**ЗАВДАННЯ ДЛЯ КОМПЛЕКСНОЇ КОНТРОЛЬНОЇ РОБОТИ**

1. **A team of researchers have written a project summary for a grant proposal to the National Science Foundation of the United States. Read the first sentence of each of the five paragraphs from the project summary (a–e). Then write down what you think the best order is: 1 2 3 4 5**

**a** Both teams for this project already have knowledge in various features of the problems described.

**b** However there are very few outcomes and the methods that were developed have broken down.

**c** The need for mathematical analysis of shell models is in response to a variety of technological demands, which call for more complex models.

**d** This project will focus on stabilization and optimal control, particularly with boundary controls, of systems concerning dynamical shells.

**e** We propose to carry out collaborative research between the French National Institute of Computer Science Research and the University of Ottawa in the general area of control theory for models illustrated by partial differential equations (PDEs).

**2. Check your answers to Exercise 1 by matching a sentence (a–e) to the correct paragraph (1–5) of the full project summary.**

**NSF Grant Proposal for Stabilization and Optimal Control of Dynamic Shell Models**

[1] \_\_\_\_\_\_ We intend to investigate problems related to stabilisation and optimal control of dynamic shell models where control actions and sensing are put into place via smart materials technology.

[2]\_\_\_\_\_\_ The principle model considered in this proposal is a three- dimensional structural acoustic interaction with curved walls, which is modeled by shell equations. This model occurs in the context of decreasing noise or pressure entering an acoustic chamber (e.g. airplane’s cabin) and generated by an exterior source.

[3]\_\_\_\_\_\_\_ Thus mathematical investigation related to control problems of shell equations is challenging from a mathematical point of view and calls for the introduction of new tools and new techniques for the analysis and computations connected to the problem.

[4]\_\_\_\_\_\_\_ Two approaches will be considered. First, piezoelectric shell’s modeling tracked by past researchers and a second centre on piezoelectric patches attached to the curved wall. These approaches will result in two different control models. Rigorous mathematical analysis of the problem, including comparative analysis, followed by numerical computations and experimental verification of the models will represent the essential part of the project.

[5]\_\_\_\_\_\_\_ Thus we wish to combine the teams’ expertise to generate results leading to progress in the field.

1. **Read the completed project summary. Then, decide if the following statements are true (T) or false (F).**

1 The summary includes information on what research will be done and who will do it.

 2 The summary does not mention any possible commercial applications of the research.

3 Members of the team have worked on projects in similar areas in the past.

1. **Match the beginnings and endings of the sentences to make polite questions.**

|  |  |
| --- | --- |
| 1 Can anyone tell me if  | **a** hydrogen bond can also act as an ionic bond. |
| 2 I’d like to know if  |  **b** there is a simple experiment to distinguish between NaOH and KOH? |
| 3 I’m trying to find out what  | **c** I can make a good quality ferrofluid? |
| 4 Could anyone tell me how  | **d** the best make of microscope is. |

**5. Make the questions a–d more polite. Begin with the word/phrase given**.

 a How do you find electronegativity of an element?

 Could\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 b What’s the best way to store agarose gels?

 I’m trying \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 c Where can I buy an inexpensive distillation set?

 I was wondering\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 d Is it true that no two fingerprints are the same?

 Does\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. **Match the beginnings and ends of the sentences.**

|  |  |
| --- | --- |
| 1 Am I right in thinking …  | **a** you said about sea sponges and making glass. |
| 2 I still don’t quite see how whales …  | **b** have been the inspiration for pacemakers. |
| 3 I’m afraid I didn’t understand what …  | **c** that we could mimic the beetle to make white paper even whiter? |
| 4 I’m not really clear on …  | **d** animal cells have inspired inflammable materials. |

1. **The following sentences all describe equipment used by scientists in their work. Match the beginnings (1–10) to the endings (a–j).**

|  |  |
| --- | --- |
| 1 Centrifuges are used …  |  **a** … a pipette was used. |
| 2 An electron microscope is used …  | **b**…to stop the experiment getting contaminated. |
| 3 Scientists sometimes use a fume cupboard …  | **c**…scientists often use an autoclave. |
| 4 You can separate a mixture of compounds… | **d** … that scientists use to culture cells.  |
| 5 Liquid nitrogen can be used… | **e** … several test tubes can be held at the same time. |
| 6 To sterilize equipment, … | **f** … in an attempt to produce magnified images of very small objects. |
| 7 A petri dish is a shallow glass or plastic dish | **g**  … for storing biological samples. |
| 8 In order to measure and transfer exactly 1.75ml of the solution, … | **h**… by using High Performance Liquid Chromatography (HPLC). |
| 9 One use of latex gloves is to protect the scientist; another use is … | **f**… to limit their exposure to hazardous chemicals and other airborne hazardous materials. |
| 10 By using a test tube rack, … | **j**… to separate materials of different specific gravities, or to separate solid particles suspended in a liquid. |

