**Faculty of Engineering & Technology**

**MSc Renewable Energy Engineering**

**Solar Energy Systems RE-SES**

**Individual Report**

The report should contain all sections and well-organized structure that covered the main areas of the as described below:

| Outline | Max | Mark |
|---|---|---|
| 1. Executive Summary | 5 | |
| 2. Project Objectives and Plan | 5 | |
| 3. Introduction | 5 | |
| 4. Market Evaluation | 5 | |
| 5. Site selection and layout | 10 | |
| 6. Methodology | 5 | |
| 7. Results & Discussion | | |
| i. Preliminary design calculation | 15 | |
| ii. PVsyst simulation and calculation | 10 | |
| iii. Economic Appraisal | 10 | |
| iv. Presentation and Style | 10 | |
| v. Discussion | 10 | |
| vi. Creativity and Innovation | 5 | |
| 8. Conclusion | 5 | |
| **Total** | 100 | |

**Technical Guidlines:**

The report's design section must comprise the following aspects:

1. Choose a specific date within the year and conduct solar radiation calculations for the selected location, covering all the aspects taught in class for that date.

2. Utilize PVsyst software to design a solar PV plant with a capacity of 300 kWp.

3. Experiment with different tilt angles, present the outcomes, and provide your recommendations based on the observations.

4. Investigate additional factors influencing PV output generation and provide a thorough discussion of the findings.

5. Analyze the results obtained from PVsyst.

6. Additional marks will be awarded for the incorporation of creative and innovative ideas.

The report should also include the manual sizing methodology for the PV panels and inverter selection. Furthermore, students are encouraged to integrate the PV system with an existing building (e.g., hospital, offices, shopping mall, etc.) and thoroughly discuss the outcomes and benefits after the system deployment.

**General instructions:**

- Page limit: 25 pages (Arial 11-point font, single-spaced, excluding Title page, Executive Summary, Table of Contents, Nomenclature, Reference List and Appendices). The page size is A4, and all margins (top, bottom, left, right) should be at least 15 mm. Any material that exceeds this limit will not be marked.
- The reports must be word-processed including tables, calculations and equations. All figures and tables must be of a size that is comfortable to read. Scanned images (good quality) can be used, but these must be correctly referenced to the original source. All figures and tables must be uniquely numbered with a descriptive caption and referred to by number from the text.
- Number all pages in the main body of the reports.
- Adopt common styles for the text, graphs, tables etc., as this improves the overall appearance of the reports.
- All sources of information used in the reports must be in the public domain and correctly referenced (the Harvard method is recommended).

**Content:**
Title page
To include the title of the project, author, year and Institution.

**Executive Summary:**
To include the product, capacity and location, the name and purpose of your project, and some details on the site selection, rationale, main calculations, and findings. Maximum one page.

**Table of Contents:**
A list of section and subsection numbers and headings in the report together with the starting page number in each instance. No more than 3 levels of section number are recommended (e.g. 1., 1.1., 1.1.1.). A fourth level (e.g. 1.1.1.1.) is still acceptable but should be used sparingly.

**Introduction of the theoretical basis:**

give a general introduction about the renewable energy narrowing down to the solar PV plant. The '**Introduction and Literature'** section should contain information from the trustworthy published scientific literature and get cited.

**Site selection and layout:**
Each student should select a specific location within Oman to design a solar PV plant using PVsyst software and to determine the evacuated power where it will be connected.
Explain the rationale behind selecting the location. And show the layout of the selected location and find the real /assume that building consumption to evaluate the savings.

**Design Methodology:** In this section, show your site location and explain the required area of the solar farm, and brief summary of the methodology followed in your design and the methodology you have followed.

**Results and discussion:**

The most important results are discussed in this section. You must explain what you obtained and justify the quality of the results, the reasons the trends that we expected/predicted were correct and why. It is more important to discuss the results underpinning with theory than to say: "I observed this, I observed that, I obtained this…"

**Design Calculations:**
In this part, show your manual calculation leads to the design. The calculations must be presented in a clear, consistent, and logical manner and are easy to follow. All parameters and their corresponding units should be included. All results are explained and cross-

referenced within the discussion. Assumptions are clearly stated and referenced appropriately.
Sample calculations need to be included in the section. The final design data should be summarized in a **Table**.

**Conclusions, recommendations and reflections:**
Here you must summarize the results that give an answer to the conclusion. In recommendations and reflections, you can indicate things that could be considered for further testing.

