University of Toronto
Faculty of Applied Science and Engineering
APS112 & APS113 Engineering Strategies and Practice
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Question Booklet #1 – Multiple Choice Question Booklet

Midterm Examination
March 29, 2018
6:15 pm - 7:45 pm

Instructions:

- This is a 90-minute midterm with a total of 40 questions.
- It is multiple choice AND short answer.
- It is closed book and closed notes. No aids are permitted other than a translation-only paper dictionary.
- The questions are divided between two separate booklets.
    - Question Booklet #1 – Multiple Choice Question Booklet
    - Question Booklet #2 – Short-Answer Question Booklet
- Ensure you have both booklets and a multiple choice answer sheet (bubble scan sheet).
- At the end of the test hand in the short-answer question booklet and the multiple choice answer sheet. You do NOT have to hand in the multiple choice question booklet.

This booklet contains 37 multiple-choice questions, worth 1 mark each. Read each question thoroughly and provide the answer on the answer sheet (not in this booklet). Fill in your name and student number on the multiple-choice answer sheet. You do not have to fill in the class name, instructor or form code.

When providing answers on the answer sheet be sure to:

- use a pencil or pen (pencil is recommended in case you make errors)
- fill out the answer sheet (scan sheet) clearly with no overlaps
- erase any errors completely
- provide only the single, most correct answer for each question

There is no penalty for wrong answers. Select the answer that best satisfies the question.

You are not required to hand in this multiple-choice question booklet.

The short-answer questions are found in the Short-Answer Question Booklet.

1. Research shows that body language accounts for what percentage of the impact of an oral communication?
   a. Less than 10%
   b. More than 90%
   c. Less than 50%
   d. More than 50%

2. In meeting with the client, “open questions” are used to:
   a. Clarify and confirm information
   b. Get the client talking
   c. Help the client understand the difference between “want” and “need”
   d. Ensure the client feels the design team is polite and respectful

3. You demonstrate “Active listening” by:
   a. Asking questions to clarify what you don’t understand
   b. Arriving early for the meeting
   c. Avoiding eye contact
   d. Not taking notes, to show that you are memorizing what is said

4. What happens if you find out in the first meeting that a client has a predetermined solution in mind that students may not necessarily agree with?
   a. Walk out of the meeting immediately and report the incident to your Engineering Manager (EM).
   b. Proceed directly to working on the solution because that is what the client wants.
   c. Ignore what the client has said and proceed with the course requirements.
   d. Be polite but continue to explore the details of the problem rather than fixate on a solution.

5. What is the primary purpose of a Design Review Gateway **in Industry**?
   a. To gain confidence in your project from your EM, TA and peers.
   b. To get approval to proceed with your project.
   c. To carry out an oral presentation that is professional in tone and substance.
   d. To debrief the company on your final design.

6. What is the primary purpose of a Design Review Gateway in **this course**?
   a. To gain confidence in your project from your EM, TA and peers.
   b. To get approval to proceed with your project.
   c. To carry out an oral presentation that is professional in tone and substance.
   d. To debrief the client on your final design.

7. Regarding Technical Design and Project Management, which of the following are **TRUE**?
   a. Project management is totally independent of technical design
   b. Project management is linked to technical design as part of the costing of the project only
   c. Project management is linked to technical design only during the initial stages of the project
   d. The two are closely linked always

8. Tasks of a project: (select what is always **TRUE**)
   a. Should always be different than each other
   b. Should be able to be done without adding resources partway through
   c. Should be able to be done in under a day
   d. Should be able to be done in under a week

Case Study #1: The Wagon Project

Some friends get together to make a wagon (Figure 1). They used a project management software to figure out the timing and the sequencing of the operations. The chart in Figure 2 is what they got after the data was first entered. Questions 9, 10, and 11 relate to Figure 2.

