

Midterm exam questions

The mid-term exam is based on Topics 1 to 5 in the [course lectures](#). Six questions will be randomly selected from a pool of 12 in each category (a total of 30 questions). To help you study for the exam, the complete pool of exam questions *without the multiple-choice answers* are listed below;

Topic 1 - Management

- Question 1: Which view of conflict states that "conflict can be a positive force necessary for a group to perform effectively"?

Which view of conflict states that "conflict can be a positive force necessary for a group to perform effectively"?

Yanınız:

- transactional
- traditional
- managed
- mindful
- interactionist

Yanıtı temizle

Geri Sonraki

Answer:

- Interactionist view of conflict (functional conflict) Pg.14
- Team with a degree of diversity. (interactionist)Pg.14

So the answer is: E

Reason:

Handling Conflicts

Conflict is a process that begins when one party perceives that another party has negatively affected, or is about to negatively affect, something that the first party cares about. If no one is aware of a conflict, then it is generally agreed no conflict exists. Also needed to begin the conflict process are opposition or incompatibility and interaction.

The **traditional view of conflict** is that it is a dysfunctional outcome resulting from poor communication, a lack trust between people, and the failure of managers. It assumes that all conflict is bad and to be avoided.

The alternative **interactionist view of conflict** is that a harmonious group is prone to becoming static and unresponsive to needs for change and innovation. In this viewpoint, a minimal level of conflict is needed, but not all conflicts are good:

functional conflict supports goals.

dysfunctional conflict will hinder group performance.

- Question 2: Which of the following terms indicates the tendency of individuals to spend less effort when working collectively?

Which of the following terms indicates the tendency of individuals to spend less effort when working collectively?

Your answer:

- social facilitation
- collective efficacy
- groupshift
- social loafing
- groupthink

Answer:

- Social Loafing Pg.11

So the answer is: D

Reason:

Team performance

The effectiveness of a team can be influenced by many factors, some important ones are discussed here.

Team size

Large teams can take on larger projects and can be good for gaining diverse input. Smaller teams are easier to organize and better at communicating and processing information quickly.

One of the most important findings about the size of a team concerns ***social loafing*** – this is the tendency for individuals to expend less effort when working collectively than alone. Social loafing tends to increase in larger teams.

- Question 3: Which of the following is *not* one of the characteristics of project objectives?

Which of the following is *not* one of the characteristics of project objectives?

Your answer:

- artistic
- specific
- timely
- relevant
- measurable

Clear answer

Answer:

Project objectives should have the following characteristics

- • S Specific establish a clear, precise goal
- • M Measurable measure the progress with quantifiable indicators
- • A Achievable establish a realistic goal that can be accomplished with available resources
- • R Relevant identify the significance of the goal for all the stakeholders
- • T Timely state the time and date for the completion of the goal

So the answer is: A

Reason:

Objective should be SMART

Objectives

Project objectives should have the following characteristics

- **S Specific** establish a clear, precise goal
- **M Measurable** measure the progress with quantifiable indicators
- **A Achievable** establish a realistic goal that can be accomplished with available resources
- **R Relevant** identify the significance of the goal for all the stakeholders
- **T Timely** state the time and date for the completion of the goal

- Question 4: Which of the following is *not* an objective for the success of a project?

Which of the following is *not* an objective for the success of a project?

Yanıtınız:

- performs below the desired level
- completed within budget
- effectively utilized resources
- satisfies the stakeholders
- completed on time

Answer: A successful project is one that

- • is complete on time
- • is within budget
- • has effectively utilized resources
- • has the desired performance
- • satisfies the stakeholders Pg.22

So the answer is: A

Reason:

Defining Success

A successful project is one that

- is complete on time
- is within budget
- has effectively utilized resources
- has the desired performance
- satisfies the stakeholders

The aim of project management is to ensure the success of the project.

- Question 5: The lowest level in the hierarchical breakdown of the Work Breakdown Structure is

Answer:

- Work Packages (WP) Pg.25

Reason:

Planning the tasks and time-line of a project

The Work Breakdown Structure (WBS)

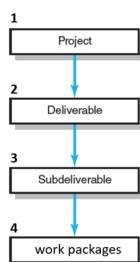
The hierarchical division of work into smaller elements is called the Work Breakdown Structure (WBS).

The WBS:

- provides a map of the project
- establishes a basis of control
- is task and deliverable-oriented and top-down

To plan this, we need to:

- Define the project scope and priorities.
- Create the Work Breakdown Structure (WBS).
- Assign Work Packages (WP) to team members.



- Question 6: Which of the follow is *not* a tool used for project management?

Which of the follow is *not* a tool used for project management?

Your answer:

- the Gantt chart
- the work breakdown structure
- the system-interface diagram
- the project network
- the responsibility matrix

Answer:

Tools:

- work breakdown structure (WBS)
- Responsibility Matrix (RM)
- Project Network (PN)
- the Gantt Chart

So the answer is: C

Reason:

- Pg26-31

- Question 7: Which of the following *best* explains the term "synergy"?

Soru 5

Which of the following *best* explains the term "synergy"?

Yanıtınız:

- synthesis into a physical architecture
- team motivation
- team synchronicity
- the whole is greater than the sum of the parts
- 1+1=2

[Yaniti temizle](#)

Answer:

So the answer is: D

Synergy ($1+1+1+1+1 = 6$) The combined effect of the collaboration is greater than the sum of individual parts. (it is positive)

Reason:

Groups and teams are not the same thing.

The members of traditional **work groups** are mainly motivated toward their own goals and individual responsibilities. In contrast **work teams** generate *positive synergy* through coordinated effort, mutual accountability and complementary skills.



- Question 8: Which of the following does *not* encourage cohesiveness within a team?

Which of the following does *not* encourage cohesiveness within a team?

Your answer:

- increasing the time that members spend together
- stimulating competition with other teams
- encouraging agreement with team goals
- making the team larger
- emphasizing the importance of the team and its goals

[Clear answer](#)

Answer:

Cohesiveness can be encouraged by:

- • Making the team smaller
- • Encouraging agreement with team goals
- • Increasing the time that members spend together
- • Emphasizing the importance of the team and its goals
- • Stimulating competition with other teams
- • Giving rewards to the team rather than to individual members
- • Physically isolating the team

So the answer is: D

Reason:

Cohesiveness

Teams differ in their *cohesiveness*, or the degree to which members are attracted to each other and are motivated to stay in the team.

Cohesiveness directly affects the team's productivity and depends strongly on the performance-related norms established by the team.

Cohesiveness can be encouraged by:

- Making the team smaller
- Encouraging agreement with team goals
- Increasing the time that members spend together
- Emphasizing the importance of the team and its goals
- Stimulating competition with other teams
- Giving rewards to the team rather than to individual members
- Physically isolating the team

- Question 9: Which of the following is *not* an attribute of a project?

Which of the following is *not* an attribute of a project?

Yanıtınız:

- has flexible and open-ended goals
- may involve risk and uncertainties
- has clear objectives and a definite duration
- is unique and has stakeholders
- involves activities and uses resources

Yanıtı temizle

Answer:

A project has the following attributes:

- • has clear objectives
- • has a definite duration
- • involves activities
- • uses resources
- • is unique, not same as any other
- • has stakeholders
- • may involve risk and uncertainties

So the answer is: A

Reason:

The project

The PMI (Project Management Institute) defines a project to be:

A temporary endeavor undertaken to create a unique product, service or result.

A project has the following attributes:

- has clear objectives
- has a definite duration
- involves activities
- uses resources
- is unique, not same as any other
- has stakeholders
- may involve risk and uncertainties

- Question 10: Project management techniques are applied to avoid project failures by:

The image shows a mobile application screen. At the top, there is a yellow header bar with the text "Question 10: Project management techniques are applied to avoid project failures by:". Below this, the screen has a light gray background. In the top left corner, the text "Soru 6" is displayed. In the center, the question "Project management techniques are applied to avoid project failures by:" is asked. Below the question, the text "Yanıtınız:" is followed by a list of five options, each preceded by a radio button. The options are: "improving communication", "reducing the required time", "all of these answers", "improving quality and performance", and "reducing risks". To the right of the list, there is a small cursor icon pointing towards the bottom right. Below the list, the text "Yaniti temizle" is visible. At the bottom of the screen, there are two green rectangular buttons with white text: "Geri" on the left and "Sonraki" on the right.

Answer:

Project management techniques are applied to avoid project failures by:

- • improving the overall project performance
- • improving quality
- • improving communication
- • reducing the required time
- • reducing risks
- • providing standard methodologies
- • providing accurate reporting and documentation

So the answer is: C

Reason:

Project Management

The PMI defines Project Management as

The art of directing and coordinating human and material resources through the life of a project by using modern management techniques to achieve predetermined goals of scope, cost, time, quality and participant satisfaction.

