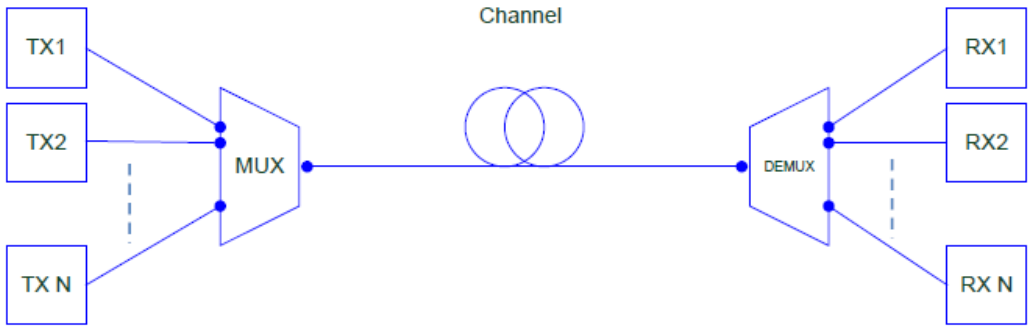
ELECTRICAL ENGINEERING DEPARTMENT
FACULTY OF ENGINEERING
ALEXANDRIA UNIVERSITY
EGYPT

Lecturer :	Hossam Shalaby, *Professor*	Semester	I, 2017/2018
Course Code	EE482	Course name	Optical Communications Systems

Optisystem Assignment

Part I. Design a 64 channel dense WDM system



with the following specifications:

1. **Transmitter**
   - Channel spacing = 100 GHz
   - For the wavelengths; try to use **ITU-T Recommendation G.694.1**. it specifies DWDM operation in the S, C, and L bands for frequency spacing of 100 to 12.5 GHz (equivalently 0.8 to 0.1 nm at 1550 nm)
   - Transmission line rate = 10 Gb/s
   - NRZ modulation format, $2^{15} - 1$ PRBS pattern length
2. **Channel**
   - Transmission link length = 400 km
   - Optical fiber is : SMF-28e+ J
   - divide the total distance into N spans using loop control (ex.: for distance 240 km should be divided into 3 spans) each span consists of fiber, DCF to compensate dispersion , EDFA to compensate the attenuation loss.

The design goal is to achieve error-free transmission (BER < 10^{-9}) for all channels

Your report must include:

- A **printout** of the schematic diagram of the system
- **Optical spectra** of the multiplexed 64 channels at 0 km, 200 km and 400 km
- **BER plots (BER vs. received optical power)** of Channel 1, Channel 17, Channel 39 and Channel 64, and their corresponding eye diagrams at BER = 10^{-9}

Part II. Design a Single carrier system

1. **Transmitter**
   - Operating wavelength = 1550 nm
   - Transmission line rate = 100 Gb/s
   - NRZ modulation format, $2^{15} - 1$ PRBS pattern length
2. **Channel**
   - Transmission link length above 80 km
   - Optical fiber is : SMF-28e+ J
   - Divide the total distance into N spans using loop control (ex.: for distance 240 km should be divided into 3 spans) each span consists of fiber, DCF to compensate dispersion, EDFA to compensate the attenuation loss.
3. **Modulation format**

   Each team should choose **only one** of the following formats

   - PAM
   - PSK
   - QAM
   - DPSK

➢ It is upon your choice the modulation order (M)

Bonus

- Generating the baseband signal in Matlab & passing it to optisystem
- Calculating the BER using Matlab
- Using higher order modulation (M=16,32,64 ……)

Your report must include:

- A **printout** of the schematic diagram of the system
- **Constellation diagram** of the signal at 0 km, 40 km and 80 km
- **BER plots (BER vs. received optical power)** their corresponding eye diagrams at BER = 10^{-9}

Regulations:

1. Working in groups, each group will consists of 6-8 students (you could stick with your lab group or change it).
2. You should submit all optisystem project files, m-files and a report contains all figures, curves, comments and group names.
3. The e-mail of submission will be announced later
4. Submission Deadline is Friday, 22th of December, 2017.
5. Discussion will be held in the following day of your submission