Figure 1: Toy wagon. Source http://clipartxtras.com

	Task Name	Duration	Predecessor	Resource Names
1	Build side panels	2 hrs		Mary
2	Build bottom	2 hrs		Mary
3	Build end panels	1.5 hrs		Mary
4	Base paint side panels	1 hr	1	Fred
5	Decal on side panels	1.2 hrs	4FS+3 hrs	Lucy
6	Base paint on bottom & ends	1.5 hrs	2,3	Fred
7	Assemble bottom, ends, sides	2.5 hrs	4,6	Joe
8	Attach wheel assemblies	0.75 hrs	7	Aida
9	Attach handle	0.5 hrs	7	Aida
10	Done	0 hrs	8,9,7,5	

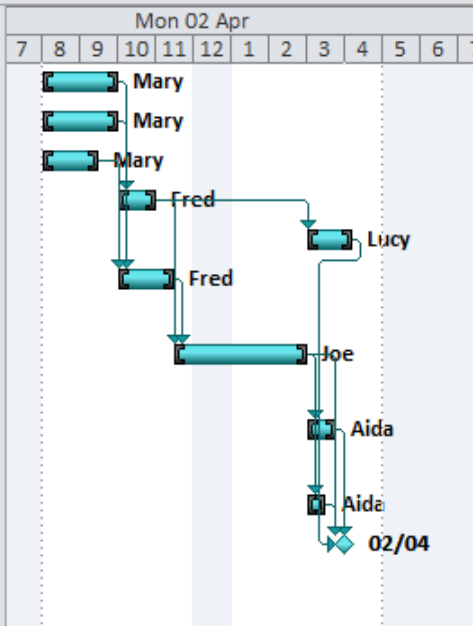


Figure 2: Timing and sequencing of the wagon project operations

9. There is a lag between task 4 and 5. Which of these statements is **TRUE** according to Figure 2?
   a. Task 5 had to be delayed because Lucy was unavailable.
   b. The lag is likely to let the paint dry
   c. Task 5 only had to end before the end of the project, so it was moved forward.
   d. Leveling would eliminate the lag

10. In Project Management terms, Mary in Figure 2, is:
   a. Overworked
   b. Overallocated
   c. The first worker
   d. Critical

11. Task 7 “Assemble bottom, ends, sides” delegated to Joe has a duration of 2.5 hours, but the chart in Figure 2 displays it running from 11 to 3. Why?
   a. Joe has a lunch break
   b. Joe is a slow worker
   c. There is allowance for Joe to work on other projects
   d. The project is not yet levelled

12. Pick the correct completion to this sentence: If a non-critical path has a slack of 2 days then …
   a. … no task is allowed to expand more than 2 days
   b. … each task can take no longer than 2 days without the project going overtime
   c. … there are two days that are not worked, for example a weekend that is not worked
   d. … a task on the path can go over its time estimate slightly without effecting the project duration

13. A Problem Statement should:
   a. Define the qualities of the solution without being solution dependent
   b. Identify what is missing from current solutions
   c. Clearly reiterate the client want from their point of view
   d. Include budgetary constraints

14. For a solar panel design for homes, “increase environmental sustainability” is a(n):
   a. Function of the design
   b. Result of the design
   c. Objective of the design
   d. Constraint of the design

15. In the Living Things section of Service Environment, you should include:
    a. Bacteria that might be present in the environment
    b. Necessity for the design to prevent rodents
    c. Most important stakeholders if they will be affected by the design
    d. Human-built elements of the environment.

16. The purpose of the Project Requirements is to define the problem in Engineering Terms. What would be one obstacle to objectivity?
    a. The feeling that there is one right answer, and someone knows what it is
    b. Too many sources of information with multiple conflicting points of view
    c. Trying to gain a complete understanding of new information
    d. Having to take the Second Law of Thermodynamics into account

17. In the CRAAP method to evaluate information, one of the “A’s” stands for Authority and the other for Accuracy. Authority in this case, refers to:
    a. How current or up-to-date the information is.
    b. The reliability, truthfulness and correctness of the information.
    c. The value of the credentials of the person or organization providing the information.
    d. Why the information was provided by the author.

18. Which is **NOT** a common error when starting to tackle a design problem?
    a. Failing to search thoroughly for the state of the art
    b. Not breaking the problem into subparts
    c. Jumping on the first idea that comes to mind
    d. Discussing the problem with your client

19. The reason to use formal creativity methods in the Idea Generation project phase is:
    a. To avoid design fixation.
    b. To reduce the number of infeasible designs.
    c. To increase the quality of designs.
    d. To avoid relying on benchmarking.