It is not just scheduling!

Project management techniques are applied to avoid project failures by:

- improving the overall project performance
- improving quality
- improving communication
- reducing the required time
- reducing risks
- providing standard methodologies
- providing accurate reporting and documentation

- Question 11: Which of the following ***best*** defines the Project Network?

Which of the following ***best*** defines the Project Network?

Your answer:

- the progress of the activities against time
- a table summarizing risks and their mitigation
- the hierarchical division of work into smaller elements
- a summary of the tasks to be accomplished and by whom
- the chronological order and logical dependencies between activities

Clear answer

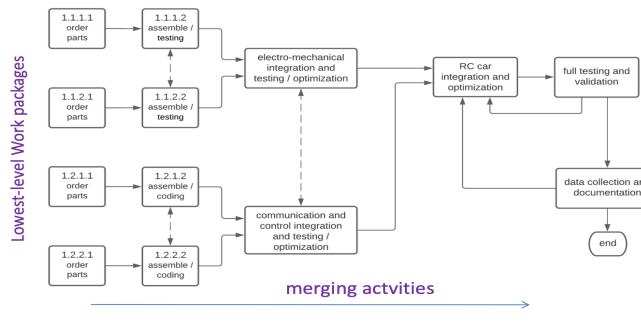
Answer:

the Project Network (PN) shows the chronological order and dependencies between activities and include integration and testing activities.

Reason: Answer is E

The Project Network (PN)

Unlike the WBS, the Project Network (PN) shows the chronological order and dependencies between activities and include integration and testing activities.



- Question 12: Which of the following ***best*** defines the Work Breakdown Structure?

Which of the following ***best*** defines the Work Breakdown Structure?

Your answer:

- a table summarizing risks and their mitigation
- the hierarchical division of work into smaller elements
- the progress of the activities against time
- a summary of the tasks to be accomplished and by whom
- the chronological order and logical dependencies between activities

Answer:

The hierarchical division of work into smaller elements is called the Work Breakdown Structure (WBS).

So the answer is: B

Reason:

Planning the tasks and time-line of a project

The Work Breakdown Structure (WBS)

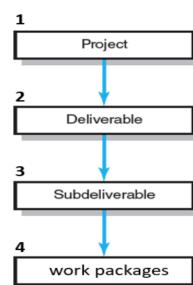
The hierarchical division of work into smaller elements is called the Work Breakdown Structure (WBS).

The WBS:

- provides a map of the project
- establishes a basis of control
- is *task and deliverable-oriented and top-down*

To plan this, we need to:

- Define the project scope and priorities.
- Create the *Work Breakdown Structure (WBS)*.
- Assign *Work Packages (WP)* to team members.



Topic 2 - Design

- Question 1: Which of the following *best* defines the "quality" of a product, service or process?

Which of the following *best* defines the "quality" of a product, service or process?

Your answer:

- aesthetically pleasing
- safe
- fitness for use
- low design costs
- high profit margin

[Clear answer](#)

[Next](#)

A defect in a car tire in rare cases causes the tire to

Answer:

Quality means fitness for use.

So the answer is: C

Reason:



Product quality

Quality means *fitness for use*. There are many components to quality but in the Capstone course we will focus on:

Features

What does the product do?

Performance

How well does the product perform the intended function?

Reliability

Can the product perform its function repeatedly?

Not just the day before the final presentation! ;-)

By the end of your project you should be able to **measure** these attributes and present proof of fitness for use.

- Question 2: Which of the following is *not* a step in the design process?

Which of the following is *not* a step in the design process?

Yanıtınız:

- definition of the problem
- synthesis into a physical architecture
- research the field
- presentation to stakeholders
- marketing and sales analysis

[Yaniti temizle](#)

Which of the following is *not* a step in the design process?

Your answer:

- identification of the need
- evaluation
- materialization
- mass production
- conceptualization

[Clear answer](#)

Answer:

- 1. Identification of the need
- 2. Definition of the problem
- 3. Research the field
- 4. Conceptualization
- 5. Synthesis into a physical architecture
- 6. Materialization and optimization
- 7. Evaluation (verification and validation)
- 8. Presentation to stakeholders

So the answer respectively is:

- E
- D

Reason:

The design process

Design is a highly iterative and innovative process. A number of solutions should be considered and the 'best' chosen for prototyping.

The design process can be broken down into a number of steps:

1. Identification of the need
2. Definition of the problem
3. Research the field
4. Conceptualization
5. Synthesis into a physical architecture
6. Materialization and optimization
7. Evaluation (verification and validation)
8. Presentation to stakeholders

This process can be highly iterative with some steps revisiting earlier ones before converging on a final solution.

- Question 3: Which of the following is *least* important for a designer?

Question 1

Which of the following is *least* important for a designer?

Your answer:

- good communication skills
- good practical skills
- good entrepreneurial skills
- creativity
- good theoretical knowledge

Answer:

- be creative
- have good theoretical knowledge
- have good practical skills
- have good communication skills

So the answer is: C

Reason:

Qualities of a good designer

After studying the design process, it becomes clear that to be successful a designer needs to

1. **be creative** to be able to imagine solutions in innovative ways as well as using established problem-solving techniques.
2. **have good theoretical knowledge** to be able to mathematically model solutions, optimize and evaluate them.
3. **have good practical skills** to be able to physically construct a system quickly, reliably and safely.
4. **have good communication skills** to communicate effectively with all stakeholders, including team members (which may be from different disciplines), manufacturers, managers and clients.

- Question 4: Which of the follow *best* defines "risk"?

The screenshot shows a digital exam interface. At the top, there is a navigation bar with various icons and text. Below the navigation bar, the main content area has a light green background. A question is displayed in a white box: "Which of the follow *best* defines 'risk'?" Below the question, a section titled "Your answer:" contains a list of five options, each preceded by a radio button. The options are:

- risk = probability of harm or severity of the harm
- risk = probability of harm / severity of the harm
- risk = probability of harm - severity of the harm
- risk = probability of harm + severity of the harm
- risk = probability of harm x severity of the harm

At the bottom of this section, there is a blue "Clear answer" button. At the very bottom of the page, there are two green buttons labeled "Back" and "Next". In the bottom right corner, there is a small text box containing the text "Capstone midterm exam.pdf (page 3 of 9)".

Answer:

- Risk = The potential for failure in a project is minimized by good project management and good design.

- Risk = Probability of the failure X Severity of the failure

So the answer is: E

Reason:

Risk

The potential for failure in a project is minimized by good project management and good design. However, the possibility of failure cannot be excluded entirely. The possibility for partial failure also exists; that is although requirements are met, the quality of the product might be lower than intended.

To help to minimize failure, the engineer should identify risks. In this context, *risk* can be defined as the product of the probability of the failure and the severity of the failure.

$$\text{Risk} = \text{Probability of the failure} \times \text{Severity of the failure}$$

The **Probability** of the failure is how likely the failure will occur during the project lifecycle and can be represented on a scale, for example, from *unlikely* to *likely*.

The **Severity** of the failure is a measure of how much harm the failure brings to the project and can be represented on a scale, for example, from *Minor* to *Major*.

- Question 5: Which of the following *best* defines "factor of safety"?

Question 6

Which of the following *best* defines "factor of safety"?

Your answer:

- norms of safety outlined by the relevant laws, standards and professional organizations
- the objectives taken into consideration to ensure safety
- definitions that state the safety requirements of a product, service or process
- demonstrable proof that a product, service or process is safe
- the factor by which performance exceeds the requirement

Clear answer

Back Next

Answer:

- factor of safety (FoS) which can be defined as the ratio of the actual performance to the required performance.
- FoS = actual performance/required performance

So the answer is: E

Reason:

Factor of Safety (FoS)

Products are generally designed to exceed the performance requirements to allow for unexpected loads, misuse, or degradation. This can be quantified in terms of the *factor of safety* (FoS) which can be defined as the ratio of the actual performance to the required performance.

The factor of safety can be determined by the designer to ensure that the product meets the requirements or can be imposed by law or standards.

Examples

A pick-and-place robot is required to have a precision of 6 mm. The robot is designed to have a precision of 3 mm to allow for degradation. The FoS is therefore $6\text{mm}/3\text{mm} = 2$.

A bridge is required to support load of up to 100 Tonnes. The bridge is designed to support 800 Tonnes (a FoS of 8) to allow for unexpected loads and degradation.

A motor driver is required to supply a maximum current of 2.4 A. The designer selects a driver that can support 3.0 A; the FoS is $3.0/2.4 = 1.25$.

- Question 6: Which of the following *best* defines "design"?

Question 2

Which of the following *best* defines "design"?

Your answer:

- a specification for the construction of a product, service or process that satisfies certain requirements
- the construction of a product, service or process
- the designation of resources for the construction of a product, service or process
- the evaluation of a product, service or process with respect to its requirements
- a specification of requirements for a product, service or process that is to be constructed

Clear answer

Answer:

- is a plan or specification for the construction of a product or service that should satisfy certain requirements.

