366) 3(231-260)	BB
20.	Properties of Z-transform and ROC	50 min	1(685-693)	BB
21.	Problems on Z-transform.	50 min	1(712-721)	BB
22.	Methods of Inverse Z Transform	50 min	1(703)	BB
23.	Problems	50 min	3(127-140)	BB
24	s- to z-plane mapping	50 min	-	-

UNIT III Fourier Transforms (FT):

Syllabus: Fourier Transforms: Properties and Significance of CTFT, CTFT of Common Signals, Inverse CTFT; Introduction to DTFT, DTFT of Common Signals, Theorems and Properties – DTFT, Inverse DTFT; Continuous Time and Discrete Time Hilbert Transform and its Properties. Introduction of Gaussian signal and its Fourier transform.

Objective: To study the analysis and synthesis of continuous time systems.

Session No.	Topics to be covered	Time	Ref with page number	Teaching Method
24.	Fourier Transform analysis	50 min	1(7.28-7.30) 8(4.1- 4.5)	BB
25.	Properties of Fourier Transform	50 min	1(7.36-7.40)	BB
26.	Problems on Fourier Transform	50 min	1(7.36-7.40)	BB
27.	Parseval's theorem, Inverse FT	50 min	8(4.14-4.15)	BB
28.	Relation between LT and FT	50 min	8(4.11) 3(223-226)	BB
29.	Introduction to DTFT	50 min	8(4.29-4.46)	BB
30.	Properties of DTFT	50 min	8(6.41-6.57)	BB
31.	Problems on DTFT	50 min	8(7.42-7.58)	BB
32.	Comparison between continuous time FT and DTFT	50 min	3(445-448)	BB
33.	Problems	50 min	3(368,374) 8(7.94-7.110)	BB
34.	Problems	50 min	3(377- 425)	BB

UNIT IV: Systems

Syllabus:: Systems and Analysis of System: System Classification, Linearity/Time Invariance, Causal System, Characterization of LTI Systems, Unit Sample Response, Generalization of D.T. Systems, Concept of Stability, Convolution Integrals/summations, Energy and Power spectral density, Properties of Power spectral Density, Analysis of First order systems, Analysis of second order systems.

Objective:

To study the sampling process and analysis of discrete systems using Z-transforms.

Session No.	Topics to be covered	Time	Ref with page number	Teaching Method
35.	Basic properties of Systems – Linear and Non-Linear, Time Variant and Time Invariant	50 min	1(544-562)	BB
36.	Basic properties of Systems – Causal and Non-causal	50 min	1(388-392)	BB
37.	Basic properties of Systems :Stable and Unstable, Static and Dynamic	50 min	1(402-421)	BB
38.	characterization of linear time-invariant (LTI) systems,	50 min	1(393-397) 4(305-318)	BB
39.	unit sample response, convolution summation	50 min	4(305-318)	BB
40.	step response of discrete time systems	50 min	1(771-782)	BB
41.	signal power and power spectral density	50 min	1(792-793)	BB
42.	properties of power spectral density	50 min	4(228-235)	BB

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UNIT V :Time and frequency domain analysis of systems

Syllabus: Sampling of Time Signals: Nyquist Criterion, Sampling theorem and frequency domain representation of sampling, Sampling Techniques, Reconstruction of band limited signal from its samples, Sampling of Sinusoidal and other signals.

Objective:

To study the analysis and synthesis of continuous & discrete time systems.

Session No.	Topics to be covered	Time	Ref with page number	Teaching Method
43.	Sampling of Time Signals	50 min	1(104-107) 4(256-258) 8(10.76-10.85)	BB
44.	Nyquist Criterion, Sampling theorem	50 min	1(107-111)	BB
45.	frequency domain representation of sampling	50 min	1(111-120) 4(263-269)	BB
46.	Sampling Techniques	50 min	1(409-418)	BB
47.	Reconstruction of band limited signal from its samples	50 min	1(804-810)	BB
48.	Sampling of Sinusoidal and other signals	50 min	8(10.88-10.95)	BB
49.	Problems	50 min	8(10.88-10.95)	BB
50.	Problems	50 min	3(377-426)	BB
51.	Discussion on Old University Question papers	50 min	-	BB
56.	Discussion on Old University Question papers	50 min	-	-

TEXT BOOKS:

1. P.Ramesh Babu, R.Ananda Natarajan "Signals and Systems",Scitech publications Pvt. Ltd.,III edition,2009.
2. Allan V.Oppenheim, S.Wilsky and S.H.Nawab, "Signals and Systems", Pearson Education, 2007.

REFERENCES:

3. Edward W Kamen & Bonnie's Heck, "Fundamentals of Signals and Systems", Pearson Education, 2007.
4. H P Hsu, Rakesh Ranjan" Signals and Systems", Schaum's Outlines, Tata McGraw Hill, Indian Reprint, 2007
5. S.Salivahanan, A. Vallavaraj, C. Gnanapriya, "Digital Signal Processing", Tata McGraw Hill International/TMH, 2007.
6. Simon Haykins and Barry Van Veen, "Signals and Systems", John Wiley & sons, Inc, 2004.
7. Robert A. Gabel and Richard A.Roberts, "Signals & Linear Systems", John Wiley, III edition, 1987.
8. Rodger E. Ziemer, William H. Tranter, D. Ronald Fannin. "Signals & systems", Fourth Edition, Pearson Education, 2002.

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