# THESIS SUPERVISOR'S REPORT

## I. IDENTIFICATION DATA

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| **Thesis title:** | **Experiment and Simulations of Four Wave Mixing in Optical DWDM Systems** |
| **Author's name:** | **Sana Mohammed** |
| **Type of thesis :** | master |
| **Faculty/Institute:** | Faculty of Electrical Engineering (FEE) |
| **Department:** | Department of Telecommunication Engineering |
| **Thesis reviewer:** | Ing. Michal Lucki, PhD. |
| **Reviewer's department:** | Department of Telecommunication Engineering |

## II. EVALUATION OF INDIVIDUAL CRITERIA

| **Assignment** | **challenging** |
|---|---|
| *How demanding was the assigned project?* | |

The work included both numerical simulations and a subsequent experiment of Four Wave Mixing in a DWDM system. The presented thesis is highly topical. I consider the assignment to be challenging.

| **Fulfilment of assignment** | **fulfilled** |
|---|---|
| *How well does the thesis fulfil the assigned task? Have the primary goals been achieved? Which assigned tasks have been incompletely covered, and which parts of the thesis are overextended? Justify your answer.* | |

The Student performed simulation of a reference configuration for the FWM effect and then incorporated it into a DWDM system. The subsequent experimental results confirm the simulations. Four Wave Mixing was examined in combination with several other unfavorable factors that influence transmission in optical systems. Last but not least, a sample solution to avoid FWM in DWDM is shown. I consider the goals of the work as **fulfilled** without any objections.

| **Activity and independence when creating final thesis** | **A - excellent.** |
|---|---|
| *Assess whether the student had a positive approach, whether the time limits were met, whether the conception was regularly consulted and whether the student was well prepared for the consultations. Assess the student's ability to work independently.* | |

Ms. Sana Mohammed is a very responsible student who showed involvement, confirmed by her excellent skills and theoretical knowledge. She spent many hours in the laboratory of optical systems and participated in the planned meetings with the Supervisor. All the deadlines were respected. She can work independently and approaches any research problem in an academic way. I emphasize her academic skills and the ability to write about technical problems.

| **Technical level** | **A - excellent.** |
|---|---|
| *Is the thesis technically sound? How well did the student employ expertise in his/her field of study? Does the student explain clearly what he/she has done?* | |

The main focus of the work was to investigate the phenomenon of Four Wave Mixing and its consequences in DWDM systems. The technical approach is excellent, it includes calculations (prediction), simulations and practical experiments. Individual components were also carefully tested for potential troubleshooting. The results showed that FWM could result in significant increase in BER, regardless relatively high power levels. To avoid that, careful dispersion planning, reasonable optical power management and the use of ITU frequency grid are necessary. The work submitted by Ms. Sana Mohammed can potentially facilitate a systematic approach to network planning and understanding nonlinear physical processes in DWDM networks. It assesses deep theoretical / practical knowledge and writing skills of the Student. The results are explained in a professional way. Very interesting findings (among many others) are the ones found in Chapter 8.

| **Formal level and language level, scope of thesis** | **A - excellent.** |
|---|---|
| *Are formalisms and notations used properly? Is the thesis organized in a logical way? Is the thesis sufficiently extensive? Is the thesis well-presented? Is the language clear and understandable? Is the English satisfactory?* | |

The work is written in American English, it is well readable (Ms. Mohammed is also a professional English teacher). It is accompanied by a number of diagrams and figures with high quality and resolution. The terminology is correct; abbreviations are introduced in a correct way. The use of academic language proves that the Author is proficient.

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| **Selection of sources, citation correctness** | **A - excellent.** |

*Does the thesis make adequate reference to earlier work on the topic? Was the selection of sources adequate? Is the student's original work clearly distinguished from earlier work in the field? Do the bibliographic citations meet the standards?*

As references, the Student primarily used indexed professional journal and conference papers. The references are up to date and of a high quality. The state of art, the related works are referenced in a proper way. The used elements are clearly distinguished from the Author's own results.

**Additional commentary and evaluation (optional)**

*Comment on the overall quality of the thesis, its novelty and its impact on the field, its strengths and weaknesses, the utility of the solution that is presented, the theoretical/formal level, the student's skillfulness, etc.*

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## III. OVERALL EVALUATION, QUESTIONS FOR THE PRESENTATION AND DEFENSE OF THE THESIS, SUGGESTED GRADE

*Summarize your opinion on the thesis and explain your final grading.*

The most influential aspect of overall assessment is the quality of the results; the work is excellent.

I **recommend** the work of Ms. Sana Mohammed for the defense.

The grade that I award for the thesis is **A - excellent.**

Date: **25.5.2023**                    Signature: