COURSE PLAN AND EVALUATION PLAN

1. Course Code: EC102 2. Course Title: CIRCUITS AND SYSTEMS
3. L – T – P**:** **3-1-0** 4. Credits**:** **4**
5. Pre-requisite**:** **Nil** 6. Teaching Department**:** **Electronics & Communication Engg.**
7. Course Instructor**:** **Dr SUMAM DAVID S.**
8. Objectives of the Course:
   - Introduce students to analysis of electric circuits
   - Introduce students to basic signals, linear systems and their properties
   - Introduce students to methods of characterizing & analyzing continuous-time linear systems in the time and transform domains
   - Introduce students to discrete time systems, their properties and real life applications
9. Course Outcomes

At the end of the course the student must be able to

Course Outcome	POs
Analyse Electrical circuits – Steady state and transient	a,
Analyse the behavior of continuous-time and discrete-time signals	a , k
Apply time domain techniques to analyse continuous time LTI systems	a , e, k
Apply transform domain techniques to analyse continuous time LTI systems	a , e, k
Analyse the behavior of discrete-time FIR systems in time and frequency domain	a, e, k

10. Course Coverage (40 – Lecture Schedule) **:**

Module	Contents	Objectives	Lecture	Evaluation
Introduction	Introduction to signals & systems – Objectives of the course, motivation, continuous-time, discrete-time, digital signals and systems, course plan, evaluation method, references	• Appreciate the relevance of the course	**L1**	
Electric Circuit Analysis – Resistive circuits	Circuit concept, circuit elements, independent and dependent sources, network reduction techniques (star-delta), network equations, node voltage and mesh current analysis, Network Theorems	• Analyse electric circuits with DC excitation	**L2-L10**	**Application, Analysis**
	Assignment I/Tutorial I			

Time domain analysis of continuous-time linear systems	Inductance, Capacitance and Mutual inductance, First order systems - Analysis of RL and RC circuits, representation of systems using differential equations, solution of differential equations, Transient and steady state response, time constant, initial conditions, coupled circuits	• Analyse time domain behavior of RL and RC circuits for DC excitation • Analysis of coupled circuits	**L11-L17**	**Application, Analysis**
	Assignment II/Tutorial II			
	Second order systems - RLC circuits, characteristic equation, Natural and step response	• Analyse time domain behavior of RLC circuits for DC excitation	**L18-L20**	**Application, Analysis**
	Basic signals, operations, and properties	• Classify signals based on properties	**L21-L22**	**Application**
Transform domain analysis of continuous-time systems	Laplace Transform: Definition and properties, inverse transforms, partial fraction expansion	• Compute LT and inverse LT	**L23-L26**	**Application, Analysis**
	Assignment III/Tutorial III			
	Linear-time invariant systems, Transform domain analysis of systems, impulse response, convolution, equivalent sources for initial conditions, transform circuits, Impedance functions and Network Theorems, transfer function, poles and zeros, stability	• Analyse systems using LT • Analysis of LTI systems using LT • Represent electric circuits using LT • Relate system behavior to pole-zero plot	**L27-L33**	**Application, Analysis**
	Assignment IV/Tutorial IV			
Discrete-time signals and systems	Sinusoids –complex exponentials and phasor, Spectrum representation – spectrum of sum of sinusoids, Periodic signals, Fourier series representation, synthesis	• Representation of signals in frequency domain	**L34-L36**	**Application, Analysis**
	Sampling and aliasing – sampling of sinusoidal signals, aliasing, sampling theorem, reconstruction	• Understand sampling of continuous time signals	**L37-L38**	**Application, Analysis**
	Discrete time FIR systems – moving average filter, general FIR filter, impulse filter, implementation of FIR filters, LTI systems, convolution, frequency response of FIR systems	• Representation of discrete-time systems • Analyse time domain behaviour of discrete-time FIR systems	**L39-L43**	**Application, Analysis**
	Applications of FIR systems – Sinusoidal synthesis, Image denoising	• Understand simple applications of discrete-time FIR systems	**L44-L45**	**Application**
	Assignment V/Tutorial V			

10. Course web page : Moodle in iris

11. Reference Books

i. J.W.Nillson and SA Riedel, Electric Circuits, PHI, 2000
ii. RC.Dorf and J.A. Svoboda, *Introduction to Electric Circuits, Wiley, 2009*
iii. Mc Chellan, R.W. Schafer & Yoder, *Signal Processing First*, Pearson 2003.
iv. Ambarkar, *Analog and Digital Signal Processing*, Brooks Cole, 1999

12. **EVALUATION PLAN :**

Mid semester exam - 25%
Assignments/Quiz - 25%
End semester exam - 50%

Prepared by:

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Approved by

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