LESSON PLAN (SUMMER-2025)

Discipline:ETC	**Semester:6th**	**Name of the Teaching Faculty: Soma Dash,Lecturer Stage II ,E &TC**
Subject: Control System	**No of Days /per week class allotted:4**	**Semester From date: 04.02.2025 To date: 16.05.2025** **No of Weeks:15**
Week	**Class Day**	**Theory / Practical Topics**
1st	1st	**1. Fundamental of Control System(5)** 1.1 Classification of Control system
	2nd	1.2 Open loop system & Closed loop system and its comparison
	3rd	1.3 Effects of Feed back
	4th	1.4 Standard test Signals(Step, Ramp, Parabolic, Impulse Functions)
2nd	1st	1.5 Servomechanism 1.6 Regulators (Regulating systems)
	2nd	**2. Transfer Functions(8)** 2.1 Transfer Function of a system & Impulse response
	3rd	2.2 Properties, Advantages& Disadvantages of Transfer Function
	4th	2.3 Poles & Zeroes of transfer Function, 2.4 Representation of poles & Zero on the s-plane
3rd	1st	2.5 Simple problems of transfer function of network
	2nd	2.5 Continue
	3rd	2.5 Continue
	4th	2.5 Continue
4th	1st	2.5 Continue
	2nd	**3. Control system Components & mathematical modelling ofphysical System(5)** 3.1 Components of Control System
	3rd	3.2 Potentiometer, Synchros
	4th	3.2 continue, 3.3 DC motors, AC Servomotors
5th	1st	AC Servomotors 3.4 Modelling of Electrical Systems(R, L, C, Analogous systems)
	2nd	3.4 continue
	3rd	**4. Block Diagram & Signal Flow Graphs(SFG)(8)** 4.1 Definition of Basic Elements of a Block Diagram
	4th	4.2 Canonical Form of Closed loop System
6th	1st	4.3 Rules for Block diagram Reduction,
	2nd	continue
	3rd	4.6 Basic Definition in SFG & properties
	4th	4.7 Mason's Gain formula, 4.8 Steps for solving Signal flow Graph
7th	1st	4.9 Simple problems in Signal flow graph for network
	2nd	continue
	3rd	**5. Time Domain Analysis of Control Systems(8)** 5.1 Definition of Time, Stability, steady-state response, accuracy, transient accuracy, In-sensitivity and robustness.
	4th	5.2 System Time Response
8th	1st	5.3 Analysis of Steady State Error
	2nd	5.4 Types of Input & Steady state Error(Step ,Ramp, Parabolic)
	3rd	5.5 Parameters of first order system & second-order systems
	4th	continue

9th	1st	5.6 Derivation of time response Specification (Delay time, Rise time, Peak time, Setting time, Peak over shoot)
	2nd	continue
	3rd	**6. Feedback Characteristics of Control Systems(6)** 6.1 Effect of parameter variation in Open loop System & Closed loop Systems
	4th	6.2 Introduction to Basic control Action& Basic modes of feedback control: proportional, integral and derivative
10th	1st	continue
	2nd	6.3 Effect of feedback on overall gain, Stability
	3rd	6.4 Realisation of Controllers(P, PI,PD,PID) with OPAMP
	4th	continue
11th	1st	**7. Stability concept& Root locus Method(8)** 7.1 Effect of location of poles on stability
	2nd	7.2 Routh Hurwitz stability criterion.
	3rd	7.3 Steps for Root locus method
	4th	7.4 Root locus method of design(Simple problem)
12th	1st	continue
	2nd	continue
	3rd	continue
	4th	continue
13th	1st	**8. Frequency-response analysis & Bode Plot(7)** 8.1 Frequency response, Relationship between time & frequency response
	2nd	8.2 Methods of Frequency response, 8.3 Polar plots & steps for polar plot
	3rd	8.4 Bodes plot & steps for Bode plots
	4th	continue
14th	1st	8.5 Stability in frequency domain, Gain Margin& Phase margin
	2nd	8.6 Nyquist plots. Nyquist stability criterion.
	3rd	8.7 Simple problems as above
	4th	**9. State variable Analysis(5)** 9.1 Concepts of state, state variable, state model,
15th	1st	continue
	2nd	9.2 state models for linear continuous time functions(Simple)
	3rd	Revision
	4th	Revision