**References & Nomenclature**
If any of the information used has been extracted from a different source, you must acknowledge it by referencing it. A full list of references used in the compilation of the report must be included in this section. When quoting a reference in the text, it is recommended that the Harvard system is used, i.e. authors' surnames are quoted inside brackets along with the year of publication, e.g. (Smith and Richardson, 1997; Smith et al., 2008). In the reference section, the entry list should be in author alphabetical order and in a consistent style. Internet websites/URLs must not exceed 10% of the total number of references quoted.
A nomenclature list should also be included.
-No less than 5 reference should be included in the report.

➢ **Appendices**

Include additional information here, *e.g.* supporting documentation *etc*. It is important that material in the appendices is referred appropriately from the main body of the report; otherwise, the reader will not be aware of its relevance.

**Marking rubrics**

Executive Summary:

| ***Grading criteria*** | ***Class*** |
|---|---|
| The document does not show the key features of the proposed design. | Fail |
| The document attempts to show the key features of the proposed design but does so in a confusing manner that lacks structure. | Pass/Third |
| The document highlights the key features of the proposed design. | Lower Second |
| The document clearly states the basis of the design and summarizes how the proposed design meets this basis and the overall project brief. | Upper Second |
| The document objectively states the basis of the design and quantifiably states how the proposed design meets this basis and the project brief. | First |

Introduction:

| ***Grading criteria*** | ***Class*** |
|---|---|
| Very short or missing introduction to the product. | Fail |
| The introduction to the product is short and doesn't include important product characteristics. | Pass/Third |
| The introduction to the product includes some important aspects but brief. | Lower Second |
| The introduction to the product is good and covers all relevant aspects, as mentioned in the design guidelines. | Upper Second |

| | |
|---|---|
| The introduction to the product is well written and shows in-depth appreciation of how the product characteristics can influence final selection. | First |

Market Evaluation:

| ***Grading criteria*** | ***Class*** |
|---|---|
| Limited or missing market evaluation. | Fail |
| The market evaluation is very brief and doesn't follow the design guidelines. | Pass/Third |
| The market evaluation is adequate but contains mistakes. | Lower Second |
| The market evaluation contains past, present, and future trends but some of the information is incorrect or unrealistic. | Upper Second |
| market has been researched extensively and data are backed up with trustworthy references and valid assumptions. | First |

Site selection and layout:

| ***Grading criteria*** | ***Class*** |
|---|---|
| There is a plan view layout showing week rationale selection in a given area. The layout is not easy to follow and there are no solid considerations taken into account during the design. | Fail |
| There is a plan view layout showing most general in a given area. Some of the layout is in agreement. The design demonstrates a site that operates in a safe manner. | Pass/Third |
| There is a plan view layout showing most items of rational selection. The design demonstrates a site that operates in a safe manner. | Lower Second |
| There is a plan view layout showing most rationale selection items. The design demonstrates a site that operates in a safe and unrestricted manner. | Upper Second |
| There is a plan view layout showing all rationale selection items. The design demonstrates a site that operates in a cost effective, safe, and unrestricted manner. | First |

Presentation and Style:

| ***Grading criteria*** | ***Class*** |
|---|---|
| The report doesn't follow the design guidelines. The language is not technical. There are many spelling mistakes and poor grammar. There are very few references, not cited correctly within the text and are presented in an inconsistent way. Most references are from untrustworthy sources. Figures/tables are unclear and not labelled properly. Poor editorial efforts. | Fail |
| There are inconsistencies in the structure of the report, but the majority follows the design guidelines. There are some spelling mistakes and grammatical errors. The language is not technical in most places. There are enough references but not all are presented in a consistent way nor are they cited correctly within the text. Quite a few references are from untrustworthy sources. Most figures/tales are unclear, not easy to read/follow and not labelled properly. Acceptable editorial efforts. | Pass/Third |
| The report is well organized with very few errors in the structure. There are minor grammatical and spelling mistakes. Technical language is used in the majority of the report. Most figures/tables are clear and labelled correctly. There are enough references, and all are presented in a consistent way. Good number of references and all are from trustworthy sources. Good editorial efforts. | Lower Second |
| The report follows the design guidelines. There are minor grammatical and spelling mistakes. Technical language is used throughout the report. All Figures/tables are clear and labelled correctly. There is satisfactory signposting. Good number of references and all are from trustworthy sources. Very good editorial efforts. | Upper Second |

| | |
|---|---|
| A very clear and coherent report of exceptional quality that follows the design guidelines and is edited to a high standard. There are no grammatical errors or spelling mistakes. The report is interesting and easy to read (aided by good signposting). All figures/tables are drawn and presented in a consistent way and are labelled correctly. Good number of references, presented in a consistent way. All references are from trustworthy sources and some of them help to improve the quality of the document, providing important information or new points of view. | First |