1. **Complete the gaps in the following sentences with one of the five forms of *use* or with the words *in* or *to*.**

 1 A micrometer can\_\_\_\_\_\_\_\_\_ to measure very small lengths and diameters.

 2 Generally,\_\_\_\_\_\_\_\_\_\_ order\_\_\_\_\_\_\_\_\_\_ produce high-voltage pulses from a low- voltage DC supply, an induction coil\_\_\_\_\_\_\_\_\_\_\_\_\_\_ .

 3 By\_\_\_\_\_\_\_\_\_\_\_\_ a magnetometer, the direction and strength of a magnetic field can be measured.

4 Physicists nowadays\_\_\_\_\_\_\_\_\_\_\_\_ particle accelerators\_\_\_\_\_\_\_\_\_\_\_\_ an attempt \_\_\_\_\_\_\_\_\_\_\_\_\_\_learn more about the nature of matter and energy.

5 In the second experiment, a Polymerase Chain Reaction (PCR) technique\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_ generate thousands of copies of the DNA sequence.

 6 Protecting the sample being viewed is one\_\_\_\_\_\_\_\_\_\_\_\_\_ of a coverslip.

1. **Vocabulary choice is very important to style. Below is a summary of another experimental procedure. For 1–10, underline the word or phrase which you think is in the most appropriate style for a formal scientific report**.

In order to **(1)** ***determine / find out*** the value of n from **(2)** ***just one / a single*** ***experiment****,* **(3*) you should / it is necessary*** to have a range of stress levels acting within a **(4)** ***one thing / single specimen***. **(5)** ***You can do this*** / ***This is achieved*** by making the sample into a coil. The stress **(6)** ***comes from / is provided by*** the weight of the coil itself, so that the upper part of the coil **(7)** ***experiences / gets*** more stress than the lower parts. The stress in a particular turn of the coil is **(8*) proportional to / changes at*** about the same speed as its number, N, where the turns are numbered beginning from the bottom turn and ending at the top. The shear stress τ in each turn **(9)** ***is totally different / varies from*** zero at the centre of the turn (axis of the coil) to a maximum value at the edge of the coil. The average local strain rate **(10)** ***is thus*** ***/ must*** ***be kind of*** related to the spacing between turns, s, and the time, t.

1. **The passive voice is also often used in formal scientific writing. Complete the sentences (1–10) by rewriting the verbs in the brackets in the passive voice and in the tense described.**

1 In this paper, a structure *is suggested* for the salt of deoxyribose nucleic acid (D.N.A.). (*suggest****, present simple)***

 2 Plant seeds\_\_\_\_\_\_\_\_\_ by wind and animals. (*disperse****, present simple***)

3 Research\_\_\_\_\_\_\_\_\_\_\_\_ to discredit this theory. ***(****carry out****, present perfect simple)***

4 This relationship\_\_\_\_\_\_\_\_\_\_ by Smith et al. ***(****investigate****, present perfect simple)***

5 The sodium hydroxide\_\_\_\_\_\_\_\_\_\_\_\_ in water. ***(****dissolve****, past simple)***

 6 The procedure\_\_\_\_\_\_\_\_\_\_ until there was certainty regarding the results. (*repeat*, ***past simple)***

 7 The problems encountered by the patients \_\_\_\_\_\_\_\_\_\_\_\_\_by the bacteria. (*cause,* ***past simple)***

 8 The solution\_\_\_\_\_\_\_\_\_\_ to 90°C for approximately 30 minutes and then allowed to cool. (*heat****, past simple)***

1. **Match the verbs (1–7) to their meanings (a-g).**

1 decant a put two or more things together so they can’t be separated

 2 identify b mix by moving in a circular pattern

3 isolate c discover or recognize what sth is

4 mix d stay after other things have gone or been taken away

5 remain e separate one thing from others

6 remove f take sth away

7 stir g to pour a liquid from one container into another

1. **Complete the guidelines for preparing visual data from a scientific journal, below, using the words in the box**.