So the answer is: A

Reason:

Overview

A **design** is a plan or specification for the construction of a product or service that should satisfy certain requirements. The aim of design is to maximize the **quality** of the product given available resources and limitations of constraints*.

Many constraints exist, such as *budget, time, standards, legal, economic, environmental, sustainability, manufacturability, conformability, aesthetics, safety, marketability, ethical, health, safety, socio-political*. These are important considerations during the design process, they will be discussed separately in the next lecture (Topic 3). Please consider these constraints once you understand the basic design process.

Remember that these topics will be examined in the mid-term exam, should be applied during the design phase of your project, and should be expressed in your project proposal.

* anything that limits the designer's freedom of choice is a constraint.

- Question 7: Which of the following is an important design consideration?

Which of the following is an important design consideration?

Your answer:

- maximizing quality
- the need for the product, service or process
- the functional requirements of the product, service or process
- all of these answers
- conforming to constraints

Clear answer

Back **Next**

Answer:

- Many constraints exist, such as budget, time, standards, legal, economic, environmental, sustainability, manufacturability, conformability, aesthetics, safety, marketability, ethical, health, safety, socio-political. These are important considerations during the design process, they will be discussed separately in the next lecture (Topic 3).

So the answer is: E

Reason:

Overview

A design is a plan or specification for the construction of a product or service that should satisfy certain requirements. The aim of design is to maximize the **quality** of the product given available resources and limitations of constraints*.

Many constraints exist, such as *budget, time, standards, legal, economic, environmental, sustainability, manufacturability, conformability, aesthetics, safety, marketability, ethical, health, safety, socio-political*. These are important considerations during the design process, they will be discussed separately in the next lecture (Topic 3). Please consider these constraints once you understand the basic design process.

Remember that these topics will be examined in the mid-term exam, should be applied during the design phase of your project, and should be expressed in your project proposal.

* anything that limits the designer's freedom of choice is a constraint.

- Question 8: Which of the following *best* describes the "Identification" and "Definition" steps of the design process?

Question 3

1 2 3 4 5 6

Which of the following *best* describes the "Identification" and "Definition" steps of the design process?

Your answer:

- all of these answers
- determine the need for the product and prepare specifications
- decompose into a physical architecture and build the product
- perform verification and communicate the product to stakeholders
- investigate the market and technologies, imagine solutions

Clear answer

Back Next

Answer:

- Design begins with the **identification** of the need for a product or service.
- a technical **definition** of the problem is stated in terms of specifications of the product or service. - feature and performance requirements; - objectives (see the SMART requirement for objectives); - engineering constraints.

So the answer is: B

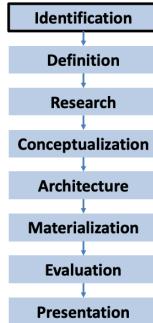
Reason:

Identification of the need

Design begins with the identification of the need for a product or service. Ask yourself, *what engineering problem needs to be solved? what product or service needs to be developed?*

Innovation plays an important role here. An innovation can provide an incremental improvement in an existing product, or it can lead to a completely new product that creates an entirely new market (see Topic 5).

In the capstone course, projects descriptions are already provided to the students. In some cases a project will be suggested by the student team; in such cases we require a demonstration of need, that is the project brings some value to society.

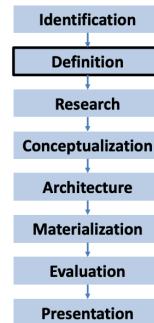


Definition of the problem

Once the need has been identified, a technical definition of the problem is stated in terms of specifications of the product or service.

- feature and performance requirements;
- objectives (see the SMART requirement for objectives);
- engineering constraints.

In your capstone project, some features and performance requirements will already be defined for you by the project advisers; you will need to discuss these with your advisers and define them in more detail. The definition of objectives is a core task of project management (see Topic 1). The first constraints that you need to consider are those of budget and time; more constraints should be considered (see Topic 3).



- Question 9: Which of the following *best* describes the "Research" and "Conceptualization" steps of the design process?

Which of the following *best* describes the "Research" and "Conceptualization" steps of the design process?

Yanıtıiniz:

- investigate the market and technologies, imagine solutions
- decompose into a physical architecture and build the product
- determine the need for the product and prepare specifications
- all of these answers
- perform verification and communicate the product to stakeholders

Yanıtı temizle

Answer:

- **Research:** Identify similar design solutions that already exist, investigate relevant technologies and methods.
- **Conceptualization:** Conceptual solutions are imagined, discussed and compared. The designer will prepare a number of different conceptual solutions that will satisfy requirements and constraints differently.

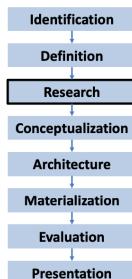
So the answer is: A

Reason:

Research the field

Usually, similar products or services will already exist in the market. Identify similar design solutions that already exist, investigate relevant technologies and methods. During this step, the designer should also investigate broader design constraints placed on your product due to legal, ethical, sustainability (etc) considerations. Standards, set by the relevant profession, should also be noted.

For your capstone project, identify what similar products already exist in the market and state what differentiates your product from them. Often a capstone project attempts to reproduce existing features at a lower cost or provides innovative feature enhancements or prototypes a new product.



4991 Capstone I

Engineering Design

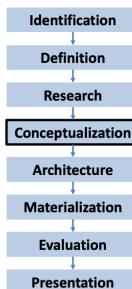
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Conceptualization

Conceptual solutions are imagined, discussed and compared. The designer will prepare a number of different conceptual solutions that will satisfy requirements and constraints differently.

At this early stage of the project it is important to find solutions that minimize costs and risks, and maximize the potential for quality.

For your capstone project, get together with your full team to discuss the established methods for solving the problem. Also "brainstorm" and try to "think out of the box" to establish innovative ways of solving the problem. Make sketches and predict the costs, risks and performance of each idea. Finally discuss your conceptual solutions with your advisers.



4991 Capstone I

Engineering Design

8

- Question 10: Which of the following *best* describes the "Synthesis" and "Materialization" steps of the design process?

Soru 8

Which of the following *best* describes the "Synthesis" and "Materialization" steps of the design process?

Yanıtınız:

- all of these answers
- decompose into a physical architecture and build the product
- determine the need for the product and prepare specifications
- perform verification and communicate the product to stakeholders
- investigate the market and technologies, imagine solutions

Yanıtı temizle

Geri

Sonraki

Testi duraklat

Answer:

- **Synthesis:** In the synthesis step, a conceptual solution is decomposed into a physical architecture (a set of objects that represent actual components). The architecture can be mathematically modelled and/or prototyped. A number of conceptual solutions should be considered and compared and the best one chosen for the next step.
- **Materialization:** This will be an iterative process where the architecture, components and manufacturing methods are optimized to obtained a system that best meets the product specifications

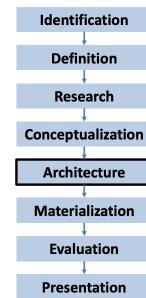
So the answer is: B

Reason:

Synthesis into a physical architecture

In the synthesis step, a conceptual solution is decomposed into a physical architecture (a set of objects that represent actual components). The architecture can be mathematically modelled and/or prototyped. A number of conceptual solutions should be considered and compared and the best one chosen for the next step.

In the capstone course, you are not required to physically build your product until the second semester, though prototyping can be very useful. You are expected to at least mathematically model the physical architecture in enough detail to predict the quality of the final product. The best concept should then be chosen for the next step.

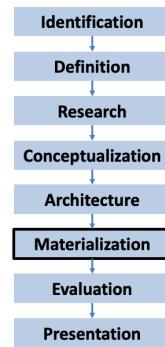


Materialization and optimization

The chosen physical architecture is ready to be transformed into a material form, that is a physical prototype. This will be an iterative process where the architecture, components and manufacturing methods are optimized to obtained a system that best meets the product specifications.

Important: up to this step, the design process should place emphasis on designing safety into the product; consider all uses, including likely abuse.

In the capstone course this step is usually started in the second semester (Capstone II). You will face many practical problems, failures, or even the realization that the physical architecture has significant design flaws. You may need to go back one or more steps to redesign your solution! Try to get it right on the first iteration.



- Question 11: Which of the following *best* describes the "Evaluation" and "Presentation" steps of the design process?

Which of the following *best* describes the "Evaluation" and "Presentation" steps of the design process?

Your answer:

- all of these answers
- determine the need for the product and prepare specifications
- investigate the market and technologies, imagine solutions
- perform verification and communicate the product to stakeholders
- decompose into a physical architecture and build the product

[Clear answer](#)

Answer:

- **Evaluation:** The completed prototype is thoroughly tested to obtain objective proof that the product performs according to the design specifications (verification) and satisfies user requirements (validation).
- **Presentation:** The final step is to present the product to stakeholders (supervisors, managers, manufacturers, clients) in an effect way to give proof that the solution is successful.