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Signature of the Faculty

LESSON PLAN (SUMMER-2025)

Discipline: ETC	**Semester:6th**	**Name of the Teaching Faculty: SOMA DASH, LECTURER STAGE II,E&TC, GP BHUBANESWAR**
Subject: Digital Signal Processing	**No of Days /per week class allotted: 4**	**Semester From date: 04.02.2025 To date: 16.05.2025** **No of Weeks:15**
Week	**Class Day**	**Theory / Practical Topics**
1st	1st	**1. Introduction of Signals, Systems & Signal processing(10)** 1.1 Basics of Signals, Systems & Signal processing- basic element of a digital signal processing system -
	2nd	Compare the advantages of digital signal processing over analog signal processing.
	3rd	1.2 Classify signals - Multi channel& Multi-dimensional signals-Continuous time verses Discrete -times Signal. -
	4th	Continuous valued verses Discrete -valued signals.
2nd	1st	1.3 Concept of frequency in continuous time & discrete time signals-Continuous-time sinusoidal signals-Discrete-time sinusoidal signals-Harmonically related complex exponential.
	2nd	1.4 Analog to Digital & Digital to Analog conversion & explain the following. a. Sampling of Analog signal,
	3rd	b. The sampling theorem.
	4th	c. Quantization of continuous amplitude signals, d. Coding of quantized sample.
3rd	1st	e. Digital to analog conversion.
	2nd	f. Analysis of digital systems signals vs. discrete time signals systems.
	3rd	**2. DISCRETE TIME SIGNALS & SYSTEMS (14)** 2.1 Concept of Discrete time signals. 2.1.1 Elementary Discrete time signals. 2.1.2 Classification Discrete time signal.
	4th	2.1.3 Simple manipulation of discrete time signal.
4th	1st	2.2 Discrete time system. 2.2.1 Input-output of system.
	2nd	2.2.2 Block diagram of discrete- time systems
	3rd	2.2.3 Classify discrete time system.
	4th	2.2.4 Inter connection of discrete -time system.
5th	1st	2.3 Discrete time time-invariant system. 2.3.1 Different techniques for the Analysis of linear system.
	2nd	2.3.2 Resolution of a discrete time signal in to impulse.
	3rd	2.3.3 Response of LTI system to arbitrary inputs using convolution sum.
	4th	2.3.4 Convolution & interconnection of LTI system - properties.
6th	1st	2.3.5 Study systems with finite duration and infinite duration impulse response.
	2nd	2.4 Discrete time system described by difference equation. 2.4.1 Recursive & non-recursive discrete time system.
	3rd	2.4.2 Determine the impulse response of linear time invariant recursive system.
	4th	2.4.3 Correlation of Discrete Time signals

