**Higher National Certificate**

**Construction and the Built Environment**

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| **Student Name /ID Number** |  |
| **Unit Number and Title** | **10 Principles of Ventilation & Air-conditioning Design & Installation** |
| **Academic Year** | **2020** |
| **Unit Assessor** |  |
| **Assignment Title** | **System Design and Cooling Load Analysis** |
| **Issue Date** |   |
| **Submission Date** |  **Individually negotiated** |
| **Assignment Writer** | **Dr. Qutaiba Abessalam** |
| **IV Name**  |  |

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| **Submission Format:** |
| The submission is in the form of an individual written report. This should be written in a concise, professional style. The selection of font face, font size and line spacing are left to your discretion. However, you should keep in mind that clarity and readability are key factors in professional documents.You are encouraged to make use of drawings, graphics, charts, etc. Any material (images, graphics, drawings, text) that is derived from other sources must be suitably referenced using a standard form of citation. Provide a bibliography, using an academic standard format.The recommended word limit is 4,000-5000 words. You will not be penalised for exceeding the total word limit, but being concise and clear are key features of professional documents.**Review the Unit Content from the Unit Specification along with the Learning Outcomes and Assessment Criteria shown below thoroughly.** This shows the depth of knowledge that you must demonstrate in the submission. It is important that your submission meets ALL of the PASS criteria as a minimum requirement. Remember the tasks set up in this brief provide the opportunity for you to respond appropriately to the assessment criteria. |
| **Unit Learning Outcomes:** |
| **LOI Identify pre-design information required for a non-domestic ventilation and air conditioning system.****L02 Analyse cooling loads for non-domestic buildings.****L03 Present a design for a non-domestic ventilation system and air-conditioning system for a given building type.****L04Justify the selection of non-domestic ventilation and air conditioning components and an installation strategy.** |

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| **Assignment Brief and Guidance:** |
| **Task 1:**You have been hired by a local Air-Conditioning Services firm, as an assistant to the building services engineer. The firm has been appointed to manage the design and installation of a new cooling system for a small commercial building. Your employer has tasked you with identifying and preparing an initial report on the pre-design information needed and cooling loads required for the building.Your report should include:* an overview of the design process for a cooling system
* a review of the information that will be required for a cooling system design brief
* calculations to support the design of a system, including heat gain, cooling load and peak temperatures analysis of health and safety legislation related to air-conditioning systems.

**Task 1 addresses Learning Outcome 1; P1, P2, P3, M1, D1 and Learning Outcome 2: P4, P5, P6, M2 and M3.****Task 2:**Having prepared a report on the design information and cooling loads, your employer would now like you to undertake the design of the system and selection of necessary plant/components for a small commercial building.Based on pre-design information and cooling load analysis (Task 1) and drawings, in your report you are expected to compare and evaluate sustainable options for inclusion in a ventilation and air conditioning strategy for a given building type include:* prepare a design for the ventilation and air-conditioning systems, comparing different alternatives to arrive at a design
* consider how to reduce the total cooling load in order to make the system more sustainable
* specify the requisite plant/components for the ventilation and air-conditioning systems, including consideration of ducting sizes and their effect on the systems.

**Task 2 addresses Learning Outcome 3; P7, P8, M4P9, D2 and Learning Outcome 4: P9, P10, M6.** |

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| **Learning Outcomes and Assessment Criteria** |
| **Pass** | **Merit** | **Distinction** |
| **LOI Identify pre-design information required for a non-domestic ventilation and air conditioning system** | LOI L02DI Analyse health & safety and environmental legislation relevant to the design, installation and operation of a nondomestic ventilation and air conditioning system. |
| PI Explain the design process stages and tasks for the design of a nondomestic ventilation and air conditioning system.P2 Discuss the information included in a design brief for a nondomestic ventilation and air conditioning system design.P3 Produce design data for a ventilation and air conditioning system in a given building. | M l Evaluate the design considerations and constraints for the design of a nondomestic ventilation and air conditioning system for a given building. |
| **L02 Analyse cooling load for non-domestic buildings** |
| P4 Calculate the heat gains for a room within a given building.P5 Calculate the total cooling load for a given building.P6 Calculate the peak summertime temperature for rooms in a given building. | M2 Analyse strategies that could be used to reduce the total cooling load calculated for the given building.M3 Analyse the peak summertime temperatures calculated, making suitable recommendations. |
| **L03 Present a design for a non-domestic ventilation and air conditioning system for a given building type.** | L03 L04D2 Critically evaluate sustainable options for inclusion in a ventilation and air conditioning strategy for a given building type. |
| P 7 Discuss ventilation strategies for a given building.P8 Present a ventilation and air conditioning design proposal for a given building type. | M4 Compare different ventilation strategies to determine best practice. |
| **L04Justify the selection of non-domestic ventilation and air conditioning components and an installation strategy.** |
| P9 Specify ventilation and air conditioning components, including ductwork sizing for a given building.PI 0 Justify the selection of components for a nondomestic ventilation and air conditioning system. | M5 Discuss the effect of different duct sizing on the performance of a ventilation and air conditioning installation. |

**Recommended Resources**

**Textbooks**

CHADDERTON, D. (2013) *Building Services Engineering*. 6th ed. Abingdon: Routledge.

CHADDERTON, D. (2014) *Air Conditioning: A Practical Guide*. 3rd ed.

Abingdon: Routledge.

CIBSE (2015) *CIBSE Guide A: Environmental design.* 8th ed*.* London: CIBSE.

CIBSE (2005) *CIBSE Guide B: Heating, Ventilating, Air Conditioning and Refrigeration.*

London: CIBSE.

JONES, W. (2001) *Air Conditioning Engineering*. 5th ed. Oxford: Elsevier.

RACE, G.L. (2012) *CIBSE Knowledge Series: KS20, Practical Psychrometry*.

London: CIBSE.London: CIBSE

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| **Learner declaration**  |
| I certify that the work submitted for this assignment is my own and research sources are fully acknowledged.   Student signature: Date:  |

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Higher Education Qualifications

Summative Assignment Feedback Form