So the answer is: D

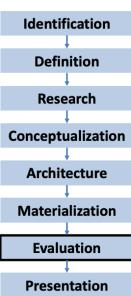
Reason:

Evaluation (verification and validation)

The completed prototype is thoroughly tested to obtain objective proof that the product performs according to the design specifications (verification) and satisfies user requirements (validation).

This step requires testing the product under normal operation conditions and any likely extreme conditions.

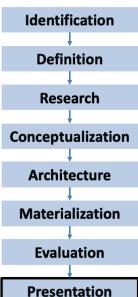
In the capstone course you will be expected to give proof that your product is performing according to the give requirements in the project description. As well as testing the completed product, the performance of each subsystem should be measured, and the results documented. More details are given in Topic 4 – Product Verification.



Presentation to stakeholders

The final step is to present the product to stakeholders (supervisors, managers, manufacturers, clients) in an effect way to give proof that the solution is successful. In a commercial setting for example this will determine whether the product goes on to be manufactured for sale. Presentation includes all kinds of communication including detailed documentation of evaluation, and user manuals.

In the capstone course, requirements for presentation of your project are clearly set out in the course syllabus (4991 & 4992). They include a written project proposal, a written status report, a final project report and at least two major presentations.



Topic 3 - Constraints

- Question 1: Which of the following *best* defines an "engineering constraint"?

Which of the following *best* defines an "engineering constraint"?

Your answer:

- the specification of requirements
- an experiment to verify that requirements have been met
- a step in the engineering design process
- a plan for the execution of project tasks
- anything that limits the designer's freedom of choice

[Clear answer](#)

Answer:

- anything that limits the designer's freedom of choice is a constraint.
- is expanded further introducing very briefly the subjects of ethics, standards, security and privacy, environment and sustainability, safety, legal, social and political.

So the answer is: E

Reason:

Overview

Anything that limits the designer's freedom of choice is a *constraint*. Constraints take many forms. We have already seen that *time* and *economics*(budget) are primary constraints as well as the requirements for *features* and *performance*. In this lecture the topic of engineering constraints is expanded further introducing very briefly the subjects of *ethics, standards, security and privacy, environment and sustainability, safety, legal, social and political*.

We will not go much beyond a definition of each topic, so please seek out further reading especially in the areas that are related to your technical field. A good place to start is the *professional organization* that guides engineers in your field; a list is given on the next page.

Remember that these topics will be examined in the mid-term exam. The concepts should be applied to your project and should be expressed in your project proposal.

- Question 2: Which of the following is *not* one of the four moral theories of ethical thinking?

Answer:

- 1. **Utilitarianism**; in this view, a right choice is one which gives maximum benefit to society as a whole.
- 2. **Duty ethics**; in this view, a right choice is one that follows ethical rules.

- 3. **Rights ethics**; in this view, a right choice is one that respects the rights of the individual person.
- 4. **Virtue ethics**; in this view, a right choice is one that supports good character traits (responsibility, honesty, competence, loyalty, trustworthiness, fairness, respect)

Reason:

four moral theories that guide the engineer

Often the engineer is faced with a difficult and complex decision to make. As well as using tools such as risk analysis, modelling and experiment, the engineer should also consider moral philosophy when making decisions.

We can identify four moral theories that will help us to make the right choice; all views should be considered in the choice:

1. Utilitarianism; in this view, a right choice is one which gives maximum benefit to society as a whole.
2. Duty ethics; in this view, a right choice is one that follows ethical *rules*.
3. Rights ethics; in this view, a right choice is one that respects the *rights of the individual person*.
4. Virtue ethics; in this view, a right choice is one that supports good character traits (responsibility, honesty, competence, loyalty, trustworthiness, fairness, respect)

- Question 3: Which of the following has the *lowest* importance in maximizing the safety of a product?

Soru 26

Which of the following has the *lowest* importance in maximizing the safety of a product?

Yanıtınız:

- thoroughly test the product
- maximize the performance of the product
- consider alternative safer designs
- comply with the law
- follow current engineering standards

Yaniti temizle

Answer:

Reason:

To help maximise the safety of a product, five steps must be followed.

- 1. Comply with the law.
- 2. Follow current engineering standards.
- 3. Consider alternative designs.
- 4. Foresee potential misuse of the product.
- 5. Test the product.

So the answer is: B

- Question 4: Which of the following is *not* one of the steps to ensure sustainable design?

Which of the following is *not* one of the steps to ensure sustainable design?

Your answer:

refer to the relevant laws
 seek advice from other professionals
 reduce manufacturing costs
 refer to the environmental standards
 consider alternative environmentally-friendly designs

[Clear answer](#)

Answer:

Reason:

Five steps to sustainability in the design process

- 1. Refer to the laws provided on the national and international level.
- 2. Refer to the environmental standards set by your profession. These will often go beyond the standards set by law.
- 3. Seek advice from other professionals; such as biologists, public health experts and professional environmentalists.
- 4. Choose materials that are less harmful to the environment, especially materials that are recyclable.
- 5. Consider alternative environmentally-friendly designs and processes and adopt them as much as possible.

So the answer is: C

- Question 5: Which of the following is *not* a cyber security objective?

Soru 7

Which of the following is *not* a cyber security objective?

Yanıtınız:

- privacy, anonymity and confidentiality
- sustainability
- authentication
- availability
- integrity

Yanıtı temizle

Geri Sonraki

Answer:

six security objectives can be defined

- Confidentiality
- Integrity,
- Authentication,
- Availability,
- Privacy,
- Anonymity.

So the answer is: B

Reason:

six cyber security objective:

To help you to design security into a project, six security objectives can be defined; they are:

confidentiality, integrity, authentication, availability, privacy, and anonymity.

Confidentiality means

- unauthorized users cannot **read** information.
e.g., your medical records cannot be read by your friends.

Integrity requires that

- unauthorized users cannot **alter** information.
e.g., the balance of your bank account cannot be changed by unauthorized persons.

Authentication addresses

- knowing **who** is interacting with the system.
e.g., you use a passcode to unlock your smart phone.

4991 Capstone I

Engineering Constraints

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Availability requires that

- authorized users can access the relevant information **when needed**.
e.g., an ATM machine should be able to handle requests 7/24.

Privacy means

- **complying with the law** when collecting, storing, using and sharing data.
e.g., a mobile application should not track users' locations when they're not using the application.

Anonymity means that

- the **identity** of the participant or the data point is **not known**.
e.g., you do not ask the name of the participants for a survey.

4991 Capstone I

Engineering Constraints

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- Question 6: What can the engineer do to improve the social impact of their work?

What can the engineer do to improve the social impact of their work?

Your answer:



- all of these answers
- seek to understand better the social impact of their products
- seek out to improve practices and policies in society
- work with communities to learn more about their needs
- continuously educate themselves in the latest laws and practices

Clear answer

Answer:

- While engineers are commonly expected to work in technically multidisciplinary teams, they also need to work with communities to learn more about their needs and how products and services affect them.

So the answer is: A

Reason:

Social and political considerations

There is an increasing demand on engineers to understand the social impacts of products, services and processes and integrate this understanding into the design process. **While engineers are commonly expected to work in technically multidisciplinary teams, they also need to work with communities to learn more about their needs and how products and services affect them.**

Professional engineers and the professional organizations that represent them also have an important role in policy making. Engineers are consulted by companies, local authorities and law-makers. As standards of professional organizations develop, these standards often become the minimal-standard expressed by law.

Engineers have an important role as leaders in society, they need to continuously educate themselves in the latest laws and practices of their profession and actively seek out to improve practices and policies in society.

- Question 7: Which of the following is *not* true for a "standard"?

Soru 4

Which of the following is *not* true for a "standard"?

Yanıtınız:

- a communication tool that allows all users to speak the same language
- provide an enforceable means to evaluate acceptability of products
- a document that defines the characteristics that must be met by the product
- a specification of the user-requirements of a product, service or process
- ensure that products and services are consistent, compatible and safe

Yaniti temize 

Geri **Sonraki**

Answer:

- A standard is a document that defines the characteristics that must be met by the products, systems and processes that the standard covers. Standards attempt to ensure that products and services are consistent, compatible and safe.

So the answer is: D

Reason:

Standards

A standard is a document that defines the characteristics that must be met by the products, systems and processes that the standard covers. Standards attempt to ensure that products and services are consistent, compatible and safe.

Example from history: In the US, up until 1860 the railway companies used to have their own railroad track gauge (i.e. the distance between the rails), which hindered the interchangeability of the railroad cars. Once 4 feet and 8.5 inches is agreed on as the standard track gauge by the leaders in the railroad industry, the interchangeability of railroad cars across the country became possible.

