

# SELECTED TOPICS IN ADVANCED ELECTRONICS

Edited by  
Khalid A. S. Al-Khateeb



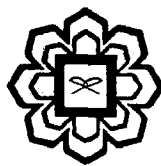
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**ADVANCED ELECTRONICS**

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## CHAPTER 16

# ERBIUM DOPED FIBER AMPLIFIER WITH A QUADRUPLE PASS

By

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### Synopsis

A new configuration of an Erbium Doped Fiber Amplifier achieves Quadruple-Pass amplification by Double-Pass amplification in a Dual-Stage using a fiber loop-back incorporated with a Tunable Band Pass Filter. Spontaneous emission is filtered-out in the mid-section to ensure efficient amplification of the signal as it propagates along the fiber. High gain of 61dB is achieved for -50dBm signal power at 1550nm. The two stages can be pumped by laser diodes operating at 980nm with 10mW and 220mW respectively.

### 1 Introduction

Erbium doped fiber amplifiers (EDFA's) have attracted much attention for use in the third telecommunication window at wavelengths in the 1540-1560nm band [1][2]. Although much progress has been made in the development of high gain EDFAs, which form the backbone of high-capacity optical communications, fiber systems still suffer from loss due to different intrinsic characteristics of fiber materials. Hence, increased research effort is directed towards new materials and detailed system optimization [3]. Various configurations [5] have been proposed to increase amplifier