7th	1st	**3. THE Z-TRANSFORM & ITS APPLICATION TO THE ANALYSIS OF LTI SYSTEM. (14)** 3.1 Z-transform & its application to LTI system.
	2nd	3.1.1 Direct Z-transform.
	3rd	3.1.2 Inverse Z-transform.
	4th	3.2 Various properties of Z-transform.
8th	1st	Continue
	2nd	3.3 Rational Z-transform.
	3rd	3.3.1 Poles & zeros.
	4th	3.3.2 Pole location time domain behaviour for casual signals.
9th	1st	3.3.3 System function of a linear time invariant system.
	2nd	3.4 Discuss inverse Z-transform.
	3rd	3.4.1 Inverse Z-transform by partial fraction expansion.
	4th	Continue
10th	1st	3.4.2 Inverse Z-transform by contour Integration
	2nd	Continue
	3rd	**4. DISCUSS FOURIER TRANSFORM: ITS APPLICATIONS PROPERTIES(12)** 4.1 Concept of discrete Fourier transform.
	4th	4.2 Frequency domain sampling and
11th	1st	reconstruction of discrete time signals.
	2nd	4.3 Discrete Time Fourier transformation(DTFT)
	3rd	Continue
	4th	4.4 Discrete Fourier transformation (DFT).
12th	1st	Continue
	2nd	4.5 Compute DFT as a linear transformation.
	3rd	4.6 Relate DFT to other transforms.
	4th	4.7 Property of the DFT.
13th	1st	4.8 Multiplication of two DFT &
	2nd	circular convolution
	3rd	**5. FAST FOURIER TRANSFORM ALGORITHM & DIGITAL FILTERS(10)** 5.1 Compute DFT & FFT algorithm.
	4th	Continue
14th	1st	5.2 Direct computation of DFT.
	2nd	5.3 Divide and Conquer Approach to computation of DFT
	3rd	5.4 Radix-2 algorithm. (Small Problems)
	4th	5.5 Application of FFT algorithms
15th	1st	5.6 Introduction to digital filters.
	2nd	(FIR Filters)& General considerations
	3rd	5.7 Introduction to DSP architecture,
	4th	familiarization of different types of processor

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LESSON PLAN (SUMMER-2024)		
Discipline: ETC	**Semester: 4th**	**Name of the Teaching Faculty: Rajat Kumar Dutta**
Subject: ANALOG ELECTRONICS & LINEAR IC	**No of Days /per week class allotted: 5**	**Semester From date: 16.01.2024 To 26.04.2024** **No of Weeks:14**
Week	**Class Day**	**Theory / Practical Topics**
1st	1st	**Unit-1: DIODE, TRANSISTORS AND CIRCUITS(10)** 1.1 Working principle, of Diode & its current equation, Specification anduse of p-n junction diode.
	2nd	1.2 Breakdown of diode (Avlance&Zener Breakdown) and Construction, working, Characteristics
	3rd	1.3 Classification of Rectifiers and working of different types of Rectifiers- Half-Wave Rectifier, Full-Wave Rectifier (CT & BRIDGE type)
	4th	continue
	5th	1.4 Working principle of p-n-p and n-p-n transistor, different types of transistor connection (CB, CE and CC)& input and output characteristics of transistor in different connections.
2nd	1st	continue
	2nd	1.5 Define ALPHA, BETA and GAMMA of transistors in various modes. Establish the Mathematical relationship between them.
	3rd	1.6 Basic concept of Biasing, Types of Biasing,h-parameter model of BJT,load line (AC &DC) and determine the Q-point.
	4th	continue
	5th	1.7 Types of Coupling, working principle and use of R-C Coupled Amplifier & Frequency Responses of R-C coupled Amplifier & draw the curve.
3rd	1st	**Unit-2: AUDIO POWER AMPLIFIERS(08)** 1.1 Classify Power Amplifier &Differentiate between Voltage and Power Amplifier.
	2nd	continue
	3rd	1.2 Working principle of different types of Power Amplifier (Class-A, Class-AB, Class-B and Class-C & Class D amplifier).
	4th	continue
	5th	continue
4th	1st	continue
	2nd	1.3 Construction and working principle and advantages of Push Pull (Class-B) Amplifiers
	3rd	continue
	4th	**Unit-3: FIELD EFFECT TRANSISTOR (FET)(10)** 3.1 FET & its classifications &Differentiate between JFET & BJT.
	5th	continue
5th	1st	3.2 Construction, working principle & characteristics of JEFT &Explain JEFT as an amplifier, parameters of JFET & Establish relation among JFET parameters.
	2nd	continue
	3rd	continue
	4th	3.3 Construction & working principle MOSFET & its classification & characteristics (Drain & Transfer)
	5th	continue
6th	1st	continue
	2nd	3.4 Explain the operation of CMOS, VMOS & LDMOS.
	3rd	continue
	4th	**Unit-4: FEED BACK AMPLIFIER & OSCILLATOR(08)** 4.1 Define & classify Feedback Amplifier, principle of negative feedback with the help of block diagram, Types of feedback – negative &positive feedback.
	5th	continue
7th	1st	4.2 Types of negative feedback – voltage shunt, voltage series, current shunt& current series and characteristics voltage gain, bandwidth , input Impedance output impedance, stability, noise , distortion in amplifiers.
	2nd	continue
	3rd	4.3 Oscillator -block diagram of sine wave oscillator ,Types Requirement of oscillation-Barkhausen criterion
	4th	continue
	5th	4.4 RC oscillators – RC phase shift ,Crystal, LC oscillators – Colpitts , Hartley & Wien Bridge Oscillators :Circuit operation, circuit diagram, equation for frequency of oscillation & frequency stability