Standards are a *communication tool* that allows all users to speak the same language. They provide a "legal," or at least enforceable, means to evaluate acceptability and sale-ability of products and services. They can be taught and applied globally. They are designed to protect society from poor designs, products and practices, and help engineers to meet environmental, health, safety and societal responsibilities.

- Question 8: Which of the following is *least* true for a "law"?

Which of the following is *least* true for a "law"?

Your answer:

tells you what you can and cannot do
 ensures that products and services are consistent
 enforces minimal standards of society
 reflect what society accepts as the norms of behavior
 a formalized code of conduct that is enforced

[Clear answer](#)

Answer:

- A law is a formalized code of conduct that is enforced through social or governmental institutions. Laws reflect what society accepts as the norms of behavior.
- It is useful to make a distinction between ethics and law. As we have seen, ethics relies on moral philosophy to answer the question of what should we do? Law will tell you what you can and cannot do
- Laws tend to provide and enforce minimal standards of society. The engineer must always abide by the law, but also hold themselves to higher standards. This

can be very challenging for the engineer since they operate in environments that are often hostile to their ethical obligations.

So the answer is: B

Reason:

Legal considerations

A law is a formalized code of conduct that is enforced through social or governmental institutions. Laws reflect what society accepts as the norms of behavior.

We have already seen many references to laws that the engineer is required to take into consideration. Laws are discussed further here.

It is useful to make a distinction between *ethics* and *law*. As we have seen, ethics relies on moral philosophy to answer the question of what **should we do?** Law will tell you what you **can** and cannot do.

Laws tend to provide and enforce minimal standards of society. The engineer must always abide by the law, but also hold themselves to higher standards. This can be very challenging for the engineer since they operate in environments that are often hostile to their ethical obligations.

- Question: Which of the following is *not* a principal source for a standard?

Which of the following is *not* a principal source for a standard?

Your answer:

- government
- client
- company
- consortia
- trade association and professional society

Answer:

- • Company standards
- • Trade associations and professional society standards
- • Government standards
- • Consortia standards
- • De facto (ad hoc) standards

So the answer is: B

Reason:

Classifying Standards by origin (source)

Standards can also be classified by their origin (where they were developed).
There are four principal sources for standards:

- Company standards
- Trade associations and professional society standards
- Government standards
- Consortia standards
- De facto (ad hoc) standards

In addition, standards can be classified by their scope:

- National (applied within a country)
- Regional (applied to a collection of regional countries)
- International such as
 - International Organization for Standardization (ISO)
 - International Electrotechnical Commission (IEC)
 - International Telecommunication Union (ITU)

- Question 10: Which of the following *best* defines "safety"?

Which of the following *best* defines "safety"?

Yanıtınız:

- the condition of being protected from damage
- the condition of being protected from risk
- the condition of being protected from hazards
- a measure of the probability and the severity of a harm
- the condition of being protected from harm

Yanıtı temizle

Answer:

- **Safety** is the condition of being protected from risk.
- **Safety** is maximized by eliminating hazards as much as possible and minimizing the risk from any that remain.

So the answer is: B

Reason:

Safety

The professional engineer has the responsibility to place public safety and interest above all other considerations. The need for a product, process or service to be safe is therefore a major constraint in design.

Safety is maximized by eliminating hazards as much as possible and minimizing the risk from any that remain.

Some definitions

Safety is the condition of being protected from **risk**.

Risk is a measure of the probability and the severity of a **harm**.

Harm is damage; for example physical, psychological or financial.

Hazards present us with harmful situations.

- Question 11: Which of the follow classifications of standards provides the widest scope?

Soru 4

Which of the follow classifications of standards provides the **widest scope**?

Yanıtınız:

- international
- company
- local
- national
- regional

Yanıtı temizle

Answer:

International such as

- International Organization for Standardization (ISO)
- International Electrotechnical Commission (IEC)
- International Telecommunication Union (ITU)

So the answer is: A

Reason:

Classifying Standards by *origin* (*source*)

Standards can also be classified by their origin (where they were developed).
There are four principal sources for standards:

- Company standards
- Trade associations and professional society standards
- Government standards
- Consortia standards
- De facto (ad hoc) standards

In addition, standards can be classified by their scope:

- National (applied within a country)
- Regional (applied to a collection of regional countries)
- International such as
 - International Organization for Standardization (ISO)
 - International Electrotechnical Commission (IEC)
 - International Telecommunication Union (ITU)

- Question 12: Which of the following *best* defines "cyber security"?

Which of the following *best* defines "cyber security"?

Yanıtınız:

- information-based security
- the protection of information systems
- computer-based security
- the collection of information for security
- the brand name of a well-known security company

Yanıtı temizle

Answer:

- **Cyber security** is the protection of information systems, including both hardware and software, from theft, unauthorized access, information disclosure, and intentional harm.

So the answer is: B

Reason:

While the emergence of new technologies such as *Internet of Things (IoT)*, *cloud computing*, *mobile computing*, and *fog computing* makes our lives easier, they introduce new challenges. The field of Cyber security addresses these challenges.

Cyber security is the protection of information systems, including *both hardware* and *software*, from theft, unauthorized access, information disclosure, and intentional harm.

Data Privacy

Data privacy (or information privacy) is concerned with the proper handling of data with respect to consent, notice, and laws. Data should be legally collected, stored, used and shared. The engineer should consider the local, national and international laws relating to data privacy. Also stakeholders may have requirements that go beyond the protection of the law.

The security of a product, service or process must be considered throughout all stages of design, and not just as an after-thought.

Topic 4 - Verification

- Question 1: Which of the following *best* defines "verification"?

Which of the following *best* defines "verification"?

Yanıtınız:

- the product conforms to the relevant standards
- the product has been fully tested for safety
- the product satisfies the requirements of the stakeholders
- the product conforms to the design specifications
- the product conforms to the relevant laws

Answer:

- Verification - are we building the product right? This is the evaluation of whether the product conforms to the design specifications:

So the answer is: D

Reason:

Verification and validation

Verification - are we building the product right?

This is the evaluation of whether the product conforms to the design specifications; that is the product satisfies the functional and performance requirements defined during the product definition step. This is often a highly iterative process and is applied during the development of the sub-systems as well as to the completed product.

Validation - are we building the right product?

Here we are ensuring that the system satisfies the requirements of the stakeholders (e.g. customers) in its intended environment. This may require testing the product in the intended environment and interacting with the user. Failure at this stage may require the designer to return to much earlier steps of the design process.

- Question 2: Which of the following *best* defines "validation"?

Question 7

Which of the following *best* defines "validation"?

Your answer:

the product has been fully tested for safety

the product satisfies the requirements of the stakeholders

the product conforms to the relevant laws

the product conforms to the relevant standards

product conforms to the design specifications

[Clear answer](#)

erm-VIP.pdf

Answer:

- Validation - are we building the right product? Here we are ensuring that the system satisfies the requirements of the stakeholders (e.g. customers) in its intended environment.

So the answer is: B

Reason:

Verification and validation

Verification - are we building the product right?

This is the evaluation of whether the product conforms to the design specifications; that is the product satisfies the functional and performance requirements defined during the product definition step. This is often a highly iterative process and is applied during the development of the sub-systems as well as to the completed product.

Validation - are we building the right product?

Here we are ensuring that the system satisfies the requirements of the stakeholders (e.g. customers) in its intended environment. This may require testing the product in the intended environment and interacting with the user. Failure at this stage may require the designer to return to much earlier steps of the design process.

- Question 3: In the verification process, which of the following is *not* an example of a "functional objective"?

Answer:

Functional/feature requirements: Identify each feature and demonstrate that they are present in the product. This will require a written account of test runs.

Found this on Chegg:

Question: In The Verification Process, Which Of The Following Is *Not* An Example Of A "Functional Objective"? The Machine Should Sort Eg...

In the verification process, which of the following is *not* an example of a "functional objective"?

Yanıtınız:

the machine should sort eggs into categories of small, medium and large
the vehicle should autonomously follow a yellow line
the system should provide wireless digital communication between a transmitter and receiver
the image recognition system should recognize known faces
the project should be completed within the budget

So the answer is: E

Reason:

Objectives of verification

The aim of verification is to demonstrate that the **functional** and **performance** requirements and imposed **constraints** are satisfied. Important objectives need to be identified:

Functional/feature requirements

Identify each feature and demonstrate that they are present in the product. This will require a written account of test runs.

Performance

Identify each performance objective and design experiments for the collection and analysis of relevant data. *This will be the focus of this lecture.*

Constraints

Identify each constraint and demonstrate that they have been met. This would usually require a written discussion for each constraint, and a record of results from consultation with relevant experts and users, or even certificates from authorities.

- Question 4: In the verification process, which of the following is *not* an example of a "performance objective"?