***data figure grid leading notation parentheses plotted purpose space typos***

1 Make sure you use the right type of visual to represent your\_\_\_\_\_\_\_\_\_ .

2 Choose a title that clearly defines the\_\_\_\_\_\_\_\_\_\_\_\_ of the visual.

3 Units should be presented in\_\_\_\_\_\_\_\_\_\_\_\_\_ , for example ‘(3.5)’

4 Use scientific\_\_\_\_\_\_\_\_\_\_\_\_ such as ‘2.3 x 103’ for 2,300

5 Use\_\_\_\_\_\_\_\_ zeros on all decimals, for example ‘0.3’ or ‘0.55’ not ‘.3’ or ‘.55’

6 Maximize the space given to presentation of the data to avoid wasted white\_\_\_\_\_.

7 Include the\_\_\_\_\_\_\_\_\_\_\_ ’s identifying number, for example ‘Fig. 1.’

8 Scales or axes should not extend beyond the range of the data\_\_\_\_\_\_\_\_\_\_\_\_\_\_ .

9 Do not use\_\_\_\_\_\_\_\_\_\_ lines.

10 Always check your visual and caption for spelling and\_\_\_\_\_\_\_\_\_\_\_\_ , for example ‘atmosphere’(✓) not ‘atmopshere’ (✗)

1. **A team of researchers is preparing a paper on how different insects react to pathogen agents (that is, their reaction to disease or infection). Look at the graph below, which one member of the team has prepared, and then answer the following questions.** **Make a note of any corrections on the graph below.**

1 Do you think the graph is ready for publication?

2 What do you think the researcher still needs to do to improve the graph?

1. **The 2010 Nobel Prize for physics was awarded to two scientists, Andre Geim and Konstantin Novoselov, for research on graphene. Watch the short video and make notes on the following questions.**

1 What was Geim and Novoselov’s idea?

2 How is graphene different from graphite?

3 How did Geim and Novoselov make graphene?

4 Why is graphene’s structure exciting for physicists and chemists?

 b **Watch the video again. Number sentences a–d in the order you hear them on the video.**

A And then what they did is they found another surface and pushed the thing down and peeled off the sellotape and it stuck.

 B If we make a mark with a pencil, what we’re doing is we’re depositing little sheets, atomic sheets of, of carbon on the paper.

 C Well, what, what, uh, Andrei and Konstantin had was the crazy idea of making a transistor structure out of a single atomic sheet.

D What Kostia and Andrei did in Manchester, uh, was to look at electronic properties of graphene.

**15.** **Read the extract and answer the following questions from different scientists who are interested in publishing in one of the journals of the American Meteorological Society.**

1 I’ve just translated a paper which I published in a French-language online journal – can I submit my translation to an AMS journal?

 2 Will the paper be copyrighted to me when it’s published?

3 Five people worked on our paper, do we all need to sign the copyright form?

4 Our paper has been written by scientists working in Mexico, India and Switzerland – will it be OK if we signed the copyright form separately?

5 Our manuscript is very long – about 75 pages of single-spaced text – will that be OK?

6 Should I print off a copy of my paper and send it in the post?

 7 After I put double spaces between the lines of the text, our paper was 30 pages long. I’ve changed the font size from 12 points to 10 points so now it’s only 24 pages – that’s OK now, isn’t it?

 8 Some researchers in our team work for a University and others work for a private company – should we say we are from the University or from the company?

 9 Should I use the active or the passive when I write my abstract?

10 I’ve divided our paper into sections with headings – is there anything else I need to do?

 11 I’ve put three tables in the Appendix – that’s OK, isn’t it?

 12 OK I’ve put the references for our paper into the order they appear in the text – that’s OK, isn’t it?

**1 Introduction**

This document provides essential information required by authors to submit manuscripts to American Meteorological Society (AMS) journals. It is intended to serve as a quick reference for frequently needed information …

**2 Author disclosure and transfer of copyright**

When a manuscript is submitted, the author will be asked to confirm that the publication has not been previously published in any language, and whether it is under consideration for publication by another journal. The author must promptly inform the chief editor if it is submitted for publication elsewhere before its disposition by the journal. Each manuscript must be accompanied by a statement transferring copyright from the authors (or other holder of the copyright) to the American Meteorological Society. The appropriate form for the transfer of the copyright to AMS is available on the AMS Web site or upon request. The signed transfer of the copyright is required under U.S. Copyright Law (Title 17 USC, as revised by P.L. 94-553) in order for AMS to have valid rights to continue its wide dissemination of research results and other scientific information. Editorial action on a manuscript that is not accompanied by the completed copyright transfer form, signed by all authors, will be delayed until the form is received. Original, faxed, or scanned versions are acceptable for both peer review and the production process. All authors need to sign a copyright transfer form for the manuscript that is submitted, but it is acceptable for each author to provide a separate form with this or her signature rather than requiring a single form signed by all …

**3 Manuscript preparation**

 Manuscript length should be less than 7500 words (including appendixes but not references or figure captions) or about 26 double-spaced typed pages when submitted. All manuscripts must be submitted electronically … All copy (including tables, references, and list of figure captions) must be double spaced … and all pages must be numbered consecutively. The font used should be no smaller than 12 point and the line spacing should be no more than three lines per 2.5 cm, as measured from anywhere on the page.