20. What is **NOT** a method to avoid personal bias in Idea Generation?
    a. Working with a diverse team
    b. Decomposition
    c. Critical thinking
    d. Weighted Decision Matrix

21. The statement, “Gasoline is not a bad thing, it is just not priced properly” is an expression of:
    a. Eco-fiscal policy
    b. Carbon tax
    c. Green-washing
    d. Environmental regulation

22. What is the factor that increases the sustainability of the environment?
    a. Limited population
    b. Non-renewable energy
    c. Long-lasting goods
    d. Regulations

23. The Brundtland Commission defined sustainability as:
    a. Highly efficient use of energy and resources
    b. Protecting the natural environment
    c. Meeting the needs of the present without compromising the ability of future generations to meet their own needs
    d. Ensuring that buildings are built in a way that allows adaptive use by future generations

24. Which of the following is an example of ecosystem services?
    a. Purification of water by wetlands
    b. Pollination of crops by bees
    c. Regulation of atmospheric composition by plankton and algae
    d. All of the above

25. One function of Visualization in engineering thinking:
    a. To help make the problem statement solution independent
    b. To ensure that you have a good idea of the client’s level of technical awareness
    c. To help clarify a problem in order to come up with a solution
    d. To make your client feel better about a solution they are uncomfortable with

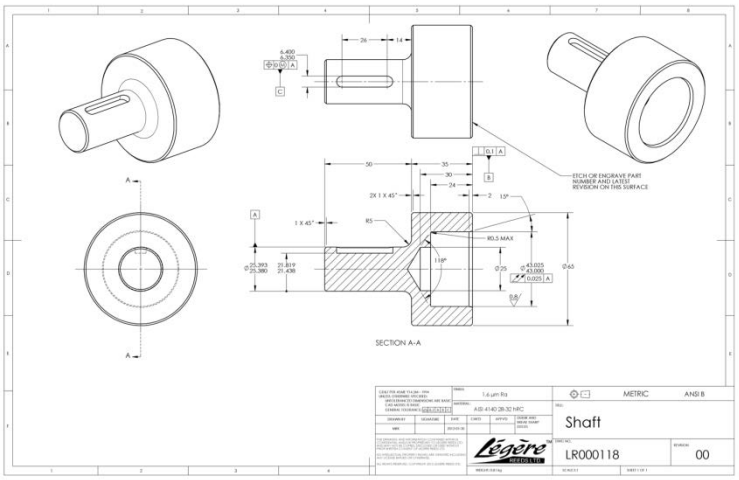


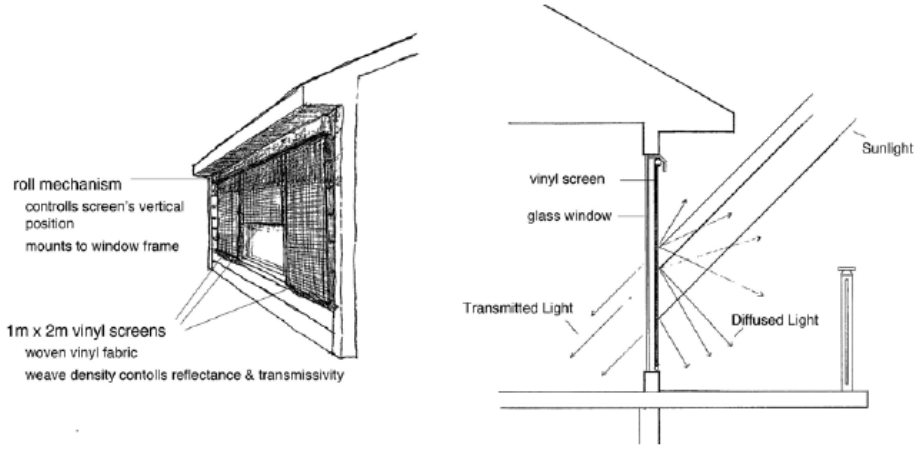
Figure 3: Engineering drawing of a shaft