In the verification process, which of the following is *not* an example of a "performance objective"?

Your answer:

- the system should recognize faces with an error rate of less than 5%
- the vehicle should follow a line with deviation of less than 10 cm
- the project should be completed within eight months
- the machine should sort eggs with 90% accuracy
- the communication system should provide a data-rate of at least 1 kbps

[Clear answer](#)

Answer:

- Performance Identify each performance objective and design experiments for the collection and analysis of relevant data. This will be the focus of this lecture.

So the answer is: C

Reason:

Performance objectives

Product specifications will have been listed during the "Definition" step of your design process. Example are:

- The robot should place items with an *accuracy* and *precision* of 10 mm.
- The color sorter should process items with a *rate* of 30 per minute and with an *accuracy* of 95%.

Such objectives can usually be assigned with well-defined mathematical meaning which allow for the objectives to be measured and statistically tested. The example objectives above can be restated as:

- The robot should place items with a *mean error* of < 10 mm and a *standard deviation* of < 10 mm.
- The color sorter should process items with a *Poisson mean* > 30 per minute and with a *binomial success probability* > 95%.

Note that in these mathematical definitions we have assumed well-known random processes, and bounds (upper or lower) have been given. Many objectives and statistical tests exist; some of them will be exemplified in this lecture.

Objectives of verification

The aim of verification is to demonstrate that the **functional** and **performance** requirements and imposed **constraints** are satisfied. Important objectives need to be identified:

Functional/feature requirements

Identify each feature and demonstrate that they are present in the product. This will require a written account of test runs.

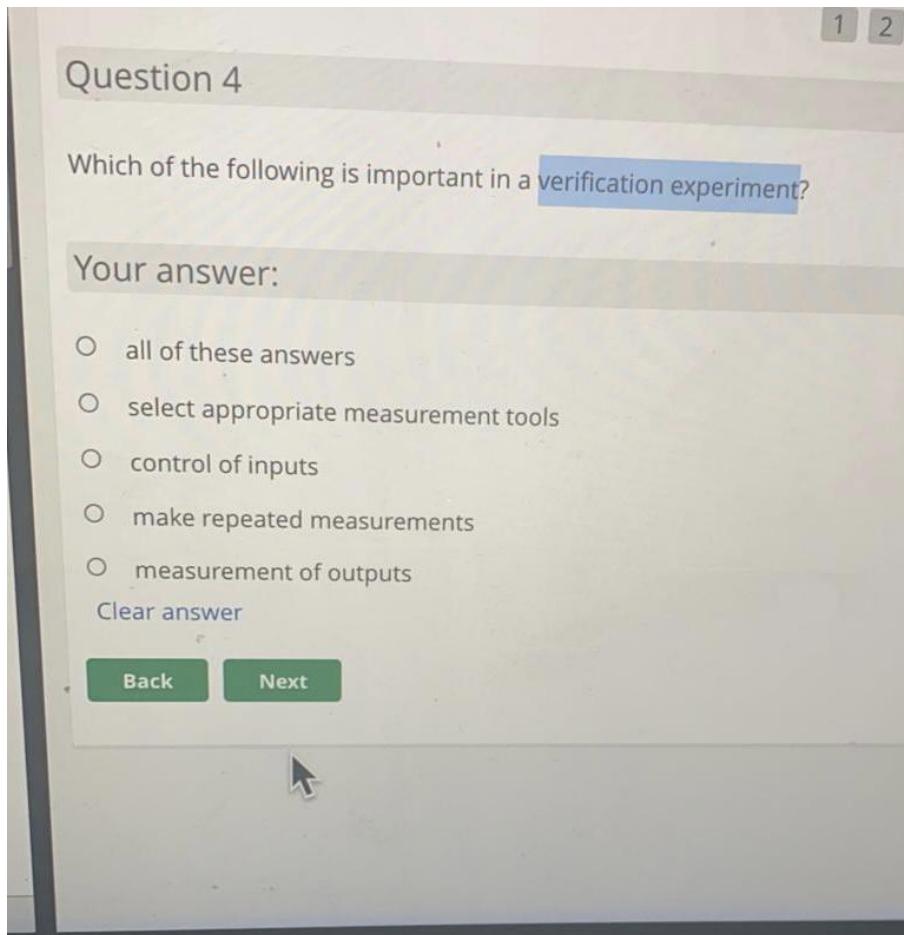
Performance

Identify each performance objective and design experiments for the collection and analysis of relevant data. *This will be the focus of this lecture.*

Constraints

Identify each constraint and demonstrate that they have been met. This would usually require a written discussion for each constraint, and a record of results from consultation with relevant experts and users, or even certificates from authorities.

- Question 5: Which of the following is important in a verification experiment?



Answer:

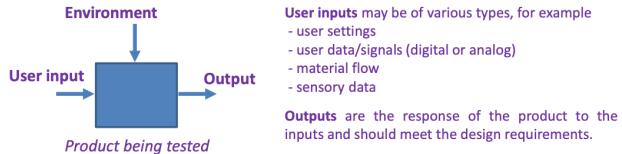
- Inputs, Outputs, Repetitions, Different Values
- Experimentation requires the selection of appropriate measurements tools, and careful control of the inputs, user inputs: user settings, user data/signals, material flow, sensory data

So the answer is: A

Reason:

Experimental design

Statistical tests require data which needs to be collected by performing appropriate experiments. Experimentation requires the selection of appropriate measurement tools, and careful control of the inputs.



Environmental inputs (where relevant) are any conditions that significantly affect the output of your product, for example this may be *ambient temperature, light, sound, vibration, moisture, electrical noise or bias* etc. The environment should be controlled and varied within the range of conditions that the product is expected to experience.

- Question 6: Which of the following is *not* related to statistical analysis?

Question 3

Which of the following is *not* related to statistical analysis?

Your answer:

- conform to the relevant engineering standards
- make repeated measurements
- calculate the mean and standard deviation of the data
- describe the data and results using tables and figures
- form a hypothesis test, build a confidence interval

Clear answer

Back **Next** **Mute** **Start**

Answer:

So the answer is: A

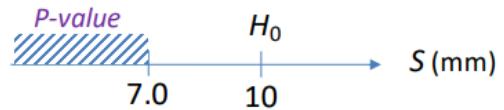
Reason:

Variability gives rise to **uncertainty** in the measured performance. To quantify variability in the system, the engineer needs to **perform repeated measurements (sampling)** under controlled operating conditions, and then perform **statistical analysis**. It is important to note that statistical uncertainty reduces with larger sample sizes; try to plan the experiment to maximise the amount of data that you can collect in the available time.

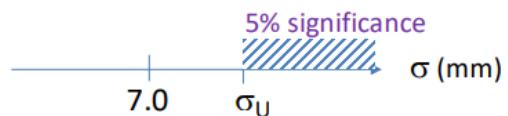
- will depend on the nature of the performance parameter and the type of requirement

Two alternative statistical approaches are commonly followed:

1. A **hypothesis test** to establish whether the measured (sample) standard deviation provides *significant evidence* to support $\sigma < 10 \text{ mm}$.



2. An upper-bound **confidence interval** for σ with 95% *confidence level*.



Statistical analysis

From this data, the sample standard deviation s can be obtained as follows:

$$s = \sqrt{\frac{1}{n(n-1)} \left[n \sum_{i=1}^n x_i^2 - \left(\sum_{i=1}^n x_i \right)^2 \right]}$$

$$\Rightarrow s = 7.0138 \text{ mm}$$

This is an estimate of σ
and is looking good.

- Question 7: Which of the following is *not* an example of an environmental input?

Which of the following is *not* an example of an environmental input?

Yanıtınız:

- ambient light
- ambient sound
- ambient temperature
- user data
- ambient vibration

Yanıtı temizle

Geri

Sonraki

Answer:

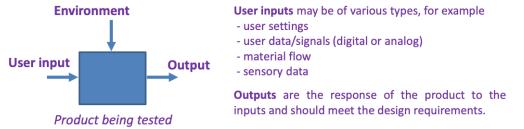
- example this may be ambient temperature, light, sound, vibration, moisture, electrical noise or bias etc.

So the answer is: D

Reason:

Experimental design

Statistical tests require data which needs to be collected by performing appropriate experiments. Experimentation requires the selection of appropriate measurement tools, and careful control of the inputs.



Environmental inputs (where relevant) are any conditions that significantly affect the output of your product, for example this may be *ambient temperature, light, sound, vibration, moisture, electrical noise or bias* etc. The environment should be controlled and varied within the range of conditions that the product is expected to experience.

- Question 8: Which of the following is *not* an example of a user input?

Which of the following is *not* an example of a user input?

