

GANPAT UNIVERSITY								
FACULTY OF ENGINEERING & TECHNOLOGY								
Programme	Master of Technology				Branch/Spec.	Biomedical Engineering		
Semester	I				Version	1.0.0.0		
Effective from Academic Year		2018-19			Effective for the batch Admitted in		August 2018	
Subject code	3BM104	Subject Name			Advanced Digital Signal Processing			
Teaching scheme					Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total	CE	SEE	Total
	L	TU	P	TW				
Credit	3	-	1	-	4	Theory	40	60
Hours	3	-	2	-	5	Practical	30	20
Pre-requisites: Good Knowledge of mathematics, signal Processing concepts and basic programming								
Learning Outcome: The educational objectives of the course are to educate students to attain the following:								
<ul style="list-style-type: none"> To understand the students the concepts of frequency domain representation of signals, design and use of digital filters, adaptive filters, wavelets, cross correlation and auto correlation to bio signals. To make students familiar with techniques of digital signal processing. Through this course students will understand the applications of digital signal processing to the bio-signals. Students can analyses the bio-signals using discrete Fourier transform. Students can design digital filters and use them for bio-signals for noise suppression and many other purposes. Students will be familiar with the concepts of wavelets, adaptive filtering and cross correlation. Students can apply these techniques for processing of bio-signals for extracting information for the signals 								
Theory syllabus								
Unit	Content							Hrs
	Introduction to the overview and importance of the course.							
1	INTRODUCTION: Overview of various types of Signals & Systems, Sampling, Sampling Theorem, Discrete Time & Continuous Time Signal Analysis, Analysis of Non-Stationary Signals, Overview of application of Signal Processing in Biomedical. overview of FIR-filters & IIR-filters							6
2	MULTIRATE DIGITAL SIGNAL PROCESSING: Decimation and interpolation, Filters in sampling rate alteration systems, Polyphase decomposition and efficient structures, Digital filter banks.							8
3	ADAPTIVE CANCELLATION AND STATISTICAL PROCESSING: Adaptive filtering, Application of Adaptive filters, Mean Square Error, RLS and LMS Algorithm, Adaptive Lattice Ladder Filter, Adaptive Noise Control.							6
4	SPECTRAL ESTIMATION: Classical Spectral Estimation, Non parametric methods for power spectrum estimation: Bartlet method, Welch method, Blackman and Tuckey method, performance analysis of various techniques, ARMA modeling, Yule-Walker equation and solution.							6
5	WAVELET: Introduction to wavelet, Scaling function and wavelet function, HAAR Wavelet, Daubechies Wavelet, Wavelet Filter Bank and it's complete reconstruction, Comparison of Wavelet with STFT, Application of Wavelet for Biomedical Signal Processing.							6
6	FINITE WORD LENGTH EFFECT ANALYSIS: Finite word length effect, Quantization process & errors, Arithmetic round effect errors analysis, Dynamic range scaling, Reduction of product round off errors.							6
7	APPLICATIONS: Audio processing, Data compression, Neural Networks, Image Processing.							7
Practical content: Term Work and Practical shall be based on the above syllabus.								
Text Books:								
1	J. G. Proakis, D. G. Manolakis: Digital Signal Processing: Principles, Algorithms, and Applications, Prentice Hall, 2007, 4th edition							
2	S. K. Mitra: Digital Signal Processing: A Computer Based Approach, McGraw Hill Higher Education, 2006, 3rd edition							
Reference Books:								
1	Digital Signal Processing by S. Salivahanan							
2	Digital Signal Processing By N.G. Palan							
3	Analog and Digital Signal Processing by Ashok Ambardar							
Web Resources:								
1	http://www.nptelvideos.in/2012/12/advanced-digital-signal-processing.html							

3	https://in.video.search.yahoo.com/yhs/search?fr=yhs-pty-pty_extension&hsimp=yhs-pty_extension&hspart=pty&p=advance+digital+signal+processing+youtube+video&vm=r#id=5&vid=383b5e3f097ec922bfb6ec93cabe014d&action=click
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Note:

Version 1.0.0.0 (First Digit= New syllabus/Revision in Full Syllabus, Second Digit=Revision in Teaching Scheme, Third Digit=Revision in Exam Scheme, Forth Digit= Content Revision)

L=Lecture, TU=Tutorial, P= Practical/Lab., TW= Term work, DT= Direct Teaching, Lab.= Laboratory work

CE= Continuous Evaluation, SEE= Semester End Examination