Complex Engineering Problem

Complex engineering problems are following the Washington Accord (IEA2015). These problems must involve attributes (a) and at least one of the attributes (b) – (g) stated below:

a. Cannot be resolved without in-depth engineering knowledge.
b. Involve wide-ranging or conflicting technical, engineering and other issues.
c. Have no obvious solution and require abstract thinking and originality in analysis to formulate suitable models.
d. Involve infrequently encountered issues.
e. Outside problems encompassed by standards and codes of practice for professional engineering.
f. Involve diverse groups of stakeholders with widely varying needs.
g. High level problems including many component parts or sub-problems.

CEP (EE-411 Power Generation)

Problem Statement:

Gather weekly/monthly/yearly load profile in 6 different industries/utility companies/research papers for designing of power generating stations. Perform technical/economic analysis using software (MATLAB/VB/GUI etc.) and graphs for the same. Choose one worst scenario among them and propose design for two different types of power generating station for same demand. Compare the impact of both power generating stations on the environment and sustainability. Also justify your proposal via sufficient references.

Deliverables:

All pages should be set with the same margin. The left margin should be 4 cm and 2.5 cm for the top, right and bottom margins, Font size for main text body=12, line spacing=1.5cm

Submit the software code of the assigned tasks to the course teacher

Methodology:

With the Help of Books/Research Papers (at least 10)/ Authentic Web sources (For data), Select at least 6 load profile of different industries/utility companies/research papers.

CEP Learning Outcomes (CLOs) are as follows:

- **CLO-01:** Outline the necessary theoretical knowledge for basic and advanced concepts in Electrical Power Generating Stations.
- **CLO-02:** Analyze and evaluate the technical/economical parameters of Power Generating stations.
- **CLO-03:** Compare the impact of different power generating stations on the environment and sustainability.
- **CLO-04:** Acknowledge and value the need for team work, leadership, diversity of ideas and inclusion.

- **Guidelines:**
- Use one Column Format for writing your report.
- Sessional Marks: 20
- No. of Group members: Maximum 4, No. Pages per report: Maximum 20 (Including Names and Roll No. and List of references).
- Submission Deadline: 14th week
- The first 2-4 pages, must comprise of general description/equations justifying those results
- Next pages must be on a selected load profile results/discussion/analysis/ coding /graphs.
- List of references must be included.

Washington Accord (IEA2015) Attributes:

a. Cannot be resolved without in-depth engineering knowledge.

b. Involve wide-ranging or conflicting technical, engineering and other issues.

c. Have no obvious solution and require abstract thinking and originality in analysis to formulate suitable models.

d. Involve infrequently encountered issues.

Marking Criteria:

Criteria	Marks/Percentage	CLO	Taxonomy level	PLO
Gather required information for analysis of power station design. Correct report format adopted	[5 Marks]	**1**	**C4**	**1**
Analyze and evaluate the technical/economical parameters of power generating stations using software (MATLAB/VB/GUI etc.) and graphs for the same	[5 Marks]	**2**	**C4**	**2**

Recognize the issue(s) of one system. Propose two different types of power generating stations for same demand and compare the impact of them based on the environment and sustainability	[5 Marks]	**3**	**C4**	**7**
Mark the students' performance based on task related to sustainability and environment as a member in a team	[5 Marks]	**4**	**A4**	**7**

Evaluation Rubrics:

	CLO	**Unsatisfactory** (< 50%)	**Average** (50%- 80%)	**Good** (80%- 100%)
Gather required information for analysis of power station design. Correct format adopted	1	Unable to gather the relevant data for analysis of system. Lots of inaccuracies (15 or more)	Some relevant data are gathered for analysis of the system. considerable inaccuracies (less than 10)	Exactly all relevant data are gathered for analysis of the system. No apparent inaccuracies
Understanding of software results/codes/ graphs presented.-Justify results/codes presented	2	Almost no engineering rules applied & based on assumptions. codes/results are not justified	Some engineering rules applied to solve problem, some results are justified. Some codes/results are justified	Maximum Principles of engineering applied to identify problem & formulate solution. All codes/results are justified
Exactly recognize the issues of one system. Propose two different types of power generating stations for same demand and compare the impact of them based on the environment and sustainability/ Conclusions	3	Unable to recognize the issues. Proposal is not optimal. power generating stations did not compare based on the environment and sustainability. Study is not conclusive	Recognize problem without giving optimal solution. Incomplete comparison. Some of the results are concluded	Exactly recognize the issue(s). proposal is optimal. Compared results based on the environment and sustainability. Study well concluded
Intellectual contribution of a student as a member in a team	4	Contributes in some activities of the project and shows reasonable understanding of the different attribute of complex engineering problem	Contributes effectively in majority of the project activities and has good understanding of the complex engineering problem	Enthusiastic and contributes effectively in all activities of the project activities and demonstrates very good understanding of the complex engineering problem