Your answer:

- user data
- sensory signals
- material flow
- user settings
- ambient temperature

[Clear answer](#)

Answer:

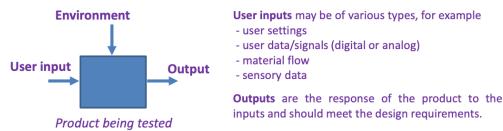
- user settings - user data/signals (digital or analog) - material flow - sensory data

So the answer is: E

Reason:

Experimental design

Statistical tests require data which needs to be collected by performing appropriate experiments. Experimentation requires the selection of appropriate measurement tools, and careful control of the inputs.



Environmental inputs (where relevant) are any conditions that significantly affect the output of your product, for example this may be *ambient temperature, light, sound, vibration, moisture, electrical noise or bias* etc. The environment should be controlled and varied within the range of conditions that the product is expected to experience.

- Question 9: Which of the following will reduce statistical uncertainty in a verification experiment?

Which of the following will reduce statistical uncertainty in a verification experiment?

Your answer:

- apply the appropriate standards
- increase the sample size
- use a high accuracy measurement tool
- calculate the mean and standard deviation of the data
- decrease the sample size

[Clear answer](#)

Answer:

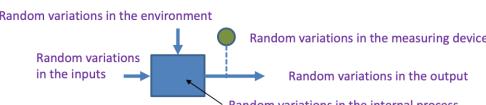
- It is important to note that statistical uncertainty reduces with larger sample sizes; try to plan the experiment to maximise the amount of data that you can collect in the available time.

So the answer is: B

Reason:

Statistical Analysis (accounting for variability)

Systems are complex and often exhibit significant variability. Output variability can be caused by random variations in inputs, environment, or within the product itself. Measurement instruments may also exhibit random variation.



Variability gives rise to **uncertainty** in the measured performance. To quantify variability in the system, the engineer needs to perform **repeated measurements** (sampling) under controlled operating conditions, and then perform **statistical analysis**. It is important to note that statistical uncertainty reduces with larger sample sizes; try to plan the experiment to maximise the amount of data that you can collect in the available time.

- Question 10: The mean of a collection of repeated measurements is a measure of

Question 6

The mean of a collection of repeated measurements is a measure of

Your answer:

- the standard unit
- the average value of the measurements
- the variability of the measurements
- the span of the measurements
- the tolerance of the measurements

Answer: (SAEED not sure)

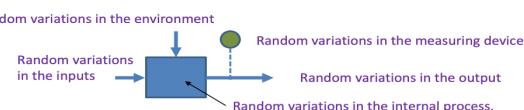
- Variability?
- Sampling?(Mostly this answer)

So the answer is: B

Reason:

Statistical Analysis (accounting for variability)

Systems are complex and often exhibit significant variability. Output variability can be caused by random variations in inputs, environment, or within the product itself. Measurement instruments may also exhibit random variation.



Variability gives rise to **uncertainty** in the measured performance. To quantify variability in the system, the engineer needs to perform **repeated measurements** (sampling) under controlled operating conditions, and then perform **statistical analysis**. It is important to note that statistical uncertainty reduces with larger sample sizes; try to plan the experiment to maximise the amount of data that you can collect in the available time.

- Question 11: With respect to verification, which of the following *best* describes the term "tolerance"?

With respect to verification, which of the following *best* describes the term "tolerance"?

Your answer:

- the smallest increment of measurement
- a measure of the average of a process
- the willingness to tolerate disagreeable opinions or behaviour
- a measure of variability of a process
- the range of acceptable values

[Clear answer](#)

Answer:

- the permissible limits of variation

So the answer is: E

Reason:

We often need to ask two main questions:

- What is the **range of performances** that we can expect from the product under normal working conditions, and does this satisfy any **tolerances** (the permissible limits of variation)?
- What is the **average performance** (expectation) of the product, and does this satisfy the requirements?

In answering these questions, the choice of experiment, and which statistical analysis to apply, will depend on the nature of the performance parameter and the type of requirement.

Some examples of statistical analysis will be given in this lecture.
Please visit this capstone course website for more statistical resources:

<https://capstone.eng.bau.edu.tr/resource-statistics.php>

- Question 12: The efficiency E of a process is determined to be in the interval $0.81 < E < 0.93$ with a 95% confidence. That is:

Answer:

Question 11

The efficiency E of a process is determined to be in the interval $0.81 < E < 0.93$ with a 95% confidence. That is:

Your answer:

- the true efficiency is 95% with an confidence between 0.81 and 0.93
- we are 95% confident that the mean efficiency is between 0.81 and 0.93
- we are highly confident that the mean efficiency is 95%
- the interval $0.81 < E < 0.93$ contains 95% efficiency
- the mean efficiency is between 0.81 and 0.93

Clear answer

Back Next

B? (chegg) (further confirmation pending) (also think B)

So the answer is: D??

Reason:

Topic 5 - Innovation

- Question 1: Innovation = ?

Innovation = ?

Your answer:

- Research + Commercialization
- Education + Research
- Invention + Commercialization
- Education + Invention
- Research + Invention

Clear answer

Answer:

- Innovation = Invention + Commercialization

So the answer is: C

Reason:

Overview

We have seen that the design process begins with the identification of a need for a product, service or process. We use the term "innovation" throughout the design process to describe the invention of new ways to solve the design problem. However, innovation is generally considered to be more than this: the product should also be *commercially successful* so that it makes an impact (brings economic, social or environmental value). This can be summarized as:

$$\text{Innovation} = \text{Invention} + \text{Commercialization}$$

In this lecture we will explore *innovation* at an introductory level including the related topics of *creativity*, *invention*, *entrepreneurship*, and finally *patents, trademarks and copyrights*.

Remember that these topics will be examined in the mid-term exam.

- Question 2: Which of the following is considered as an attribute of creative thinking?

Which of the following is considered as an attribute of creative thinking?

Your answer:

- flexibility
- uniqueness
- being judgemental
- rigidity
- smartness

Clear answer

Answer:

- Flexibility
- Originality
- Non-judgmental

So the answer is: A

Reason:

Creativity

Creativity is the ability to create; in terms of innovation it is especially the application of imagination and skills to create something new. The entrepreneur will consider creativity in terms of *ways of thinking which support commercial opportunities* for a product, service or process.

Attributes to creative thinking

- **Flexibility** – willing to look at an issue from many angles, not set in our ways.
- **Originality** – attempts to find non-typical responses to problems.
- **Non-judgmental** – not rejecting a potential solution without giving it appropriate consideration.

The ability to “think out of the box” is a key attribute of an entrepreneur.

- Question 3: Which of the following is *not* an attribute of creative thinking?

Which of the following is *not* an attribute of creative thinking?

Your answer:

- non-judgemental
- thinking "out of the box"
- flexibility
- rigidity
- originality

Clear answer

Answer:

- Flexibility
- Originality
- Non-judgmental

So the answer is: D

Reason:

Creativity

Creativity is the ability to create; in terms of innovation it is especially the application of imagination and skills to create something new. The entrepreneur will consider creativity in terms of *ways of thinking which support commercial opportunities* for a product, service or process.

Attributes to creative thinking

- **Flexibility** – willing to look at an issue from many angles, not set in our ways.
- **Originality** – attempts to find non-typical responses to problems.
- **Non-judgmental** – not rejecting a potential solution without giving it appropriate consideration.

The ability to “think out of the box” is a key attribute of an entrepreneur.

- Question 4: Which of the following is *not* one of the stages of the creative process?

Which of the following is *not* one of the stages of the creative process?

Your answer:

verification
 meditation
 illumination
 preparation
 incubation

[Clear answer](#)

Answer:

- Preparation
- Incubation
- Illumination
- Verification

So the answer is: B

Reason:

The creative process

Creative people don't just sit waiting for the "lightbulb moment", they approach a problem systematically.

The four stages of the creative process

Stage 1: **Preparation**

gather information about the problem and focus your mind on it.

Stage 2: **Incubation**

the conscious mind stop focusing on the problem to allow it to internalized into the unconscious and form connections between ideas.

Stage 3: **Illumination**

the conscious mind becomes aware of potential solutions.

Stage 4: **Verification**

the solution is developed, and consciously verified and applied.