8th	1st	continue
	2nd	**Unit-5: TUNED AMPLIFIER & WAVE SHAPING CIRCUIT(12)** 5.1 Defined and classify Tuned amplifier, Explain parallel Resonant circuit, Resonance Curve & sharpness of Resonance.
	3rd	continue
	4th	5.2 working principle of Single tuned Voltage& Double tuned Amplifier & its limitation
	5th	continue
9th	1st	5.3 Different type of Non-linear circuits - Clipper, diode series &shunt, positive& negative biased & unbiased and combinational clipper clippers circuit & its application.
	2nd	continue
	3rd	5.4 Different type of Clamper circuit (positive & negative clampers) & its application.
	4th	continue
	5th	5.5 Working of Astable, Monostable & BistableMultivibrator with circuit diagram.
10th	1st	continue
	2nd	5.6 Working& use of Integrator and Differentiator circuit using R- C circuit(Linear), input / output waveforms & frequency response.
	3rd	continue
	4th	**Unit-6: OPERATIONAL AMPLIFIER CIRCUITS & FEEDBACK CONFIGURATIONS(14)** 6.1 Differential amplifier & explain its configuration &significance.
	5th	continue
11th	1st	6.2 Block diagram representation of a typical Op- Amp, its equivalent circuits and draw the schematic symbol
	2nd	continue
	3rd	6.3 Discuss the types of integrated circuits manufacturer's designations of ICs, Package types, pin identification and temperature and ordering information.
	4th	continue
	5th	6.4 Define the following electrical characteristics input offset voltage, input offset current, CMMR, Large signal voltage gain, Slew rate
12th	1st	continue
	2nd	6.5 Draw and explain the Open Loop configuration (inverting, non-inverting Amplifier)
	3rd	continue
	4th	6.6 Draw the circuit diagram of the voltage series feedback amplifier and derive the close loop Voltage gain, gain of feedback circuits input resistance, and output resistance, bandwidth and total output offset voltage with feedback.
	5th	continue
13th	1st	6.7 Draw the circuit diagram of the voltage shunt feedback amplifier and derive the close loop, Voltage gain, gain of feedback circuits and input resistance, and output resistance, bandwidth and total output offset voltage with feedback.
	2nd	continue
	3rd	**Unit-7. APPLICATION OF OPERATIONAL AMPLIFIER, TIMER CIRCUITS& IC voltage regulator (13)** 7.1 Discuss the summing scaling and averaging of inverting and non-inverting amplifiers
	4th	7.2 DC & AC Amplifies using OP-AMP.
	5th	7.3 Integrator and differentiator using op-amp.
14th	1st	7.4 Active filter and describe the filter design of fast order low Pass Butterworth
	2nd	7.5 Concept of Zero-Crossing Detector using Op-Amp ,7.6 Block diagram and operation of IC 555 timer &IC 565 PLL& its applications.
	3rd	continue
	4th	7.7 Working of Current to voltage Convertor using Operational Amplifier
	5th	7.8 Working of the Voltage to Frequency Convertor using Operational Amplifier.
15th (Extra)	1st	7.9 Working of the Frequency to Voltage Conversion using Operational Amplifier.
	2nd	7.10 Operation of power supply using 78XX and 79XX,LM 317 Series with their PIN configuration
	3rd	continue
	4th	7.11 Functional block diagram & Working of IC regulator LM 723 & LM 317.
	5th	continue

Rajat Kumar Dutta

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