



College of Engineering

GENG 107 – L53: Engineering Skills and Ethics

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Bonus

Submitted To:

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Question 1:

Suppose you want to design a car under the project title “Design of an Electric Vehicle for Qatar”. Discuss the following:

a. List two main objectives of this project

1. Build an electric vehicle (EV) customized to perfectly suit Qatar by the end of 2030 to match Qatar’s 2030 vision.
2. Reduce the country’s carbon footprint and dependency on fossil fuels to energize transportation and create new more sustainable and greener options for customers to resort to.

b. List eight constraints/design criteria applicable to this project

1. The EV dimensions must not exceed international standard size limits and Qatar’s infrastructure capacity for automobiles.
2. The car must adhere to Qatar national electric standards, as well as international standards in terms battery pack size, voltage, power rating, charging levels, and connectors.
3. The car should produce zero torque under charging condition.
4. The car’s on-board charger should be compatible with charging levels available in Qatar either at home or at currently existing charging stations elsewhere in the nation.
5. The design, manufacturing, and the handling of the EV should maintain the public’s safety as the number one priority. Moreover, the design of the EV should be customized such that it suits Qatar’s environment while upholding a number of quality assurance measures (regulations, standards, and codes) and quality control methods (inspection, testing, and labeling).
6. The reliability of the design (design life, failures, performance statistics of the design) should be thoroughly studied and measured.
7. The vehicle should remain in fully functioning condition for at least 8 years from the date of purchase with regular periodic maintenance.

8. The assigned schedule to finalize the design of the EV is in a period of 5 years from the starting date and the project planning must consider Qatar's 2030 vision as point of reference.
9. Materials cost to build the vehicle should be less than \$20000/vehicle.
10. When selecting the materials for the EV design, their properties and their environmental impact must thoroughly researched.
11. The vehicle should be aesthetically pleasing while guaranteeing that its design does not violate any rules or offend any local or international groups.

c. What are the engineering steps you are going to follow?

1. Realizing the need for the EV in Qatar by studying the market.
2. Understand that need for the EV and define a problem statement that consider the Qatar 2030 vision.
3. Collect information about EV designs that is already exists and closely meets the need. Then consider if it is possible to adopt or modify existing designs to suit the need better or to suit Qatar environment.
4. Generate ideas that could offer reasonable solutions to the design problem, by identifying the design components. Then, analyze the merit of the developed design, evaluate design alternatives, create a milestone chart for the EV design.
5. Perform calculations of the design, like geometry of the EV. Then, implement an EV design model in the computer and run it as a simulation. Then, narrow down the type of materials to be used, size the components of the design, and search about how the EV design is going to be fabricated.
6. Identify the critical design parameters and consider their influence in the final design of the EV. Then, make sure that all calculations are performed correctly. Then, evaluate alternatives with specific evaluation criteria for the performance, importance, and cost.
7. Optimize the EV design based on cost, strength, size, weight, reliability, noise, or performance.
8. Prepare a presentation and a written report to provide the design to the government and companies who are interested in adopting the design of an EV for Qatar.

d. Select five of the following material properties which are important in your design.

I. Vapor pressure -> Also this could be because when designing a closed-loop cooling system, we have to be sure to consider the Vapor Pressure of the coolant fluid and how that pressure will change with temperature.

II. Thermal expansion

III. Viscosity -> <https://rb.gy/tgxhm8>

IV. Modulus of toughness

V. Modulus of rigidity

VI. Electrical resistivity

VII. Thermal conductivity

VIII. Stiffness

Question 2:

a. Please explain the difference between 'copyright' and 'patent'.

a patent is the authority to prevent others from creating, utilizing, offering for sale, or selling an invention, or from bringing an invention into the country, it forbids others from making, using, or selling the invention; it does not give the inventor the right to do so, while copyright is a legal protection offered to creators of "original works of authorship.", it includes both published and unpublished intellectual, whether it is theatrical, musical, artistic, and other sorts of intellectual works and in copyright, what is protected is not the content or the topic, but the form of expression.

b. Define the terms 'service trademark' and 'registered trademark'

Trademark is a name, word, or symbol that a company uses to distinguish its products from others, that excludes others from using the same or similar mark and does not prevent others from making the same or similar products.

A service trademark is a trademark that is specified for services not products, it excludes others from using the same or similar mark but does not prevent others from providing the same or similar **services**.

A registered trademark is a trademark that is officially recorded by a government office.

c. Why is optimization an important part of any engineering design?

Optimization allows the engineer to find the optimum solution in the presence of design constraints and some criterion such as cost, strength, size, weight, reliability, noise, or performance, but optimizing individual components of an engineering system does not necessarily lead to an optimized system.

d. What is the purpose of 'Taskforce' or 'Workgroup' within the framework of a professional organization

- Task forces are work groups that often include specialists in certain fields of study or practice. Small groups of people—and resources—are assembled into task forces to carry out a particular task, with the assumption that the group would disperse after the task has been done.
- Task Forces are designed to help solve specific issues and challenges affecting the digital heritage field while Working Groups are set up to address ongoing activities and issues of continuing relevance with the professional organization. Propose a Task Force.