**a *Components of a manuscript*** Each manuscript should include the following components, which should be presented in the order shown.

***b Title, name and affiliation of each author, dateline, any current or additional affiliations, and corresponding author address and e-mail.*** These items should appear on the first page by themselves, with the abstract beginning on page 2.

 ***c Abstract*.** A concise (c. 250 words) abstract is required at the beginning of each article. Authors should summarize their conclusions and methods in the abstract. First person construction should not be used in the abstract, and references should be omitted.

***d Text.*** The text should be divided into sections, each with a separate heading and numbered consecutively.

 ***e Appendix.*** Auxiliary analyses or tables whose details are subordinate to the main theme of the paper should normally appear in an appendix. Each appendix should have a title.

***f References***. References should be arranged alphabetically without numbering. The intext citation should consist of the author’s name and year of publication g Figure captions. Each figure must be provided with an adequate caption.

***h Illustrations and tables***. Each figure and table must be cited specifically in the text and in numerical order. The figure number should not be part of the illustration. All tables should have a double-spaced caption, and table text and headers also should be double spaced.

**16.Mark the following statements true (T) or false (F).**

1 Research papers must be written in a particular style in order to be published.

 2 The correct style of a research paper is the same for all journals.

 3 The correct style of a research paper depends on the field it is written for (e.g. astrophysics, genomics etc.), not the journal.

 4 The correct style of a research paper depends on the particular journal you are writing for.

**17. You are going to practise useful phrases for question-and-answer sessions following a talk or for during a poster presentation. In pairs, decide whether you think the following statements are true (T) or false (F) for you.**

1 University students and junior researchers should not ask questions to professors or more senior researchers in your field.

2 A speaker does not have to answer every question he/she is asked.

3 We usually use more informal language during the question-and-answer session of a poster presentation.

4 We usually use more informal language in the question-and-answer session following the presentation of research.

**18. Fill in the gaps and identify six different functions.**

**A** checking that you have answered the question

**B**  checking that you understood the question

**C** giving an opportunity to ask questions

**D** acknowledging a person’s question

**E**  showing that you are unable to answer a question

**F**  clarifying something you have said

**1 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

 If there are any questions, I would be \_\_\_\_\_\_\_\_ to\_\_\_\_\_\_\_\_\_\_\_\_ them.

 Hi!\_\_\_\_\_\_\_\_\_ you have any\_\_\_\_\_\_\_ for me?

 **2 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**\_\_\_\_** ‘s\_\_\_\_\_\_\_ interesting question.

 I’m\_\_\_\_\_\_\_\_\_\_ you asked me\_\_\_\_\_\_\_\_\_\_ .

**3** , \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_** you asking \_\_\_\_\_\_\_\_\_\_\_\_\_\_ what method we used?

 Sorry,\_\_\_\_\_\_\_\_\_\_\_\_ your question\_\_\_\_\_\_\_\_\_\_ the method we used?

**4 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

 Perhaps I should\_\_\_\_\_\_\_\_\_\_\_ that.

\_\_\_\_\_\_\_\_\_\_\_ another\_\_\_\_\_\_\_\_\_\_\_\_\_ , this means that we may have a real result.

**5 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

\_\_\_\_\_\_\_\_\_\_\_\_that answer\_\_\_\_\_\_\_\_\_\_\_\_\_ question?

 I\_\_\_\_\_\_\_\_\_\_\_ that answers\_\_\_\_\_\_\_\_\_\_\_ question.

 **6** **\_\_\_\_\_\_\_\_\_\_** , I’m not\_\_\_\_\_\_\_\_\_\_\_\_ best person\_\_\_\_\_\_ answer\_\_\_\_\_\_ .

I’\_\_\_\_\_\_\_\_ afraid\_\_\_\_\_\_\_\_\_\_\_\_ research didn’t look \_\_\_\_\_\_\_\_\_\_ that.

**Phrase and function cards**

Put another way, this means that we may have a real result.

If there are any questions, I would be pleased to answer them.

Hi! Did you have any questions for me?

I hope that answers your question.

Does that answer your question? Perhaps I should rephrase that.

Sorry, was your question about the method we used?

That’s an interesting question.

I’m glad you asked me that.

Sorry, are you asking about what method we used?

Sorry, I’m not the best person to answer that.

I’m afraid the research didn’t look into that.