INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

ELECTRICAL POWER DISTRIBUTION SYSTEM								
I Semester: EPS								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
BPSE09	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	-	-	3	40	60	100
Contact Classes: 45	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 45**		
Prerequisite: Power System Analysis								

I. COURSE OVERVIEW:

The course provides a good understanding of DSP principles, and their implementation and equips students to put the ideas into practice and/or to tackle more advanced aspects of DSP.This course will provide a comprehensive grounding in DSP concepts and algorithms, plus practical information on the design and implementation of DSP systems

II. COURSES OBJECTIVES:

The students will try to learn

I. The background and fundamental material for the analysis and processing of digital signals
II. The fast computation of DFT and appreciate the FFT processing.
III. The designs and structures of digital (IIR and FIR) filters and analyze and synthesize for a given specifications.

III. COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1	Analyze discrete-time signals and systems using convolution, correlation, and Z-transform techniques (including ROC) to evaluate system behavior and stability.
CO2	Apply Fourier transform techniques including FT, DTFT, DFT, FFT (Radix-2 DIT & DIF), and inverse FFT to compute and interpret frequency-domain representations of discrete-time signals.
CO3	Design digital IIR and FIR filters using analog approximation methods, transformation techniques, and window-based approaches to meet specified frequency-domain requirements.
CO4	Evaluate power spectral density of discrete-time signals using non-parametric and parametric estimation methods such as Periodogram, Blackman–Tukey, fast correlation, and autoregressive techniques.
CO5	Explain time–frequency signal analysis using STFT, Continuous Wavelet Transform, Discrete Wavelet Transform, and fast wavelet transform techniques.

IV. COURSE CONTENT:

MODULE - I: INTRODUCTION (09)

Discrete time systems, types of signals and their characteristics, types of systems and their behavior. analysis of discrete time linear invariant systems, convolution and correlation of discrete time systems ,z transforms and inverse z transform, Properties of z transform, ROC and its properties

MODULE–II: DISCRETE-TIME FOURIER TRANSFORM AND FAST FOURIER TRANSFORMS (09)

Discrete-time Fourier transform: Definition of Fourier transform (FT), important properties of FT, , The Discrete Fourier transforms, its properties and applications. Frequency domain sampling, properties of DFT, Computation of DFT: Over-Lap Add Method, Over-Lap Save Method, Relation between DTFT, DFS, DFT and Z- Transform. Fast Fourier Transforms: Fast Fourier Transforms (FFT) - Radix-2 Decimation-in-Time and Decimation-in-Frequency FFT Algorithms, Inverse FFT

MODULE –III: DIGITAL FILTER DESIGN (09)

IIR Filter: Designs based on analog filter approximation impulse invariant, Bilinear transformation, Time domain design techniques. Butterworth, Chebyshev type I & II,

Properties and design of FIR filters: Properties, Design techniques - window technique, Frequency sampling comparison of IIR and FIR filters.

MODULE –IV: POWER SPECTRUM ANALYSIS (08)

Power spectrum estimation, Non-parametric and parametric methods for power spectrum estimation. Period gram method, Blackman – Turkey method, fast correlation method. Autoregressive spectrum estimation.

MODULE –V: WAVELET TRANSFORMS (09)

Wavelet Transforms: Short Time Fourier Transform, introduction of Continuous Wavelet Transform, Discretization of the Continuous Wavelet Transform (DWT). Introduction to discrete and fast wavelet transforms.

V. TEXTBOOKS:

1. Discrete Time Signal Processing – A. V. Oppenheim and R.W. Schaffer, PHI, 2009
2. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education / PHI, 2007.
3. S.K. Mitra, Digital Signal Processing, A Computer-Based Approach, Tata Mc GrawHill, 1998

VI. REFERENCE BOOKS:

1. Digital Signal Processing – Fundamentals and Applications – Li Tan, Elsevier, 2008
2. Fundamentals of Digital Signal Processing using MATLAB – Robert J. Schilling, Sandra L. Harris, Thomson, 2007
3. Digital Signal Processing – S. Salivahanan, A. Vallavaraj and C. Gnanapriya, TMH, 2009
4. Digital Signal Processing - A Practical approach, Emmanuel C. Ifeachor and Barrie W. Jervis, 2nd Edition, Pearson Education, 2009

VII. ELECTRONICS RESOURCES:

1. Adv. Digital Signal Processing - Multirate and wavelets, IIT Bombay Prof. V.M. Gadre
2. NOC: Digital Signal Processing, IIT Madras

VIII. MATERIALS ONLINE

1. Course template
2. Tutorial question bank
3. Tech-talk topics
4. Assignments
5. Model question paper-I
6. Model question paper-II

7. Lecture notes
8. Early learning readiness videos (ELRV)
9. Power point presentations

I. Explain time–frequency signal analysis using STFT, Continuous Wavelet Transform, Discrete Wavelet Transform, and fast wavelet transform techniques.**COURSE CONTENT:**

MODULE - I: IDISTRIBUTION OF POWER (09))

Distribution of power, management, power loads, load forecasting short-term and long-term, power system loading, technological forecasting

MODULE–II: ADVANTAGES OF DISTRIBUTION MANAGEMENT SYSTEM (09)

Advantages of distribution management system (D.M.S.): Distribution Automation, definition, restoration, reconfiguration of distribution network, different methods and constraints, power factor correction.

MODULE –III: INTERCONNECTION OF DISTRIBUTION (09)

Interconnection of distribution, control, communication systems, remote metering, automatic meter reading and its implementation; SCADA: Introduction, block diagram, SCADA applied to distribution automation.

Common Functions of SCADA: Advantages of distribution automation through SCADA.

MODULE –IV: OPTIMAL SWITCHING DEVICE PLACEMENT (08)

Calculation of optimum number of switches, capacitors, optimum switching device placement in radial, distribution systems, sectionalizing switches, types, benefits, bellman's optimality principle, remote terminal units, energy efficiency in electrical distribution, monitoring

MODULE –V: MAINTENANCE OF AUTOMATED DISTRIBUTION SYSTEMS (09)

Maintenance of automated distribution systems, difficulties in implementing distribution, automation in actual practice, urban, rural distribution, energy management, AI techniques applied to distribution automation.

TEXTBOOKS:

1. AS Pabla, "Electric Power Distribution", Tata McGraw Hill Publishing Co. Ltd., 4thEdition, 2012.
2. MK Khedkar, GMDhole, "A Text Book of Electrical power Distribution Automation", University Science Press, NewDelhi, 2ndEdition, 2010.

II. REFERENCE BOOKS:

1. Anthony J Panseni, "Electrical Distribution Engineering", CRCPress, 2nd Edition, 2010
2. James Momoh, "Electric Power Distribution, automation, protection & control", CRCPress 2nd Edition, 2006.

III. ELECTRONICS RESOURCES:

1. NOC: Electrical Distribution System Analysis, IIT Roorkee
2. NOC: Power System Engineering, IIT Kharagpur

IV. MATERIALS ONLINE

1. Course template
2. Tutorial question bank
3. Tech-talk topics
4. Assignments
5. Model question paper-I
6. Model question paper-II
7. Lecture notes
8. Early learning readiness videos (ELRV)
9. Power point presentations