# ACADEMIC LESSION PLAN FOR WINTER - 2025

**Dept. of Electronics & Telecommunication, Govt. Polytechnic , Balasore**

**Name of the Faculty: Yogasakti Yogamaya (Lecturer , E&TC)**

**SIGNAL AND SYSTEM (ETCPC209)**

Theory : 3 P/W
Total Period s : 45 P/ Sem
Credit : 3
Sem : 3rd E&TC

Progressive Assessment : 30 Marks
End Semester Exam : 70marks
Total Marks : 100
Start of Class : 14/7/2025

| WEEK | PERIOD | TOPIC |
|---|---|---|
| 1st | 1st | **Unit-1: Introduction to Signal and System**<br>1.1 Signal and system as seen in everyday Life |
| | 2nd | 1.2 Signal and system in various branches of engineering. |
| | 3rd | 1.3 Electrical ,Mechanical, Hydraulic ,Thermal, Biomedical signal and system as example |
| 2nd | 1st | 1.4 Extracting the common essence and requirements of signal and system |
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| | 3rd | **Unit-2: Formalizing signals**<br>2.1 Energy and power signal |
| 3rd | 1st | 2.2 Signal properties<br>2.2.1 Periodicity<br>2.2.2 Absolute integrability |
| | 2nd | 2.2.3 Determinism and stochastic character |
| | 3rd | 2.3 Some special signals of importance<br>2.3.1 The unit step<br>2.3.2 The unit impulse<br>2.3.3 The sinusoid<br>2.3.4 The complex exponential |
| 4th | 1st | 2.4 some special time-limited signals<br>2.4.1 Continuous and discrete time signals<br>2.4.2 Continuous and discrete amplitude signals. |
| | 2nd | 2.5 Formalizing systems- system properties<br>2.5.1 Linearity<br>2.5.2 Additivity and homogeneity<br>2.5.3 Shift-invariance |
| | 3rd | 2.5.4 Causality<br>2.5.5 Stability<br>2.5.6 Reliability |
| 5th | 1st | **Unit-3: Continuous time and discrete time Systems**<br>3.1 Linear shift-invariant (LSI) systems in detail |
| | 2nd | 3.2 The impulse response and step response |
| | 3rd | 3.3 Convolution |
| 6th | 1st | 3.4 Input-output behavior with aperiodic convergent inputs |
| | 2nd | 3.5 Cascade interconnections |
| | 3rd | 3.6 Characterization of causality and stability of linear shift-invariant systems |
| 7th | 1st | 3.7 System representation through differential equations and difference equations |

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| | 2nd | **Unit-4: Periodic and semi-periodic inputs to an LSI system**<br>4.1 The notion of a frequency response and its relation to the impulse response |
| | 3rd | 4.2 Fourier series representation |
| 8th | 1st | 4.3 The Fourier Transform |
| | 2nd | 4.4 Convolution/multiplication and their effect in the frequency domain, magnitude and phase response, Fourier domain duality. |
| | 3rd | 4.5 The Discrete-Time Fourier Transform (DTFT) |
| 9th | 1st | 4.6 The Discrete Fourier Transform (DFT) |
| | 2nd | 4.7 Parseval's Theore<br>4.8 The idea of signal space and Orthogonal bases of signals |
| | 3rd | **Unit-5: Laplace Transform for continuous time signals and systems-**<br>5.1 The notion of Eigen functions of LSI systems<br>5.2 A basis of Eigen functions |
| 10th | 1st | 5.3 Region of convergence |
| | 2nd | 5.4 System functions |
| | 3rd | 5.5 Poles and zeros of system functions and signals |
| 11th | 1st | 5.6 Laplace domain analysis |
| | 2nd | 5.7 Solution to differential equations and system behavior |
| | 3rd | 5.8 Generalization of Parseval's Theorem |
| 12th | 1st | **Unit-6: System realization**<br>6.1 System realization through block-diagram representation and system interconnection |
| | 2nd | 6.2 State-space analysis and multi-input, multi-output Representation. |
| | 3rd | 6.3 The state-transition matrix and its role |
| 13th | 1st | 6.4 The Sampling Theorem and its implications<br>6.4.1 Spectra of sampled signals. |
| | 2nd | 6.5 Reconstruction:<br>6.5.1 Ideal interpolator<br>6.5.2 Zero-order hold<br>6.5.3 First-order hold |
| | 3rd | 6.6 Aliasing and its effects. |
| 14th | 1st | 6.7 Relation between continuous and discrete time systems. |
| | 2nd | **Unit-7: Applications of signal and system theory**<br>7.1 Modulation for communication and filtering |
| | 3rd | 7.2 Time-frequency representation and the uncertainty principle |
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| | 2nd | 7.3 Short-time Fourier Transforms |
| | 3rd | 7.3 wavelet transforms |

11/7/25

(Lect in E&TC)

11/07/25

(HOD E&TC)