Department Of Electrical Engineering

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CERTIFICATE

This is to certify that the thesis entitled, "**Voltage Differencing Buffered Amplifier & its applications in Signal Processing**" is a bonafide work submitted by JITENDRA KUMAR (2K11/C&I/03) in partial fulfillment of the requirements for award of the degree of Master of Technology in Control & Instrumentation under my supervision.

This work has not been submitted earlier in any university or institute for the award of any degree/diploma to the best of my knowledge.

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ABSTRACT

Contrary to the perception of signal processing community that Digital Signal Processing technique will dominate the need of Analog Signal Processing techniques; the later have remained firmly entrenched in signal processing applications. During the last two decades with rapid developments in semiconductor fabrication technologies, many active building blocks have been proposed by different research groups which can be used in typical Analog Signal Processing applications. Some of these building blocks are suitable for voltage- mode signal processing while others are suitable for current-mode/mixed mode applications. In the present work a brief survey of some of these active building blocks has been presented. One of these active building blocks namely Voltage Differencing Buffered Amplifier and its various applications have been studied in detail. A CMOS implementation of this block which uses an Operational Trans-conductance Amplifier at its input port has been used to realize amplifiers, integrators, first and second order filters and a KHN type biquad. PSpice simulations of these circuits have also been presented.

CONTENTS

LIST OF FIGURES

LIST OF SYMBOLS

S.No.	Symbols	Descriptions
1.	g_m	Transconductance
2.	Z_i	Input Impedance
3.	Z_o	Output Impedance
4.	V_{SS}	Source Supply Voltage
5.	V_{DD}	Drain Supply Voltage
6.	V_B	Bias Voltage
7.	I_b	Bias Current
8.	w.r.t.	With respect to

9.	OTA	Operational Transconductance Amplifier
10.	CC	Current Conveyor
11.	CFA	Current Feedback Amplifier
12.	CFA	Current Feedback Amplifier
13.	CDBA	Current Differencing Bufferd Amplifier
14.	FTFN	Four Terminal Floating Nullors
15.	CMOS	Complementary Metal Oxide Semiconductor
16.	OA	Operational Amplifier
17.	Op amp	Operational Amplifier
18.	VLSI	Very Large Scale Integration
19.	CDTA	Current Differencing Transconductance Amplifier
20.	VDBA	Voltage Differencing Buffered Amplifier
21.	VCVS	Voltage Controlled Voltage Source
22.	VCCS	Voltage Controlled Current Source
23.	CCVS	Current Controlled Voltage Source
24.	CCCS	Current Controlled Current Source
25.	CCI	First Generation Current Conveyor
26.	CCII	Second Generation Current Conveyor
27.	CCIII	Third Generation Current Conveyor
28.	DVCC	Differential Voltage Current Conveyor
29.	MOCC	Multiple Output Current Conveyor
30.	FDCC	Fully Differential Current Conveyor
31.	DDCC	Differential Difference Current Conveyor
32.	FB-VDBA	Fully Balanced Voltage Differencing Buffered Amplifier

33.	CCTA	Current Conveyor Trans-conductance Amplifier
34.	DV-CCTA	Differential Voltage Current Conveyor Trans-conductance Amplifier
35.	VDTA	Voltage Differential Trans-conductance Amplifier
36.	CFTA	Current Follower Trans-conductance Amplifier

CHAPTER-1 INTRODUCTION

CHAPTER-2 ACTIVE BUILDING BLOCKS AT A GLANCE

CHAPTER-3 VDBA & ITS CMOS REALIZATION

CHAPTER-4 APPLICATIONS OF VDBA

CHAPTER-5 KHN BIQUAD USING VDBA