Figure 4: Photograph of a bridge

26. The image in Figure 3 is:
    a. Decorative
    b. Illustrative
    c. Informative
    d. Indicative

27. The image in Figure 4 is:
    a. Decorative
    b. Illustrative
    c. Informative
    d. Indicative

Questions continued on next page



A. Graphical Representation of High Transparency Solar Shade
B. Window Cross Section: Interaction of Light with Vinyl Screen

Figure 5: Window diagrams

28. The images in Figure 5 are:
    a. Decorative
    b. Illustrative
    c. Informative
    d. Indicative

29. Which of the following is a component of estimating the mass of a car?
    a. Estimate mass of individual items and sum together
    b. Check against a reference at the other extreme, such as truck
    c. Modify estimate based on information you can look up with google
    d. All of the above

30. You are estimating how far a crow could fly without stopping. Of the following parameters that you could estimate, which is **LEAST** important for solving the estimation problem?
    a. Mass of a typical crow and percent fat
    b. The speed at which the crow flies
    c. Energy available in fat
    d. Typical diet of a crow

31. In the patent world, what does “prior art” refer to?
    a. A drawing of a working example of your invention.
    b. A painting by Michelangelo di Lodovico Buonarroti Simoni (Michelangelo) depicting the Venetian Senate, when it set up the first patent law in 1474, and articulated the concept of intellectual property and enshrined the importance of protecting inventors’ rights.
    c. Evidence in the public domain that your invention was already known.
    d. The first time you disclose your invention to the patent office.

32. Which of the following terms is **NOT** commonly associate with patenting?
    a. Claims
    b. Caveat emptor
    c. Inventive step
    d. Skilled in the art

33. A “data-centric” presentation is one that:
    a. Gives a great deal of detailed information (data) but not the context that makes the data meaningful;
    b. Shows concentric values of data in relation to various kinds of graphs and graphics
    c. Avoids giving too much technical information, decentralizing the impact so that it is better understood by the audience.
    d. Is organized from the perspective of the data, e.g. data centered, so that the audience can easily appreciate the expertise of the speaker.

34. What is the function of a “Main Point”?
    a. To ensure that you have provided the correct answer to the problem.
    b. To add formality and professionalism to your presentation.
    c. To synthesize the points you are presenting in a unique and memorable way.
    d. To avoid subjectivity and bias in presenting information that represents the team’s values.

Questions continued on next page

Case Study #2: Mobile Home Worker Fatality

A mobile home was being moved by workers who were using jacks to raise the structure. It was being raised high enough to allow the workers to slide steel beams under the undercarriage. The workers had raised the structure about nine inches when it began to shift and fell off the jacks. One worker was able to roll out from underneath but the structure came down on another worker, who was pinned before being able to get out of the way. The worker was taken to hospital and succumbed to the injuries the next day.

The soil on which the blocks supporting the jacks were placed was damp and soft, increasing the instability of the structure, and the jacks were lifted too high, which made the mobile home unstable on the jacks. The mobile home was not adequately braced to prevent movement that may affect its stability and cause it to shift and collapse.

Ontario Court Bulletin: http://bit.ly/MobileHomeWorker

35. The employer of the worker whose death is described in Case Study #2 was fined because:
    a. The accident was foreseeable.
    b. They did not do their Due Diligence.
    c. The accident was preventable.
    d. All of the above.

36. Section 31(1)(b) of the Construction Projects Regulation (Regulation 213/91) prescribes that every part of a project, including a temporary structure, shall be adequately braced to prevent any movement that may affect its stability or cause its failure or collapse. The employer failed in their duty to:
    a. Ensure the measures and procedures prescribed are carried out.
    b. Pay their employees adequately.
    c. Have sufficient number of supervisors.
    d. Fence off the area.

37. A team has designed a pizza box that keeps pizza warmer for longer using an embedded layer of styrofoam. They glue a layer of styrofoam between two squares of corrugated cardboard. They then place a heating element against one side, and a thermocouple against the other. The result of this action would be best used in which section of the CDS?
    a. Measures of Success
    b. Objectives
    c. Final Design
    d. Prototyping