

I. IDENTIFICATION DATA

Thesis title:	Design of an AC system for building
Author's name:	Joshua Jonathan Sadanand Donald
Type of thesis :	bachelor
Faculty/Institute:	Faculty of Mechanical Engineering (FME)
Department:	Department of Environmental Engineering
Thesis reviewer:	Daniel Adamovsky
Reviewer's department:	Department of Indoor Environmental and Building Services Engineering, FCE

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	ordinarily challenging
<i>How demanding was the assigned project?</i>	
Assigned project of air-conditioning system design for a small office building is appropriate for bachelor thesis.	

Fulfilment of assignment	fulfilled with major objections
<i>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.</i>	
Thesis represents a study of AC system, not a project. Particular level of project is not stated in given assignment, but there is at least one major part of this thesis, which do not meet requirements for a project, and that are drawings. Presented drawings are in fact sketches with no description, scale and any specific information.	

Methodology	partially applicable
<i>Comment on the correctness of the approach and/or the solution methods.</i>	
The method for solving the assignment is generally correct. Main objection aims at procedure of calculation of heat load, which use few wrong assumptions (mainly neglecting direct solar heat gains – p. 24), furthermore some inputs are not well explained and even some are not specified at all (see commentary below).	

Technical level	E - sufficient.
<i>Is the thesis technically sound? How well did the student employ expertise in the field of his/her field of study? Does the student explain clearly what he/she has done?</i>	
Technical level of thesis is quite poor. According to the comments below the thesis misses many necessities of technical design of an AC system.	

Formal and language level, scope of thesis	D - satisfactory.
<i>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?</i>	
Thesis is organized well, the structure is clear and it is written intelligibly. Scope of the thesis is small; especially parts 2 and 3 are very short and vague.	

Selection of sources, citation correctness	C - good.
<i>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?</i>	
Thesis contains important sources. The number is acceptable for practical bachelor thesis focused on a project.	

Additional commentary and evaluation (optional)
<i>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.</i>

As stated above the thesis has many issues in content, technical solution of the system and expression of solution in drawings.

General issues:

- The thesis do not meet requirements for an AC system design. Calculations are simplified too much, description of the system is weak and technical drawings are completely missing.
- Uncertain reason for design for two sites if major outer conditions, which makes fundamental distinctiveness are mostly neglected. Due to idealized shading preventing all solar radiation, the result for Czech site and Kuwait site in terms of system and power is nearly the same (p. 40).

Content issues:

- Missing description of CZ and KWT site in terms of weather conditions, indoor state, etc. Thus, inputs for design are very indistinctly set.
- Text in part 2 is very short and vague. It does not contain any technical description of possible optional AC systems. Therefore student do not provide any reason why he has chosen VRV air-conditioner.
- The building used in thesis is strange. It seems to be just a section of a building, may be an open space office (e.g. there are no bathrooms).

Technical issues:

- Assumption „Shading device blocks all radiation and so all solar heat gain is caused due to conductive heat gain on walls, windows, and roof.“ (p. 24) is wrong – a window shading, which prevents 100 % of solar radiation transmitted through glazing does not exist.
- Calculation estimates 350 lights running (table 3.5). Is it efficient to ideally shade the room and then use lighting?
- Table 3.4 specify 167 K difference for windows. It is probably wrong...
- Regarding the indoor AC unit, what portion of cooling capacity represents sensible heat?
- Outdoor unit for CZ site has cooling capacity 45 kW while indoor units require 40.5 kW and air-handling unit 10 kW. The outdoor unit is underestimated.
- Location of suction and exhaust from exterior to air handling unit is not specified.
- Noise level from outdoor units to windows nearby.
- Missing descriptions in drawings (pipe dimensions, air flow rates, cooling and heating outputs of indoor unit, etc.)

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. Pose questions that should be answered during the presentation and defense of the student's work.

Conclusion:

Submitted thesis provide very weak design of an air conditioning system. The major problem is not wrong approach or methodology, but it is lack of content, which is usually expected from a project design.

Question for student:

Specify advantages of your solution with cooling and ventilation devices dedicated for separate floors in compare to central system.

The grade that I award for the thesis is **E - sufficient**.

Date: **13.8.2020**

Signature: