

# CONTENTS

List of Tables	IV
List of Figures	V-VI
ACRONYMS	VII
CHAPTER 1.	1-13
1.1. Historical development	2
1.2. The general system	6
1.3. Advantage of optical fiber communication	9
CHAPTER 2.	14-20
2.Optical fiber & cable	14
2.1.Introduction	15
2.2.Optical fiber	16
2.2.1. Multimode step index fiber	17
2.2.2. Single mode fiber	19
2.2.2.1. standard single mode fiber	20
CHAPTER 3.	21-26
3. Introduction	22
3.1. WDM Network	22
3.2. Different types of WDM	23
3.3. Benefits of WDM	25
3.3.1. Capacity Upgrade	25
3.3.2. Transparency	25
3.3.3. Wavelength Reuse	25
3.3.4. Scalability	26
3.3.5. Reliability	26

3.4 QoS in WDM Network	26
CHAPTER 4.	27-29
4. LITERATURE REVIEW	28
CHAPTER 5.	31-35
5. Simulation setup	31
5.1. Simulation block diagram	31
5.1.1. Using binary modulation scheme	32
5.1.2. Using duo binary modulation scheme	32
5.2. Simulation schematics	34
5.2.1. Optsim layout of binary modulation	35
5.2.2. Optsim layout of Duo binary modulation	35
CHAPTER 6.	37-45
6. Simulation result and discussions	38
6.1. Result of binary modulation	38
6.1.1. Optical spectra	38
6.1.2. Eye diagram	38
6.2. Result of Duo binary modulation	41
6.2.1. Optical spectra	41
6.2.2. Eye diagram	42
6.3 Binary vs. Duo binary	45

CHAPTER 7.	48-49
7. Conclusion	48
5.1. Scope of future work	49
References	

## **List of Tables**

Table1: Structure of multimode step index fiber	19
Table2: Structure of standard single mode index fiber	20
Table 3: Type of WDM network	24
Table 4: Results from Eye diagram of Binary modulation	41
Table 5: Results from Eye diagram of Duo binary modulation	45

## **List of figure**

<b>Fig.1.1.</b> The electromagnetic showing the region used for optical fiber communication.	5
Fig.1.2. (a) The general communication system	
(b) The optical fiber communication	8
Fig.1.3. Digital optical fiber link	8
Fig.2.1. Typical structure for a glass multimode step index fiber	18
Fig 2.2. Attenuation spectra for multimode step index fiber	
(a)Multicomponent glass fiber	
(b) Doped silica fiber	18
Fig.2.3. Typical structure for a standard singal mode step index fiber	20
<b>Fig. 3.1.</b> Wavelength devision multiplexing	23
<b>Fig. .5.1.</b> Block diagram of Binary modulation	
scheme for 2- channel WDM system	33
<b>Fig. 5.2.</b> Block diagram of Dou binary modulation	
scheme for 2-channel WDM system	34
<b>Fig. 5.3.</b> Binary modulation schematic	36
<b>Fig. 5.4.</b> Duo Binary modulation schematic	36
<b>Fig. 6.1.</b> Optical spectra obtained from	
(a). Fiber input in binary modulation scheme	39

<b>(b).</b> Fiber output in binary modulation scheme	39
<b>Fig. 6.2.</b> Eye diagram of different bit rate obtained in binary modulation	40
<b>Fig. 6.3.</b> Variation of Bit Error Rate and Q- Factor with bit rate of Binary modulation	41
<b>Fig. 6.4.</b> Optical spectra obtained from <b>(a).</b> Fiber input in Duo-Binary modulation scheme	41
<b>(b).</b> Fiber output in Duo-Binary modulation scheme	41
<b>Fig. 6.5.</b> Eye diagram for different bit rate obtained in Duo-Binary modulation	44
<b>Fig. 6.6.</b> Variation of BER and Q-Factor with bit rate of Duo-Binary modulation	44
<b>Fig. 6.7.</b> Comparison of Q-Factor in binary and Duo-Binary modulation scheme	26

## ACRONYMS

PON-Passive Optical Network

WDM-Wavelength Division Multiplexing

CWDM-Coarse Wavelength Division Multiplexing

DWDM-Dense Wavelength Division Multiplexing

QoS-Quality of Service

BER- Bit Error Rate

ISI- Inter symbol interference

CW- Continuous wave

EDFA- Erbium doped fiber amplifier

MZI- Mach-Zhender interferometer

MZM- Mach-Zhender modulator

OSA- Optical spectrum analyzer

FWM- Four wave mixing

MILP-Mixed integer linear Programming.

GUI- Graphic user interface.