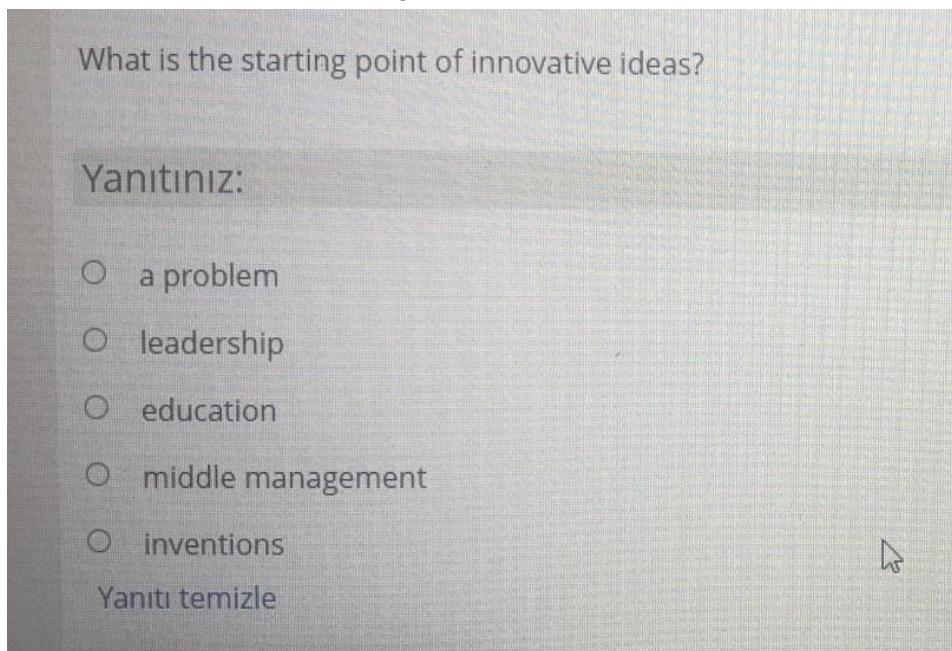
- Question 5: What is the starting point of innovative ideas?

What is the starting point of innovative ideas?

Yanıtınız:

- a problem
- leadership
- education
- middle management
- inventions

Yanıtı temizle



Answer:(SAEED not sure)

- We have seen that the design process begins with the identification of a need for a product, service or process OR
- It is the creativity of an entrepreneur that results in invention (creation of new knowledge) and innovation (application of knowledge) to create new products, services or processes.

So the answer is: A

Reason:

Innovation

Some definitions

"When an enterprise produces a good or service or uses a method or input that is new to it, it makes a technical change. The first company to make a given technical change is an innovator. Its action is innovation."

Schmookler, J. (1966) Invention and Economic Growth

"Innovation by definition must be successful in the market. The test of innovation, after all, lies not in its novelty, its scientific content, or its cleverness. It lies in its success in the marketplace."

Peter F. Drucker (1993) Innovation and Entrepreneurship

It is the creativity of an entrepreneur that results in invention (creation of new knowledge) and innovation (application of knowledge) to create new products, services or processes.

Overview

We have seen that the design process begins with the identification of a need for a product, service or process. We use the term "innovation" throughout the design process to describe the invention of new ways to solve the design problem. However, innovation is generally considered to be more than this: the product should also be *commercially successful* so that it makes an impact (brings economic, social or environmental value). This can be summarized as:

$$\text{Innovation} = \text{Invention} + \text{Commercialization}$$

In this lecture we will explore *innovation* at an introductory level including the related topics of *creativity*, *invention*, *entrepreneurship*, and finally *patents, trademarks and copyrights*.

Remember that these topics will be examined in the mid-term exam.

- Question 6: Which of the following is *not* one of the barriers of creativity?

Question 26

Which of the following is *not* one of the barriers of creativity?

Your answer:

- avoiding ambiguity
- blindly following the rules
- fearing looking foolish
- fearing mistakes and failure
- being able to take risks

[Clear answer](#)

Answer:

- The following can limit creativity and should be avoided.
 1. searching for the one 'right' answer
 2. focusing on being logical
 3. blindly following the rules
 4. constantly being practical
 5. viewing play as frivolous
 6. becoming overly specialised
 7. avoiding ambiguity
 8. fearing looking foolish

9. fearing mistakes and failure
10. believing that 'I'm not creative'.

So the answer is: E

Reason:

Barriers creativity

The following can limit creativity and should be avoided.

1. searching for the one 'right' answer
2. focusing on being logical
3. blindly following the rules
4. constantly being practical
5. viewing play as frivolous
6. becoming overly specialised
7. avoiding ambiguity
8. fearing looking foolish
9. fearing mistakes and failure
10. believing that 'I'm not creative'.

- Question 7: Which type of innovation involves improvements to existing products, processes or markets?

Which type of innovation involves improvements to existing products, processes or markets?

Yanıtınız:

- radical innovation
- product innovation
- sustaining innovation
- architectural innovation
- disruptive innovation

[Yaniti temizle](#)

Answer:

- **Sustaining innovations** are best thought of as improvements to existing products, processes or markets. Example: Desktop to Laptop computers

So the answer is: C

Reason:

Disruptive and Sustaining Innovations

Christensen (1997), identified two types of innovations: **disruptive innovations** and **sustaining innovations**.

Disruptive innovations create new markets. In such instances, individuals or business organizations take inventions and transform them into economic innovations. Existing market structure is changed.

Example: from "normal" phones to "smart phones"

Sustaining innovations are best thought of as improvements to existing products, processes or markets.

Example: Desktop to Laptop computers

- Question 8: Which type of innovation creates new markets?

Which type of innovation creates new markets?

Your answer:

- architectural innovation
- product innovation
- sustaining innovation
- radical innovation
- disruptive innovation

Answer:

- **Disruptive innovations** create new markets. In such instances, individuals or business organizations take inventions and transform them into economic innovations. Existing market structure is changed. Example: from "normal" phones to "smart phones"

So the answer is: E

Reason:

Disruptive and Sustaining Innovations

Christensen (1997), identified two types of innovations: **disruptive innovations** and **sustaining innovations**.

Disruptive innovations create new markets. In such instances, individuals or business organizations take inventions and transform them into economic innovations. Existing market structure is changed.

Example: from "normal" phones to "smart phones"

Sustaining innovations are best thought of as improvements to existing products, processes or markets.

Example: Desktop to Laptop computers

- Question 9: What types of works are protected by copyright?

Soru 24

What types of works are protected by copyright?

Yanıtınız:

- songs
- books
- plays
- all of these answers
- computer programs

Yanıtı temizle

Answer:

- The creative work may be in a literary, artistic, educational, or musical form.

So the answer is: D

Reason:

Patents, Trademarks, Copyrights and Trade Secrets

Patents, trademarks, copyrights and trade secrets protect intellectual property.

Patents protect new, useful, and non-obvious inventions (*ideas*).

An invention can be, for example, a product, service or process.

Trademarks protect source *identifications*, usually for brands, slogans, logos, or designs.

Copyright is the exclusive right given to the creator of a creative work to *reproduce* the work. The creative work may be in a literary, artistic, educational, or musical form.

Trade secrets protect valuable *secret information*, usually belonging to a business and unknown to others.

- Question 10: What type of intellectual property can be used to protect the Nike "swoosh" symbol?

What type of intellectual property can be used to protect the Nike "swoosh" symbol?

Yanitiniz:

- patent
- trademark
- trade secret
- label
- copyright

Yaniti temizle

Answer:

- Trademarks

So the answer is: B

Reason:

Trademarks and Service Marks

a word, phrase, symbol, design, or other indicator that is used to distinguish the source of goods from one party from goods of another (e.g., Nike "swoosh" symbol)

Rights to trademark are established in legitimate use of mark; do not require registration. However, marks must be registered before a suit can be brought over use of the mark. Registration can also be used to establish international rights over trademark.

Two treaties simplify registration of trademarks in multiple countries: the *Madrid Agreement Concerning the International Registration of Marks*, and the *Madrid Protocol*. Countries that adhere to either or both are in the *Madrid Union* (77 members).

- Question 11: If a company develops a new technology that improves its main product, what type of intellectual property can they use to stop others from copying their invention?

Soru 10

Yanıtınız:

- trade secret
- copyright
- label
- patent
- trademark

Yanıtı temizle

Geri Sonraki

Answer:

- Patents

So the answer is: D

Reason:

Patents

are rights granted by the government that excludes others from producing, using, or selling an invention. The patents must be useful, novel, and not be obvious.

Utility patents protect new and useful processes, machines, manufactured items or combination of materials.

Design patents protect original and ornamental designs for manufactured items.

Plant patents protect distinct new varieties of plants.

In 1998, many software algorithms became eligible for patent protection, previously covered only under copyright laws. This unleashed a flood of applications for software patents.

- Question 12: What type of intellectual property can be used to protect internal information that belongs to a business?

What type of intellectual property can be used to protect internal information that belongs to a business?

Yanıtınız:

- copyright
- patent
- trademark
- trade secret
- label

[Yanıtı temizle](#)



Answer:

- Trade Secret

So the answer is: D

Reason:

Trade Secret

information that belongs to a business that is generally unknown to others.

A firm can protect a proprietary product or process as a trade secret without disclosing detailed information that would be required in patent.

This enables a broad class of assets and activities to be protectable.

To qualify:

- Information must not be generally known or ascertainable.
- Information must offer a distinctive advantage to the firm that is contingent upon its secrecy.
- Trade secret holder must exercise reasonable measures to protect its secrecy.

